

# POSTER PRESENTATIONS

*EuroNeuro 2014*

**P-1**

## Alleviating Stress Response to Tracheal Extubation in Neurosurgical Patients: A Comparative Study of Two Infusion Doses of Dexmedetomidine

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**Objective:** Various attempts have been made to blunt the pressor response by the use of drugs. We hypothesized that infusion of dexmedetomidine may produce stable haemodynamics during extubation as compared to bolus used in earlier studies.

**Methods:** Sixty adult patients undergoing intracranial surgeries were enrolled in this randomized controlled trial. Patients were randomized to 3 groups to receive infusions, Group Dexmedetomidine<sub>0.2</sub> - 0.2 µg/kg/hr, Group Dexmedetomidine<sub>0.4</sub> - 0.4 µg/kg/hr and Group P (Placebo) - 0.9 % normal saline. The heart rate (HR) and mean arterial pressure (MAP) were recorded. Complications, if any, were noted. We also graded cough during extubation and noted Aldrete score, Ramsay sedation scale and intraoperative awareness. Continuous variables were analysed using ANOVA and categorical variables were analysed using the Chi square test.

**Results:** Demographics were comparable between the three groups. There was reduction in HR and MAP just before extubation and up to 10 minutes post extubation in the D<sub>0.2</sub> and D<sub>0.4</sub> groups (p<0.001). Patients in D<sub>0.2</sub> group had faster emergence than those in D<sub>0.4</sub> group. Sixty five percent patients in placebo group had tachycardia and hypertension at emergence as compared to only 5% patients in the D<sub>0.4</sub> group (p<0.001). Eighty percent patients in D<sub>0.2</sub> and 100% patients in D<sub>0.4</sub> group had reduced cough (p<0.001). None reported awareness or any complication. Modified Aldrete scoring and Ramsay sedation scale were comparable in all groups.

**Conclusion:** Dexmedetomidine suppresses cough and attenuates hemodynamic responses to tracheal extubation without delaying emergence.

**P-2**

## Brain Natriuretic Peptide As a Predictor of Outcome Acute Brain Injury

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**Objective:** Currently, the most common way to predict the outcome of acute brain damage is to study the level of protein S-100 in the serum. This method lacks a precision as the concentration of protein S-100 is significantly increased with age,

with men more than the women, and there are no data on prognostically significant changes in the level of S-100 after removal of the tumor and cerebral hemorrhages. Endothelins, vasopressin, some cytokines, excess sodium or calcium in serum, activation of sympathoadrenal system, tachycardia are the stimulants of the brain natriuretic peptide production. Rise of the natriuretic peptide level in case of acute brain damage is a functionally adaptive in nature, based on vasodilation, diuretic action peptide, and its ability to reduce the activity of the sympathoadrenal system. Thus, we can suppose that the more severe the damage is, the higher is the stimulation of natriuretic peptide. The objective of this study is to investigate the level of brain natriuretic peptide (BNP) in patients with severe brain damage and to identify the dependence between the level of peptide and outcome.

**Methods:** The study included 78 patients, from 20 to 72 years, 40 men and 38 women. The 1st group (n=15) - acute TBI, 2 (n=27) - patients operated on for the brain tumor, 3 (n=36) - haemorrhagic stroke. We determined the level of brain natriuretic peptide on the 1-3 day, and then every 7 days 21 days.

**Results:** All patients with severe acute brain damage level BNP higher than normal (norm-0-125 PG/mL). Significant difference in values between the groups isn't revealed. When the level of brain natriuretic peptide more than 700 PG/mL, and/or the absence of its reduction to normal indicators dynamics was marked by an unfavorable outcome of the disease - severe disability (n=25) or death (n=18).

**Conclusion:** 1. In case of acute severe brain damage the level of BNP significantly increased. 2. Correlation between the level of BNP and etiology of acute brain damage was not observed. 3. When the level of BNP is above 700 PG/mL and/or the absence of its reduction to normal level then poor outcome of the disease - severe disability or death can be predicted.

**P-3**

## Some Characteristics of the Hormone Status of Patients in the Vegetative State

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**Objective:** In recent decades the improvement in the medical technologies is mirrored by the increasing number of patients with severe brain damage, coming out of the coma in a vegetative state. Thus the problems of treating such patients as well as the development of the techniques for restoring the normal brain function is coming to the forefront of the medical studies. In connection with this urgent problem of reference of these patients and the development of techniques for the removal of vegetative state (VS) patients. The objective is to study the hormonal status of the patients in VS.

**Methods:** We studied 60 patients (25 female and 35 male) aged between 18 and 60 receiving treatment in the Russian Polenov's Neurosurgical Institute from 2007 to 2012. Brain trauma was the cause of VS for 32 patients, 24 had a hypoxia of various origin, and 4 had intracranial hemorrhage. We monitored the levels of TSH, FT4, FT3, GH, prolactin, LH, FSH; ACTH and cortisol (in the morning and in the evening) at the admission and the release of the patients. For women of the fertile age (8 persons) every week during 1 month we estimated the level of LH, FSH, estradiol and prolactin. Two groups of patients were identified: group 1 where the patients recovered the conscience or minimally conscious state (17 persons) and group 2 comprising the patients who remained in VS (n=43).

**Results:** TSH and FT4 levels were normal for both groups. We observed the syndrome of "low T3" in 4 cases in the 2<sup>nd</sup> group. Prolactin level was increased in 25% of the patients of the 2<sup>nd</sup> group in 9% for 1<sup>st</sup> one. ACTH and cortisol levels in the morning sample were elevated in 2 patients of the 1<sup>st</sup> group and in 4 of the 2<sup>nd</sup> group, and in the evening sample in 11 of the 1<sup>st</sup> group and 39 of the 2<sup>nd</sup> one. LH and FSH levels were normal or normal-low. All women of the fertile age have developed amenorrhea. Weekly monitoring of LH and FSH levels showed their monotony.

**Conclusion:** 1. Most of the patients in VS have neuroendocrine abnormalities. 2. The most frequently hyperprolactinemia and hypercorticism with the abnormal rhythm of the ACTH and cortisol secretion are observed. 3. In women of fertile age in VS we observed amenorrhea and, monotony of rhythm secretion of LH and FSH.

## P-4

### The Effect of Rotem-Guided Hemostatic Therapy in Major Spine Surgery

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**Objective:** Spine surgery for acquired adult deformity is associated with significant blood loss. ROTEM is a visco-elastometric method for hemostasis testing.<sup>1</sup> By using this dynamic hemostatic test, abnormalities of the different coagulation pathway can be identified and treated with factor-specific therapy. The primary aim of this study was to investigate how ROTEM use changes blood product utilization in adult spine surgery

**Methods:** After IRB approval, we identified subjects who had undergone spine surgery with ROTEM-guided therapy. The ROTEM-guided subjects were matched 1:1 or 1:2 on Surgery Invasiveness Index (SII) with historical cohorts who had surgery without ROTEM. Number of spine levels operated,

Tablo 1.

	ROTEM Mean	Control Mean	ROTEM Median	Control Median	Median Difference	p value
RBC (unit)	2.2	3.0	2	3	-0.75	0.03
Cell-saver (mL)	684	672	520	555	-38	.72
Blood loss (mL)	2027	2053	2000	1600	-300	0.62
Crystalloid (mL)	3100	4884	3000	4400	-1550	<0.0001
Colloid (mL)	1117	954	1000	1000	125	0.17

total blood loss and cell saver volume, units of packed red blood cells, fresh frozen plasma, cryoprecipitate, platelets, and colloid/crystalloid volume was collected. Data were analyzed by rank permutation test, adapted for the 2:1 control to ROTEM matching structure.  $p < 0.05$  was considered significant

**Results:** Fifty-one ROTEM subjects were matched with ninety controls. Groups were well matched by the SII (R:  $7.4 \pm 3$  vs. C:  $7.2 \pm 3$ ). Mean and median values for blood loss, cell saver volume, crystalloid, colloid, blood and blood-derived products between the ROTEM and control group are listed in Table 1. Significantly less packed red blood cells were administered in the ROTEM group (R: 2 vs. C: 3,  $p < 0.03$ ). Fresh frozen plasma use was reduced 20%; cryoprecipitate use was increased 37%. Platelet use was the same between both groups. With the exception of a slight increase in INR on POD 2 (R: 1.3 vs. C 1.2  $p < 0.005$ ), which normalized by POD 3, there was no difference in the postoperative coagulation profile. No differences were observed in postoperative transfusion requirements or drain outputs between the two groups

**Conclusion:** Rotational thromboelastometry facilitates the identification and treatment of specific hemostatic abnormalities resulting in less crystalloid, packed red blood cells and fresh frozen plasma utilization

## P-5

### To Evaluate the Effects of Dexmedetomidine On Intraocular Pressure and Hemodynamic Changes, in Response to Laryngoscopy and Tracheal Intubation

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**Objective:** Brain relaxation is one of the most important prerequisites for neurosurgeries. The other points of concern are the need of stable hemodynamics with less fluctuation in intracranial pressure (ICP) and speedy recovery from anesthesia. Tracheal intubation is one of the major stressful

stimuli inside an operation theatre that can elicit a marked pressor response. Various drugs have been used to attenuate these reflexes and reduce hemodynamic changes. Alpha 2 - agonists have neuroprotective, cardioprotective, and sedative effects. These unique characteristics make them potentially useful during neuroanesthesia. Recent studies have shown that Dexmedetomidine is able to decrease circulating plasma norepinephrine and epinephrine concentration in approximately 50%, decreases brain blood flow by directly acting on post-synaptic  $\alpha$  2 receptors, decreases cerebrospinal fluid pressure without ischemic suffering and effectively decreases brain metabolism and intracranial pressure and also able to decrease injury caused by focal ischemia.

**Methods:** A prospective randomized study was conducted on 50 patients (ASA grade 1, 2) scheduled for intracranial tumor surgeries, were divided into the study or control group (25 each).

Both groups received Fentanyl (2  $\mu$ g/kg). The study group received Dexmedetomidine 0.8  $\mu$ g/kg in 20 ml saline over 10 mins and controls received 20 ml normal saline. Anaesthesia was induced with propofol (BIS values targeted between (40 to 60), followed by vecuronium 0.1 mg/kg. Hemodynamic measurements were recorded 2 min before test drug and placebo, 2 min before and 1 min after induction and just after and 1 min, 3min, 5mins and 10 mins of intubation. A change in intraocular pressure (IOP) with the help of Schiotz tonometer was also noted during this period. The groups were compared for change in heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure, IOP and propofol requirement for induction. Complications, if any were noted. Appropriate statistical analysis was done.

**Results:** Groups were well matched for their demographic data and preoperative vitals. Heart rate and mean arterial blood pressure decreased significantly in patients Dexmedetomidine group compared to control group.

Haemodynamic stability was observed before induction, and at 1, 3, 5 and 10 minutes after induction in Dexmedetomidine. In group C, there was highly significant ( $p=0.0000$ ) rise in the mean heart rate values from the mean baseline value of 84.9 bpm by 25.2 bpm (29.7%) after intubation and persisted till 10 mins (increase of 12.5 bpm from baseline, 14.7%,  $p=0.0125$ ). In group D mean baseline heart rate was 84.6 bpm and an decrease of 4.28 bpm (5.06%) from baseline ( $p=0.0772$ , not significant) after intubation and of 3.28 bpm (3.88%) at 10 mins ( $p=0.1048$ ). The change in HR between groups were highly significant after intubation ( $p=0.0000$ ) and persisted till 10 mins ( $p=0.0012$ ). In group C the basal mean mean arterial pressure was 97.5 mmHg. Just after intubation statistically highly significant ( $p=0.0000$ ) increase of 30.5 mmHg (31.3%) from basal value was observed. The rise was significant till 10 mins (mean MAP 102.5,  $p=0.0379$ ). In group D (Dexmedetomidine) the basal mean mean arterial pressure was 98.6 mmHg. At intubation the mean MAP representing a fall of 1.8 mmHg (1.9%) from the basal value

( $p=0.47$ , not significant). The MAP continued to be below the basal value even after 10 mins of intubation. The decrease in MAP at 10 min after intubation compared to basal value was 9.84 mmHg and was statistically highly significant ( $p=0.0000$ ). The change in MAP between groups were also highly significant after intubation ( $p=0.0000$ ) and persisted till 10 mins ( $p=0.0001$ ). The total propofol requirement for induction was more in patients of control group than in Dexmedetomidine group (128.6  $\pm$  15.5 mg Vs 91.8  $\pm$  20.41 mg; 29% lesser in group D). The intraocular pressure in right eye and left eye decreases significantly from pre-induction value of 21.97  $\pm$  4.75 mmHg and 22.08  $\pm$  4.94 mmHg to 18.02  $\pm$  4.30 mmHg at intubation ( $p=0.0000$ ) and 17.78  $\pm$  4.15 mmHg ( $p=0.0000$ ) 1 min after intubation in both the eyes in Dexmedetomidine group after the test drug. In the control group, IOP rises significantly in both eyes and its values at preinduction, intubation and 1 min after intubation are 20.96  $\pm$  3.80 mmHg, 26.55  $\pm$  4.08 mmHg ( $p=0.0000$ ) and 25.99  $\pm$  3.78 mmHg ( $p=0.0000$ ) in right eye and 21.05  $\pm$  3.72 mmHg, 26.38  $\pm$  4.14 mmHg ( $p=0.0000$ ) and 25.90  $\pm$  3.75 mmHg ( $p=0.0000$ ) in left eye respectively, and the difference was statistically significant between the groups before induction, just after intubation 1 min after intubation till 10 mins ( $p=0.0461$ , 0.0077, 0.0000 & 0.0000 respectively) The rate of bradycardia and hypotension was higher in Dexmedetomidine group.

**Conclusion:** Dexmedetomidine is an excellent drug when used as an adjunct to general anaesthesia for attenuation of pressor response. It not only decreased the magnitude of stress response to intubation but also decreased the intraocular pressure and induction dose requirement of propofol.

## P-6

### Comparison Between Sevoflurane and Desflurane on Emergence and Recovery Characteristics of Children Undergoing Surgery for Spinal Dysraphism

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**Objective:** Rapid recovery is desirable after neurosurgery as it enables early postoperative neurological evaluation and prompt management of complications. To date no study has compared recovery characteristics in paediatric neurosurgical patients. Hence, we carried out this study to compare the effect of sevoflurane and desflurane anaesthesia on emergence and extubation in children undergoing surgery for spinal dysraphism.

**Methods:** Sixty children, aged 1-12y, undergoing elective surgery for lumbo-sacral spinal dysraphism were enrolled for this study. Anaesthesia was induced using sevoflurane with

face mask. Then, the children were randomised to receive maintenance of anaesthesia with either sevoflurane or desflurane along with a mixture of O<sub>2</sub> and N<sub>2</sub>O, fentanyl (1 µg/kg/hr), and rocuronium. The anaesthetic depth was guided by BIS (Target 45-55). Perioperative data pertaining to demographic profile, haemodynamics, emergence and extubation times, modified Aldrete score, pain (Objective Pain Score), agitation (Cole's Agitation Score), time to first analgesic, and complications thereof were recorded. The statistical analysis was done using Stata 11.2 and data were presented as median(range) or mean±SD.

**Results:** The demographic profile, haemodynamics, modified Aldrete score, pain and agitation scores, and time to first analgesic were comparable in between the two groups ( $p>0.05$ ). The emergence time was significantly less in desflurane group [2.75(0.85-12) min] as compared to sevoflurane [8(2.5-14) min] ( $p<0.001$ ). The extubation time was also significantly less in desflurane group [3(0.8-10) min] as compared to the sevoflurane group [5.5(1.2-14) min] ( $p=0.0003$ ).

**Conclusion:** Desflurane provided earlier tracheal extubation and emergence as compared to sevoflurane in children undergoing surgery for lumbo-sacral spinal dysraphism.

## P-7

### A Prospective Study of A Modified Who Checklist in the Neurosurgical Operating Room

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**Objective:** Recent studies in cardiac and general surgery have demonstrated that individually both the implementation of a WHO pre-operative checklist and the presence of dedicated OR teams reduces complications, patient morbidity and mortality, and health care expenditures. We prospectively examined the effects of implementation of a modified WHO checklist and development of a designated neuroanaesthesia team on defined operating room metrics in an academic neurosurgical practice.

**Methods:** Prior to any intervention, we collected prospective data on OR times, proper antibiotic administration, attitudes about safety, and 30-day outcomes. During implementation of the checklist and of the neuroanaesthesia team, the same data was collected and compared to pre-implementation data. Post-hoc analysis examined results in relation to compliance with the changes.

**Results:** Proper antibiotic administration improved from 70 to 91%. OR times and safety attitude scores however remained unchanged. A post-hoc analysis of compliance revealed that the presence of a core neuroanaesthesia provider

in 76% of cases correlated with significantly shorter surgical times and total OR times ( $p=0.047$ ,  $p=0.05$  respectively). The greatest improvement in total minutes in the OR was seen in cases where both the checklist was used and a neuroanaesthesia provider was present ( $p=0.02$ ).

**Conclusion:** We provide objective prospective evidence that the presence of designated neuroanaesthesia providers and the use of the checklist improves proper antibiotic administration and correlates with shorter OR times. Enhancing compliance is essential to real-world effectiveness

## P-8

### Anaesthetic Management for Awake Craniotomy: An Institutional Experience

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**Objective:** The anaesthetic challenge of awake craniotomy is to maintain adequate sedation, analgesia, respiratory and haemodynamic stability in an awake patient who should be able to co-operate for neurological assessment. In our Institute, different anaesthetic techniques have been practiced for this procedure. The objective of this study was to analyse the overall experience with these techniques.

**Method:** Medical records of 54 patients who underwent awake craniotomy for intracranial lesions over a period of 10 years were reviewed, retrospectively. Data pertaining to anaesthetic management, intraoperative complications and postoperative course were recorded.

**Results:** Propofol (81.5%) and dexmedetomidine (18.5%) were the main agents used for providing 'conscious sedation' to facilitate awake craniotomy. Hypertension (16.7%) was the most commonly encountered complication during intraoperative period, followed by seizures (9.3%), desaturation and hypoxaemia (7.4%), tight brain (7.4%), and shivering (5.6%). The procedure was converted to general anaesthesia in one patient owing to tight brain. The incidence of intraoperative seizure was less in patients who received propofol ( $p=0.03$ ) as compared to those who received dexmedetomidine. In postoperative period, 20% of patients developed new-onset motor deficit. The mean ICU stay and hospital stay was  $2.8\pm 1.9$  days (1-14 days) and  $7.0\pm 5.0$  days (3-30 days), respectively.

**Conclusion:** 'Conscious sedation' was the technique of choice for awake craniotomy, at our Institute. Propofol, and dexmedetomidine with or without fentanyl were the main agents used for this purpose. Patients receiving propofol had less incidence of intraoperative seizure. Appropriate selection of patients, understanding the procedure of surgery, and judicious use of sedatives or anaesthetic agents are key to success for awake craniotomy.

## P-9

## Anesthetic Management of an Acromegalic Patient with Mc-Cune Albright Syndrome for Endoscopic Transsphenoidal Adenoma Removal

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Mc-Cune Albright syndrome (MAS) is a genetic disease characterized by fibrous dysplasia of bone, *cafe au lait* skin spots and precocious puberty. Patients with this syndrome usually require general anesthesia for repair of bone lesion related fractures, but may also require surgery for treatment of endocrine disorders. We describe perioperative management of a 15-year female patient with MAS who underwent transsphenoidal-resection of pituitary adenoma. She had *cafe au lait* macules on knee and hip; bone swellings over maxilla and skull base causing right eye proptosis. She also had acromegalic appearance with increased size of feet and hands, broad nose, wide jaw and macroglossia. Airway examination revealed Mallampati grade II and Upper Lip Bite test of class II. All these predicted difficult mask application -ventilation and endotracheal intubation. General anesthesia was induced with propofol 2 mg/kg, remifentanyl 0.25 µg/kg and tracheal intubation was facilitated by vecuronium 0.1 mg/kg. Mask ventilation was slightly difficult as predicted, but laryngoscopy showed Cormack-Lehane grade I view. Anesthesia was maintained with sevoflurane, air, oxygen and remifentanyl infusion. Anesthetic and surgical course were uneventful. After tracheal extubation, the patient was sent to the neurosurgical intensive care unit. Acromegaly is a rare form of endocrinopathy associated with MAS and usually requires surgery for growth hormone secreting adenomas. Fibrous dysplasia of the skull base and increased vasculature of the osseous structures surrounding the pituitary can prolong surgery and increase blood loss. Enlargement of maxilla and mandible with fibrous dysplasia and eye proptosis can make mask ventilation difficult. Macroglossia, prognathism, hypertrophy of laryngeal and pharyngeal soft tissues seen in acromegalic patients also increase the incidence of difficult intubation. Identification and management of associated endocrine abnormalities such as hyperthyroidism, Cushing disease are another anesthetic concern and full endocrine studies should be performed under the care of an endocrinologist. Bone fragility requires careful patient positioning. As a conclusion, possible intubation difficulty, various endocrine abnormalities and difficulty in patient positioning require a careful preoperative preparation. The most suitable induction method and intubation devices should be

chosen and several intubation devices should be ready in the operation room.

## P-10

## Paediatric Neurosurgery and Anaesthesia

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**Objective:** Pediatric neurosurgical operations differ from adults due to patient's physical status, type and time of surgery, position problems, follow-up methods, type of anesthesia, perioperative respiratory, cardiovascular, gastrointestinal problems.

**Methods:** 52 pediatric patients who underwent elective surgery between 2010-2013 were evaluated retrospectively with respect to age, gender, type of operation, position, anesthesia, perioperative and postoperative complications and perioperative analgesia and results.

**Results:** A total of 52 patients aged from 20 days to 17 days underwent cranial surgery. Perioperative ECG, invasive arterial blood pressure (mean arterial pressure), peripheral oxygen saturation, CVP, end-tidal CO<sub>2</sub> monitoring was provided and follow-up was performed by arterial blood gas analysis. 30.7% (16) of cases were patients who underwent ventriculoperitoneal shunting due to hydrocephalus. 3 of these patients underwent endoscopic third ventriculostomy. According to the localization of tumor, 14 patients (26.9%) underwent tumor surgery with Mayfield-Holder in prone or supine position. Epidural hematoma was developed in 1 patient due to Mayfield-Holder and the patient was operated. Inhalation agent sevoflurane (1MAC) was used in patients under 2 years of age and intravenous agents (propofol, thiopental) were used in patients older than 2 years for anaesthesia induction. Analgesia was maintained with bolus dose fentanyl, neuromuscular blockage was maintained with cisatracurium and rocuronium bromide and TIVA or inhalation agents were used for maintenance according to patients' status. Fluid replacement was done after preoperative and perioperative fluid losses had been calculated. Intraoperative homologous blood transfusion was performed in 2 cases, no side effects were observed. No postoperative fever, tachycardia, nausea and vomiting were observed. Postoperative analgesia was organized with tramadol according to the needs of patients.

**Conclusion:** Predicted problems in pediatric cranial surgery can be minimized with appropriate surgical procedures and equipment together with appropriate anesthesia and analgesia techniques by taking into consideration the patient's age, existing disease and comorbid conditions.

## P-11

## Effect of Dexmedetomidine on Postoperative Recovery in Patients Undergoing Cervical Spine Surgery

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**Objective:** The present study was planned to evaluate the effect of Dexmedetomidine as an intraoperative anaesthetic adjuvant and its effect on post-operative extubation and recovery profile in patients undergoing anterior cervical spine surgeries. Primary objective was to assess post-operative recovery profile. Secondary objectives were to assess postoperative pain, time for need of 1st analgesic and to observe the perioperative hemodynamics.

**Methods:** 35 ASA I-II Adult patients (age 18-60 yrs) were randomized in this placebo controlled, double blind study. In the Dexmed Group, Dexmedetomidine was started at 0.2 µg/kg/hr after a loading dose of 1 µg/kg before induction and switched-off at last skin stitch. Perioperative hemodynamics, intraoperative fentanyl and sevoflurane consumption, and postoperative recovery profile were observed by blinded observer. Postoperative pain and discharge readiness from postanesthesia care unit was evaluated using VRS score and modified Aldrete score, respectively.

**Results:** 17 patients in placebo and 18 in dexmedetomidine group were enrolled. Time to emergence, extubation and to achieve modified Aldrete score  $\geq 9$  was earlier in Dexmed group (mean 7.8 min; 9.8 min; 4.5 min) compared to Placebo group (10.5 min; 13.2 min; 13.7 min) ( $p=0.01$ ).

Pain score at extubation was lower (2.8 vs. 26.2) and time for 1<sup>st</sup> analgesic longer (46.6 min vs. 18.7 min) in Dexmed group compared to placebo. Hemodynamics were better controlled with Dexmedetomidine. Extubation quality score was also skewed towards lesser incidence and severity of coughing in Dexmed group ( $p=0.032$ ).

**Conclusion:** Intraoperative use of dexmedetomidine at lowest recommended dosage in adults undergoing anterior cervical spine surgery results in a favorable recovery profile with reduced emergence/ extubation time and postoperative pain, without adverse perioperative hemodynamic effects.

## P-12

## Prognosis in the Cases with Postresuscitation: A Case Presentation

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**Introduction:** Two major events that affect neurological systems during cardiopulmonary resuscitation (CPR) are global cerebral ischemia and hypoxia. They are commonly comorbid

(1). This study has aimed to compare the prognoses in the intensive care unit (ICU) of the two postresuscitation encephalopathy (PRE) cases who responded to resuscitation performed after cardiac arrest that developed due to various etiologies using *Glasgow-Pittsburgh cerebral performance categories* (GP-CPC).

**Case Presentation: Case 1:** The 27-year-old male patient without any known disease was found unconscious in his vehicle and performed CPR detecting cardiac arrest. He responded to CPR which lasted for 40 minutes and was admitted to the ICU of our hospital. He was tracheotomized and in spontaneous respiratory state in room air with CPC 4 neurological level and was receiving home care service in the 220<sup>th</sup> day of followup process.

**Case 2:** The patient with hypertension and Type II Diabetes Mellitus had undergone coronary artery by-pass grafting operation one year ago. The 60-year old female patient had cardiac arrest in the 7<sup>th</sup> service hour after knee arthroplasty by combined spinal-epidural anaesthesia. She was admitted to the ICU after she responded to emergency CPR. The tracheotomized patient with CPC 4 neurological level was breathing in SIMV-VC mode however she became exitus due to heart failure in the 215<sup>th</sup> admission day.

**Conclusion:** We conclude that resuscitation performed by an experienced health care professional team for a long period, his young age and absence of any comorbid disease as well as development of cardiac arrest after myocarditis contributed to survival. However, we consider that cerebral hypoxia developed due to prolonged resuscitation and inability to provide sufficient cerebral oxygenation.

On the other side, we experienced clinical picture of an old patient with a medical history of cardiac surgery and an intensive medication. However, she received mechanical ventilation support on SIMV mode during whole admission period because of the underlying clinical picture. She became exitus due to cardiac failure.

We need a method to help us to find out the development of PRE after CPR in very early stage. Unless we don't attempt to find out this method, we will have to spend a certain portion of our present resources for home care of bedridden patients.

### Reference

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## P-13

## Management of Intensive Care Unit Process in the Patient with Comorbid Pneumonia and Herpesviralsimplex Encephalitis

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The 77-year-old female patient without no systemic disease except type II diabetes mellitus (DM) and hyperten-

sion (HT) who could manage her works applied a private healthcare center since she gave meaningless and inconsistent responses to her relatives and presented unconsciousness, subsequently performing a Cranial MRI was recommended. MRI detected acute cytotoxic edema. The patient was transferred to emergency unit in presence of high fever and right leg pulses. CSF examination revealed positive polymerase chain reaction (PCR) for herpes simplex virus Type 1 (HSV TYPE 1) and acyclovir therapy (klovirex 3 x 750 mg) due to diagnosis of viral encephalitis. In the 4<sup>th</sup> day of follow-up in neurology clinic because of increased respiratory distress and loss of consciousness (GCS<7) the patient was orotracheally intubated and admitted to the ICU. The hypodense area in the temporal lobe by Cranial CT was evaluated in favor of encephalitis. By Thoracic CT; air bronchogram and appearance of atelectasis in the right lung were evaluated in favor of pneumonia. In the 7<sup>th</sup> day of ICU admission, weaning was initiated in the patient who opened her eyes spontaneously and obeyed commands. The patient was discharged in the 16<sup>th</sup> day of admission due to recovery.

We conclude that viral detection by CSF examination, early onset of antiviral therapy and ICU support provide rapid recovery without remaining any sequale in case of herpes simplex viral encephalitis.

## P-14

### Anesthetic Management for Deep Brain Stimulation in a Patient with Pantothenate Kinase-Associated Neurodegeneration

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Pantothenate kinase-associated neurodegeneration (PKAN) is a rare progressive disorder characterized by dystonia, rigidity, choreoathetosis and mental deterioration. Patients with PKAN may have many anesthesia-relevant symptoms like risk of aspiration, difficult airway management and acute respiratory insufficiency leading to numerous anesthetic management challenges. In this case report, we present the anesthetic management of a 10-year-old male scheduled for deep brain stimulation (DBS) surgery. The patient was admitted to the emergency service because of the extreme dystonia causing self-inflicted injuries. Midazolam infusion had to be began in the intensive care unit (ICU) and DBS surgery was planned. Preanesthetic evaluation revealed a thin patient

with limited mouth opening. The entire surgical procedure was planned to perform under general anesthesia. In the operating room EKG, pulse oximetry, invasive blood pressure measurement, capnography and urinary bladder catheter were placed. Anesthesia was induced with propofol (1 mg/kg) and remifentanyl (0.1 µg/kg). After controlling ease of face-mask ventilation, neuromuscular block with vecuronium (0.1 mg/kg) was achieved and the trachea was intubated with a 5.5 mm cuffed endotracheal tube with no difficulty. Anesthesia was maintained with remifentanyl infusion and sevoflurane 1-2% inspired in O<sub>2</sub> and air. A stereotactic Leksell frame was applied to the head of the patient and the patient was transferred to a MRI suite. Anesthesia was maintained with sevoflurane with a MRI compatible anesthesia machine and the patient was transferred to the operating room 45 minutes after MRI. After making a scalp incision, bilateral burr holes were opened. Using computer-assisted stereotactic techniques based on MRI data, a microelectrode was inserted. A pulse generator was then implanted in the subclavicular area. After the procedure, mechanical ventilation was continued in the ICU and sedation was provided overnight with remifentanyl and midazolam infusions to allow slow, gradual emergence. Next day the sedation was stopped and endotracheal tube was removed with no accident. As dystonia came back after 3 hours, sedation with midazolam was began again. Endotracheal intubation was not needed. His dystonia had considerably diminished as a result of the surgery and the patient was discharged from the ICU 10 days after surgery. As a conclusion, modern anesthetic agents and a multidisciplinary team were needed to care for the patient with PKAN.

## P-15

### Severe Cerebral Vasospasm Following Astrocitoma Surgery

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**Objective:** A 61 -year-old right-handed woman presented with a history of progressive headaches. Left frontal tumor (42 x 28 x 30 mm) near sphenoid wing was demonstrated by Magnetic Resonance Imaging (MRI). Frontal craniotomy for tumor removal was performed a month later. On fifth postoperative day after uneventful surgery, the patient was discharged asymptomatic to her home. Four days later, she was brought to hospital complaining visual loss, left hemiparesis and changes in mental status. Laboratory studies were normal. After intubation, a CT-Scan (cranial tomographic scan) was performed, showing bilateral occipital, right cerebellum and mesencephalon-protuberantia subacute ischemia. An Angiographic CT-Scan (CTA) and MRI-MRA right after, demonstrated wide-spread and severe degree vasospasm of posterior circulation, involving basilar and posterior cerebral arteries, hypoplastic left vertebral artery and right cerebral

medium artery. Hyperdynamic therapy and calcium channel blockers were promptly instituted. Postoperative meningitis was suspected so antibiotic (cefepime plus vancomycin) and corticosteroids therapy were administered at once as initial treatment. Cerebral vasospasm was monitored with Transcranial Doppler Ultrasound (TDC) performed every day while patient was unconscious, showing progressive decrease of vasospasm. The antibiotic therapy was withdrawn 4 days after the entry in critical care unit because lack of information of cerebral infection. On the sixth postoperative day, patient became better, improving her consciousness level and she was able to follow simple commands. A new CTA was performed showing normalized diameter of posterior circulation arteries. Despite of that angiographic recovery, the last CT-Scan made 10 days after admission, revealed large areas of infarction concerning temporo-occipital lobes and right cerebellum. Three months after discharge from the hospital, the patient was found to have mild left residual hemiparesis and abnormal cognitive function (GOS=2).

**Discussion:** The presenting symptoms in our case were generally reflective of those commonly encountered in patient developing postoperative vasospasm, which is a very uncommon complication after tumor resection (1.9%) (1). Pituitary tumors and meningiomas were the most common pathologies (42% and 17%) and are often located in sella region and middle cranial fossa (1). The differential diagnosis for those cases in the postoperative period include multiple other etiologies, such as infectious (meningitis), systemic (hypotension, hypoxia) and neurologic (stroke, mass effect from hemorrhage or edema...) (2). The mean time to develop clinical vasospasm was 8 days, but majority of cases were detected on fifth postoperative day (1, 2). Most of the vessels involved were in the anterior circulation (72%) and vasospasm occurred in the same general area of the surgical procedure, and therefore, the presentation of our case was exceptional, because vasospasm was detected on posterior circulation and tumor was located in left frontal lobe. The two common factors contributing to the development of postoperative vasospasm are preoperative vascular abnormalities (42%) and evidence of blood spillage into the subarachnoid space (42%) (1). The first of them, hypoplastic left vertebral artery was proved in our patient. Conventional angiography has been established as the gold standard for the diagnosis of vasospasm (1, 2). In our case we used CTA, MRA, TCD which have a reasonable specificity and sensitivity for detection of vasospasm (2). A variety of therapeutic modalities were utilized for treatment, but hyperdynamic therapy and administration of calcium channel blockers are the keystone of the medical treatment. Catheter angiography and pharmacological or mechanical angioplasty could be useful in selected cases (1). The overall rate of severe deficit and mortality in the literature review was higher (59% and 28% respectively) (2).

**Conclusion:** Delayed neurologic deficit from vasospasm after tumor resection is a rare complication with very high morbidity and mortality. Early diagnostic and prompt therapy could improve that outcomes, so a high index of suspicion is required.

## P-16

### Effect of Lifestyle Interventions on Diabetic Neuropathy

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**Objective:** Diabetic peripheral neuropathy likely affects up to one-third of adults with diabetes. All diabetic patients are likely to develop peripheral neuropathy if they live sufficiently long. Drug therapy has limited potential for controlling the associated pain. Alternative methods of treatment have thus far demonstrated limited success, so the aim of study was evaluating the effect lifestyle interventions on diabetic neuropathy severity among diabetic outpatients that suffering diabetic neuropathy.

**Methods:** This clinical trial was performed as time series on 80 patients with diabetic neuropathy, in Urmia in the year of 2013. After matching the study variables, the patients were divided equally and with random allocation to two experiment and control groups. The lifestyle interventions were performed for the experiment group beginning 4 educative sessions on diabetes self-care that emphasizes strategies for glucose monitoring, dietary and exercise habits, foot care, medication taking and coping. Each session was lasted for 1.5 hour. Then these patients were followed for 12 weeks. During these 12 weeks they were given counselling on lifestyle interventions. Diabetic neuropathy symptom severity in both groups was measured using Toronto Clinical Neuropathy Score at the beginning of study and then at the end of counselling for 12 weeks. The data were analyzed by SPSS 16.0 software using t-test.

**Results:** There wasn't any difference between the mean of diabetic neuropathy symptom severity in both study groups before the intervention, but comparing the mean of diabetic neuropathy symptom severity after intervention there is a significant difference ( $p < 0.001$ ) among the two groups of study.

**Conclusion:** These findings indicate that lifestyle interventions including diet and exercise counselling for diabetic neuropathy patients result in decreasing neuropathic symptom severity and improved pain.

## P-17

### Intraoperative Factors Affecting Outcome in Patients for Clipping of Cerebral Aneurysms: A Retrospective Analysis

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**Objective:** To analyse and correlate the intraoperative factors affecting the neurological outcome at six months in the patients undergoing surgery for aneurysmal SAH.

**Methods:** Retrospective review of patients presenting for neurosurgical clipping over a period of 10 months was done. Data were collected on variables known to influence outcome after aneurysmal subarachnoid haemorrhage as well as on intraoperative factors that might influence outcome (duration of surgery, intraoperative blood pressure, temporary clipping, intraoperative rupture of aneurysm, anaesthetic agents, extubation characteristics etc.). Outcome was assessed at six months after discharge using the Glasgow Outcome Scale.  $P < 0.05$  was considered significant.

**Results:** The data of 72 patients who underwent surgical clipping of cerebral aneurysm were analysed. In univariate analysis patients with a higher preinduction diastolic blood pressure ( $95.03 \pm 18.17$  vs.  $85.41 \pm 16.65$ ,  $p = 0.02$ ), failure to extubate ( $p = 0.001$ ) and lower postoperative GCS ( $9.45 \pm 3.25$  vs.  $12.37 \pm 3.32$ ,  $p = 0.001$ ), were significantly associated with poor outcome. There was no effect of duration of surgery, temporary clipping time, intraoperative rupture of aneurysm, anaesthetic agent used, intravenous fluid used, blood transfusion, intraoperative haemodynamic changes and haemoglobin values on the clinical outcome.

**Conclusion:** We conclude that the outcome in patients with aneurysmal SAH is affected by multiple factors in the perioperative period, a thorough understanding of which can help us in predicting and if possible modifying the outcome in this group of patients.

## P-18

### The Anesthesia Technique of Keyhole Surgery for Invasive Pain Management of Trigeminal Neuralgia Cases in Developing Country

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**Objective:** The purpose of this study was to describe the anaesthesia management for micro surgery, trigeminal neuralgia cases in Indonesia, especially in Surabaya from middle of 2011-middle of 2013. We could catch the successful rate, complication and the anesthesia technique, from the patient data that we analyzed. The goal to do this analysis was to get the lesson of how to manage the patients. The final purpose was to reduce the morbidity and mortality in the pre operative, intraoperative and post operative states.

**Methods:** The design of this research was retrospective descriptive, whose aim was to be the pilot research in Indonesia. We got the data from the medical records from middle of 2011-middle of 2013. The number of the patients, anaesthe-

sia technique, and complication, was calculated to be used as the initial data in Indonesia. The medical records was from Bedah Hospital in Surabaya.

**Results:** The number of patient on whom we had been doing microvascular decompression without neurophysiology monitoring from middle of 2011-middle of 2013 was 355 patients. We got 6 patients has to be re-opened because there was still painful. There was neither any infection (meningitis) nor convulsion after the operation. The anaesthesia was general anaesthesia with sevoflurane, desflurane, oxygen and  $N_2O$ . Analgesia was fentanyl or morphine in incremental doses. After the operation, the patients were extubated directly and observed tightly in ICU for 24 hours.

**Conclusion:** Anaesthesia management has an important role in keyhole surgery especially for microvascular decompression operation in hemifacial spasm and trigeminal neuralgia cases. The choice of potent anaesthesia drugs, tight observation at intraoperative and post operative, and regulation of the cerebral perfusion pressure greatly influence the final results.

## P-19

### Anaesthesia Management for Microsurgery (Keyhole Surgery) Based on Hemifacial Spasme and Trigeminal Neuralgia Cases in Developing Country

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**Objective:** The purpose of this study was to describe the anaesthesia management for micro surgery, especially for hemifacial spasm and trigeminal neuralgia cases in Indonesia, especially in Surabaya from 2006-2013. We could catch the successful rate, complication and the anesthesia technique, from the patient data that we analyzed. The goal to do this analysis was to get the lesson of how to manage the patients. The final purpose was to reduce the morbidity and mortality in the pre operative, intraoperative and post operative states

**Methods:** The design of this research was retrospective descriptive, whose aim was to be the pilot research in Indonesia. We got the data from the medical records from middle 2006-January 2014. The number of the data of Demografi (sex and age), anaesthesia technique, complication, and the average time for the length of hospital stay was calculated to be used as the initial data in Indonesia. The medical records was from Husada Utama Hospital and Bedah Hospital in Surabaya.

**Results:** The number of patient on whom we had been doing microvascular decompression without neurophysiology monitoring from middle 2006-January 2014 was 870 patients. We got 6 patients with eye flatness at the postoperative, but they recovered within 2-4 weeks; two patients with cerebrovascular accident after the operation and post operative deafness in 1 patient. There was neither any infection (meningitis) nor convulsion after the operation. The anaesthesia was general anaesthesia with sevoflurane, desflurane, oxygen and N<sub>2</sub>O. Analgesia was fentanyl or morphine in incremental doses. After the operation, the patients were extubated directly and observed tightly in ICU for 24 hours.

We had to do re-open on 4 patients of the 375 hemifascial spasm patients because there was still spasm. However, the spasm disappeared after the re-opened. Nevertheless, the re-open on two other hemifascial spasm patients failed. Four patients with trigeminal neuralgia also had to undergo re-open because the pain persisted. But after the re-open the pain disappeared. The average length of hospital stay without complication was 4 days.

**Conclusion:** Anaesthesia management has an important role in keyhole surgery especially for microvascular decompression operation in hemifascial spasm and trigeminal neuralgia cases. The choice of potent anaesthesia drugs, tight observation at intraoperative and post operative, and regulation of the cerebral perfusion pressure greatly influence the final results.

## P-20

### The Use of Dexmedetomidine As Sedation for Percutaneous Vertebroplasty

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**Objective:** A 56 year old lady attended for elective percutaneous vertebroplasty to alleviate pain caused by vertebral metastasis. This procedure is performed under local anaesthesia with sedation in the prone position. The patient was known to have a raised body mass index of 58.1 with a history of obstructive sleep apnoea and reflux. We knew we would have very limited access to the patient during the procedure due to the prone position plus the use of video fluoroscopy in an isolated location. It was vital therefore to use a sedative agent that would ensure airway reflexes were maintained, cause no respiratory depression and maintain cardiovascular stability. In this case we describe the use of dexmedetomidine to achieve safe conscious sedation.

**Introduction:** Percutaneous vertebroplasty is a treatment for pain secondary to vertebral compression fractures that fail to respond to conventional medical therapy (1). Bone cement is injected into the vertebra, with the intended benefit

of stabilisation and therefore reducing pain. Multiple studies have demonstrated that pain is dramatically improved within hours of the procedure, which also provides long term analgesia (1, 2).

The National Institute for Clinical Excellence (NICE), states that current evidence appears adequate to support the use of the procedure for patients with painful vertebral body tumours, but it should be limited to patients whose pain is refractory to more conservative treatment (3).

The procedure is performed by an interventional radiologist in a centre providing spinal surgery services. Fluoroscopy is used throughout and therefore needs to be performed in an angiography suite, which in most hospitals is considered an isolated site. The patient will also be in the prone position, meaning access to the patient, especially the airway is difficult during the procedure.

**Case Report:** A 56 year old lady attended for elective percutaneous vertebroplasty. She was known to have breast cancer metastasis present in the fourth lumbar vertebra, causing her significant pain. Medical therapies had failed to control her symptoms, her mobility and quality of life was being compromised as a result. The intended benefits of vertebroplasty were therefore to stabilise the vertebra and relieve pain.

Past medical history includes:

- Raised body mass index (BMI)-58.1
- Restrictive lung disease demonstrated on pulmonary function testing
- Asthma, well controlled with no previous hospital admissions
- Obstructive Sleep Apnoea
- Acid reflux
- Breast cancer with metastasis in right iliac crest and pedicle of L4 vertebra

The procedure was performed in the prone position to allow surgical access and fluoroscopic imaging of the vertebrae, in the angiography suite. Local anaesthesia was provided by the surgical team and sedation administered by the anaesthetist. The patient was connected to routine monitoring and allowed to position herself prone, with care taken to prevent injury to vulnerable pressure areas. She received four litres of oxygen via a face mask throughout and a capnography trace recorded. Her actual body weight was 145 kg and lean body weight calculated to be 110 kg. A loading dose of 100 micrograms (mcg)-1 mcg per kg-of Dexmedetomidine was given followed by an infusion of 0.7 mcg/kg.hr for the rest of the procedure. This provided successful sedation throughout the procedure whilst maintaining verbal contact with the patient and intact airway reflexes. Analgesia provided by Dexmedetomidine was supplemented by a small 30 mg dose of Ketamine.

The patient remained haemodynamically stable throughout and did not require any intervention for blood pressure or heart rate control.

**Discussion:** There were a number of problems identified at pre-operative assessment of this patient which made the de-

livery of sedation in a prone position challenging. According to the body mass index classification this patient was Obesity Class III (very severely obese). She also had a history of obstructive sleep apnoea and acid reflux. It was therefore important that her airway reflexes were intact throughout the procedure as any intervention to provide airway support or protection would be challenging once in position. Prone positioning can also lead to cardiovascular instability. The drug chosen to provide sedation in this case therefore needed to have a minimal effect on the cardiovascular system, no loss of airway reflexes, be short acting and have a short context sensitive half time, to prevent accumulation in the fat compartment. It was essential to have the patient compliant and remain in verbal communication with the anaesthetist and radiologist throughout. Dexmedetomidine fulfilled all these criteria.

Dexmedetomidine is an alpha 2 agonist which gained approval for sedative use in the intensive care unit in 1999; it also has a number of different benefits for use during the perioperative period. It is more selective for the alpha 2 adrenoceptor than clonidine, permitting its use in higher doses without unwanted vascular effects from activation of alpha-1 receptors and is also shorter acting (4). The sedation achieved resembles normal sleep and is branded 'cooperative' or 'arousable' sedation in which the patient are easily roused in much the same way as during normal sleep (5). This is advantageous in this case where midazolam or propofol would produce a clouding of consciousness and increase risk of airway loss in an obese patient in the prone position.

An advantage of Dexmedetomidine as a sedative agent is its analgesic properties, however one problem highlighted in the case report was the need to supplement the sedation with Ketamine for analgesia. The analgesia provided by the sedation has to be combined with good local anaesthetic infiltration of the surrounding tissues which is known to be difficult in patients with high BMI and a large amount of subcutaneous fat surrounding the operative site. The use of Dexmedetomidine was successful however in providing adequate sedation without compromising the patient's airway, breathing or circulatory systems.

The dose we used was also based on ideal body weight. We contacted Orion Pharma, who manufacture Dexmedetomidine in Europe to ask their advice on whether dosing guidelines should be based on actual or ideal body weight. Their response: 'there are no special dosing instructions for the use of Dexmedetomidine in overweight patients. In all patient groups, patients may respond differently to different doses of Dexmedetomidine. Therefore, regardless of patient type, Dexmedetomidine infusion rate should always be carefully titrated to the desired level of sedation, depending on the patient's response'

In summary, for this patient to receive safe sedation the agent used needed to ensure airway reflexes were maintained, cause no respiratory depression and maintain cardiovascular stability. Dexmedetomidine was successful in achieving this and

allowed the procedure to be performed safely under local anaesthesia in the prone position.

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## P-21

# An Extraordinary Giant Presenting for Pituitary Surgery

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*As Above*

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**Objective:** We describe anaesthetic management of a acrogigantic male (height 223cm, weight 120kg, BMI 24.1) with panhypopituitarism and hypertension who presented for pituitary surgery to remove a growth hormone releasing hormone secreting tumour.

**Case Presentation:** Pre-operatively, he was managed by multi-disciplinary team (anaesthesiologist, neurosurgical team, endocrinologist, cardiologist, respiratory physician). He was started on hormonal replacement for hypocortisolism, hypotestosteronism, and hypothyroidism. Neurologically, he had no symptoms of raised intracranial pressure. As a result of his acromegaly-gigantism, he had Charcot's joints of ankles with peripheral neuropathy and lower limb numbness.

Preoperative airway assessment is vital as patients with acro-gigantism may have difficult airway from airway tissue overgrowth. He had acromegalic features (macroglossia and prognathism) but had good mouth opening, full neck movement, thyromental distance of 15 cm, and Mallampati class 1. Cervical spine Xray facilitated measurement of expected

length of ETT, as well as excluded possible associated cervical spondylosis. Pre-operative chest radiograph helped estimate depth to which the CVC should be inserted (about 17 cm).

The ward bed and Trumpf operating table were modified to accommodate his height and weight. We emphasized safe positioning on operating table and avoiding perioperative nerve injuries.

Simulations were conducted to minimize unanticipated difficulty with positioning and transport.

Appropriately sized airway equipment, trained anaesthetic help, airway adjuncts were obtained. IV induction was achieved with fentanyl / propofol. Effective mask ventilation was confirmed before muscle paralysis with atracurium. Direct laryngoscopy using a size 5 blade, showed a grade 1 larynx. The armoured ETT #9.0 was anchored at 29cm at teeth. Intra-arterial line and 8.5Fr 4 lumen right internal jugular vein were then sited.

General anaesthesia was maintained with desflurane, remifentanyl and atracurium. Morphine was given for post operative analgesia. The patient was extubated awake. Esmolol helped obtund sympathetic response at extubation.

The duration of surgery was approximately 7 hrs with about 950 ml blood loss was 950 mL. Vulnerable pressure areas were padded. Pneumatic calf-compressors were applied to prevent DVT and patient kept warm. The patient was sent to NICU post operatively.

**Conclusion:** Multidisciplinary approach is crucial when preparing acromegalic giants for anaesthesia and surgery. Preoperative optimization of endocrine function, airway assessment/airway equipment preparation, logistics and post-operative care are essential. Although acromegalic giants may pose fewer airway problems compared to acromegalics, there should be failed airway backup plan.

## P-22

### Use of Prothrombin Complex Concentrate (PCC) in Patient Developing Intracranial Bleeding Resulting from Warfarin Use

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**Introduction:** In patients receiving oral anticoagulant (OAC) drug treatment, intracranial bleeding may develop spontaneously or secondarily after trauma (1). Bleeding risk is higher in cases requiring surgical intervention. Today, half

of the patients who develop bleeding due to OAC and antithrombotic drug use progresses mortally (2).

In this case, we presented preoperative approach to intracranial bleeding developing due to oral warfarin sodium (OWS) use.

**Case Presentation:** The 71-year-old female patient was seen in the emergency service due to a general disorder. From her acquaintances, we learned that she used OWS 5 mg/day due to aortic valve disorder. In her physical examination, the general condition was bad, consciousness was confused and respiration was distressed. The patient, whose Glasgow Coma Scale (GCS) was evaluated as 7 points, received endotracheal intubation. Due to hypotension, dopamine infusion was started with 10 µg/kg/min dose through intravenous (iv) access. Posterior fossa was observed in cranial CT and hemorrhagic areas were observed in bilateral cerebellar hemisphere and vermis posterior. Emergent surgical intervention was planned. In her biochemistry, Htc was measured to be 25% and the international normalization rate (INR) was measured to be 5,5; and the patient received 2 units red cell concentrates (RCC). The patient with 60kg of Prothrombin Complex Concentrate (PCC) (Cofact<sup>®</sup> 500IU/20 mL) received 1ml/min infusion through iv access. When the patient reached the target value of INR 1.5-2 fifteen minutes after the PCC finished, the patient was taken to surgery. The subdural and intracerebral hemorrhage was drained and duraplasty was applied. After 4 hours of operation, the patient was taken to the intensive care unit.

The patient was connected to the mechanic ventilator at pressure controlled ventilation (PCV) mode with fraction of inspired oxygen (FiO<sub>2</sub>): 50%, inspiratory pressure (PIP): 15 cmH<sub>2</sub>O, positive end-expiratory pressure (PEEP): 5 cmH<sub>2</sub>O. Midazolam was started at 5mg/hour dose through iv access. The patient with place and time orientation and cooperation was extubated on the 5<sup>th</sup> day. After bleeding focuses were detected on the 12<sup>th</sup> day of her follow-up, the patient received a second endotracheal intubation. On the 22<sup>nd</sup> day of her hospitalization, the patient, whose vital findings did not recover, was lost due to multiple organ failure.

**Discussion:** Intracranial bleeding risk is 2-5 times more in people using OWS than the normal population (3). 6-24% of intracerebral hemorrhages were caused by OWS. Frequent cases of side effects of OAC drugs may result from wrong doses of anticoagulant, patient incompatibility and neglect in coagulation parameter measurement controls. In treatment, vitamin K, fresh frozen plasma (FFP), PCC, and recombinant factor VIIa can be preferred (4). With FFP and vitamin K treatment, INR recovery is around 0.18 per hour. PCC use is a safe method but has some risks, as well. PCC should not be used in every increase of INR (5).

As a result, we are of the opinion that PCC should be used in bleeding cases resulting from OWS and only in the cases requiring surgical intervention and threatening life.

## P-23

## Critical Illness Polyneuromyopathy Due to Diabetic Ketoacidosis and Sepsis in the ICU

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**Introduction:** Critical illness polyneuromyopathy (CIP) is the primary axonal degenerative case developing as a critical disease complication in sensory and motor fibers (1). Neuromuscular symptoms developing due to critical diseases lead to extension of the time to stay in the intensive care unit (ICU), difficulty in separation from mechanical ventilation and extended rehabilitation (2).

In this study, we aimed to present the case developing CIP after diabetic ketoacidosis (DKA) and sepsis treatment.

**Case Presentation:** The 24-year-old female patient was taken to the internal medicine service being diagnosed with DKA after examinations in the emergency service where she was admitted with complaints of vomiting and nausea. The patient, whose general condition and consciousness deteriorated and who developed respiratory problem in the emergency service, received endotracheal intubation and taken to the ICU. The patient was connected to a mechanical ventilator at pressure controlled ventilation (PCV) mode with Fraction of inspired oxygen ( $\text{FiO}_2$ ): 50%, inspiratory pressure (PIP): 12  $\text{cmH}_2\text{O}$ , positive end-expiratory pressure (PEEP): 6  $\text{cmH}_2\text{O}$ . Sedation was provided through a 5mg/hour midazolam infusion. In the arterial blood gas of the patient, pH: 6.66,  $\text{PaO}_2$ : 122 mmHg,  $\text{PaCO}_2$ : 147 mmHg,  $\text{HCO}_3^-$ : 6.8 mmol/L, lactate: 3.1 mg/dL; and in the blood biochemistry, glucose: 501 mg/dL, potassium: 2.6 mmol/L, phosphor: 1.02 mg/L, CRP: 82 mg/dL; and in the CBC, WBC:  $28.79 \times 10^3/\text{mm}^3$ ; in urine analysis protein (+++), ketone (+++), sugar (++++). The patient whose DKA treatment was arranged was extubated after 2 days. The patient, who developed sudden desaturation on the 3<sup>rd</sup> day was intubated again. Antibiotherapy was arranged for the patient who developed yeast cells, acinetobacter baumani and klebsiella pneumonia in deep tracheal aspirate cultures. Closed consciousness continued for 10 days. No pathology was observed in cranial CT and diffusion MRI visualization. In the neurological examination of the patient, whose consciousness recovered on the 14<sup>th</sup> day, tetraplegia was detected. In the needle electromyography, upper and lower extremity motor peripheral nerve transmission responses were evaluated as low-amplitude. On the 20<sup>th</sup> day of her hospitalization, she recovered from upper extremity paralysis. The patient, who was extubated on the 26<sup>th</sup> day, was transferred to the internal medicine service on the 31<sup>st</sup> day when the lower extremity paralysis regressed.

**Discussion:** The most important risk factors for CIP can be systemic inflammatory response syndrome, sepsis, multiple organ failure, diabetics, immobilization, steroid, aminogly-

coside and non-depolarizant neuromuscular blocker use (3). In presence of a sepsis lasting for longer than two weeks, CIP development was detected to be of a 50-70% possibility (4). It is considered that the underlying mechanism in CIP is sarcolemma dysfunction which seems to be related with sodium channel inactivation. It is considered that hyperglycemia increases CIP risk by deteriorating peripheral nerve microcirculation and causing hypoxia (5).

As a result, CIP risk must be taken into consideration in patients whose hospitalization in ICU extends and who have critical illness.

## P-24

## Bradycardia During Transsphenoidal Pituitary Surgery: Can Interaction Between Labetalol and Adrenaline be a Cause?

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**Abstract:** Adrenaline infiltration at surgical site before surgery is a common practice during endoscopic neurosurgical procedures. We report a case of near fatal bradycardia after giving labetalol for managing sudden transient rise in BP, HR after nasal mucosal infiltration with adrenaline in transsphenoidal surgery.

**Introduction:** Labetalol is a non-selective  $\beta$ - and  $\alpha$ -adren-ergic receptor antagonist. It is used in the management of perioperative essential hypertension, pheochromocytoma, and hypertensive crises. The  $\alpha$ :  $\beta$  ratio of antagonism is 1: 7 after intravenous administration (a 1:3 ratio exists after oral administration). Incremental doses of intravenous labetalol have been demonstrated to be safe and effective (1, 2). We present a case of profound bradycardia immediately after giving labetalol injection in TNTS for pituitary microadenoma.

**Case Presentation:** A 32 yr old 62 kg ASA 1, male patient posted for endoscopic TNTS without any comorbidity. Routine induction done with standard doses of propofol 150 mg, fentanyl 125mcg followed by 30 mcg/hr infusion, rocuronium 0.6 mg/kg and maintenance carried out with  $\text{O}_2$ :  $\text{N}_2\text{O}$ (50:50) and sevoflurane (1.2%). 10 min after induction of anesthesia and intubation, resident surgeon infiltrated as well as packed the nasal mucosa with adrenaline soaked gauze. IBP increased to 220/110 and HR increased from 88 to 146 bpm. So, Labetalol 10+10 mg boluses have given IV intermittently. IBP decreased to 140/90 but HR dropped to 30/min i.e., refractory to glycopyrrolate 0.2 mg IV two times, later responded to atropine 0.4 mg IV.

**Discussion:** During preparation of surgical site, LA and epinephrine solution are infiltrated into mucosal surfaces of the nose with to reduce bleeding and facilitate dissection. However, the lignocaine addition to adrenaline enhances safety margin by increasing threshold for cardiac arrhythmia. Possi-

ble causes of sudden increase in BP during endoscopic pituitary surgery are concealed bleeding at surgical site leading to increased ICP that further causing hypertension and bradycardia, light plane of analgesia or anesthesia or inadequately optimized cushing disease or acromegaly in preoperative period. Patients on chronic non-selective beta-blocker therapy may have a blunted effect of epinephrine in anaphylaxis but epinephrine administration may also result in profound hypertension and bradycardia or heart block. The BP rise in this case was due to absorption of adrenaline through nasal mucosa as BIS score was 45 and TOF showing adequate muscle relaxation. The mechanisms at play causing a

significant blood pressure elevations and bradycardia share similarities. In this case, unopposed alpha-adrenergic receptor activation causes profound vasoconstriction. Normally, epinephrine activates alpha (1, 2) and beta (1, 2) receptors. Though the alpha activation leads to vasoconstriction, there is a balance of beta-2 mediated vasodilation. But by blocking this beta-2 activation, there is unchecked alpha 1 mediated vasoconstriction since labetalol has seven times more affinity for beta-blockade than alpha when given IV (3, 4). The resulting effects are significant increases in blood pressure and subsequent reflex (vagal mediated) bradycardia (3, 5). Again, in cases where the patients are on chronic cardioselective beta-blocker therapy, this effect is generally not observed if they are on normal beta-blocker doses. During endoscopic approach of any surgery, mucosal infiltration with adrenaline is unnecessary and only topical vasoconstrictor application may suffice for better visualization and resection.

**Take home message:** An anesthesiologist need to be cognizant while administering labetalol for transient rise in HR, BP or both as its effect persist for a longer duration and may need further pharmacological intervention to restore perioperative hemodynamic stability. We recommend use of shorter acting selective beta blocker like esmolol in titrated doses to alleviate detrimental transient change in cerebral hemodynamics intraoperatively.

## P-25

### Using Entropy in the General Anesthesia Managements

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**Objective:** Entropy very important neurologic monitoring. We aimed to investigate the effects of three general anesthetic management on depth of anesthesia, anesthetic quality, agent consumption and postoperative recovery.

**Methods:** After written informed consent was obtained from each patient, monitoring of electrocardiography (ECG), noninvasive blood pressure (NIBP), heart rate, peripheral oxygen saturation (SPO<sub>2</sub>), neuromuscular transmission (NMT), surgical pleth index (SPI) and entropy were applied. entropy

monitoring was performed using three electrodes that affixed to the frontal region) (Carescape monitor B650 GE Healthcare Finland) and entropy was recorded as state entropy (SE) and response entropy (RE). 90 patients scheduled for elective surgery aged between 18 and 70 with American Society of Anesthesiologist (ASA) physical status between I-III aged were included in this study. After standard anesthesia induction, patients were divided into three groups according to maintenance of anesthesia using a sealed envelope system. Propofol 3-5 mg/kg/h iv infusion was performed to Group 1 (Group P, n=30), Desflurane 1MAC was used to Group 2 (Group D, n=30) and Sevoflurane to Group 3 (Group S, n=30). While muscle relaxants requirements were provided by using infusion of 0.1 mg/kg/h rocuronium, 0.1 mcg/kg/h infusion of remifentanyl were used for opioid requirements. While desflurane and sevoflurane consumption were recorded from the anesthesia machine (Datex-Ohmeda Avance, Datex Ohmeda Inc. 3030 Ohmeda Drive USA) directly, over the calculated saving propofol consumption was calculated through the consumption of perfusers and recorded at the end of the surgery. Total cost of anesthetics that used were calculated by multiplying the unit price with their consumption. Apart from these hemodynamic values of all patients, recovery time, alertness levels in the recovery room (according to Ramsey Scale) were recorded.

**Results:** Significant differences were found between the three groups in terms of cost. While the cost of propofol was significantly lower, it was significantly higher in desflurane group. Also awareness and postoperative hemodynamics were observed to be more stable in propofol group patients.

**Conclusion:** We concluded that propofol anesthesia decreased the cost significantly. Thus, we can use in the routine neuroanesthesia safely.

## P-26

### The Use of Nurse Checklists in a Bedside Computer-Based Information System to Focus on Avoiding Secondary Insults in Neurointensive Care

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**Objective:** A secondary insult prevention program was introduced in the neurointensive care (NIC) unit at the department of neurosurgery in Uppsala, Sweden in the 1990s. The cornerstone in the secondary insult program was a checklist where the occurrence of secondary insults should be recorded by the nurses after every work shift. This strategy was aimed to make all staff members maximally aware of their main task being to avoid secondary insult and to make it easy both for the doctors and the nurses to catch what the problems are for a certain patient. The aims of this study were to evaluate the

feasibility and accuracy of using nurse checklists integrated in a bedside computer-based information system for documentation of secondary insults with the ultimate goal to get maximal attention to avoid secondary insults in the NIC unit.

**Methods:** A bedside computer-based information system was used by the nurses for the checklist recording. The total number of checklist assessments included in the study was 2,184. Feasibility was investigated by assessing if the checklists were filled in as prescribed. Accuracy was evaluated by comparing the checklists with recorded minute-by-minute monitoring data for intracranial pressure (ICP), cerebral perfusion pressure (CPP), systolic blood pressure (SBP) and temperature.

**Results:** In 85% of the shifts the checklists were filled in. There was significantly longer duration of monitoring time at insult level when Yes was filled in regarding ICP (mean 134 vs 30 min), CPP (mean 125 vs. 26 min) and temperature (mean 315 vs 120 min). When a secondary insult was defined as >5% of monitoring time spent at insult level, the sensitivity/specificity for the checklist assessments were 31%/100% for ICP, 38%/99% for CPP and 66%/88% for temperature.

**Conclusion:** Checklists were feasible and appeared relatively accurate. Checklists may elevate the alertness for avoiding secondary insults and help in the evaluation of the patients. This concept may be the next step towards tomorrow's critical care.

## P-27

### How Often do Nursing Interventions in Neurointensive Care Induce Secondary Insults—a Descriptive Pilot Study

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**Objective:** The purpose of different nursing interventions is to restrict the occurrence of different complications during neurointensive care (NIC). There is also a risk that secondary insults may occur in association to nursing interventions. The aim of this study was to investigate the amount of secondary insults related to oral care, repositioning, endotracheal suctioning, hygienic measures and simultaneous interventions at a NIC unit with standardized care and maximum attention on avoiding secondary insults.

**Methods:** The study included 18 patients, seven women and eleven men, aged 36-76 years with different acute neurosurgical conditions. On admission to the NIC unit the mean Glasgow coma scale-motor was 5.28 (SD 0.96). The total number of nursing interventions analyzed was 1717. The definition of a secondary insult was intracranial pressure (ICP) >20 mmHg, cerebral perfusion pressure (CPP) <60 mmHg and systolic blood pressure (SBP) <100 mmHg for five minutes or more in a ten minute period starting from

when the nursing intervention began. The insult minutes did not have to be consecutive.

**Results:** High ICP occurred after a nursing measure in 5% of the occasions followed by low CPP (3%) and low SBP (1%). Repositioning (7%) and simultaneous interventions (7%) were the nursing interventions causing most of the ICP insults. There were substantial variations between the patients. One patient had no secondary insults, three patients had secondary insults initiated by all kinds of nursing interventions, and two patients had secondary insults in more than 30% of the occasions when a hygienic measure was performed. On some occasions (0.2-1.1%), one nursing intervention related to more than one secondary insult at the same time. Occasionally there was an ongoing secondary insult which was discontinued after a nursing intervention. For example for high ICP, after 17 out of 393 (4%) suctionings and after 17 out of 571 (3%) after repositioning.

**Conclusion:** There were overall a limited number of secondary insults related to nursing interventions when a standardized management protocol system was applied to reduce the occurrence of secondary insults. Patients with an increased risk of secondary insults should be recognized and their care and treatment should be carefully planned and performed to avoid secondary insults.

## P-28

### Anesthetic Management of a Pregnant at 30 Weeks Gestation with Cervical Intramedullar Ependymoma

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**Introduction:** Spinal tumors are rare in pregnancy, but they cause serious problems in terms of continuing pregnancy. Symptoms may present or be exacerbated because of increased tumor growth or edema, increased vascularity or pregnancy-related immunotolerance. In here, it was aimed to present an experience about the anaesthetic approach to a pregnant woman with cervical intramedullary ependymoma.

**Case Presentation:** A 21-year-old primiparous pregnant at 30 weeks gestation was admitted with quadriparesis at the Neurosurgery Department in Hacettepe University Hospital. Her preoperative history revealed that numbness and weakness had started in her shoulder, bilateral arms, and legs in the 1<sup>st</sup> trimester and gradually increased during the pregnancy. The rest of physical examination were normal as well as the fetus. Magnetic resonance imaging showed a localized heterogeneous, diffuse, and progressive intramedullary mass between C2 and C3-4. Due to the increased risk of morbidity, neurosurgical intervention was planned at 30 weeks of gesta-

tion. After administration of intravenous (iv) metoclopramide 10 mg and ranitidine 50 mg, standard monitorization including 5 lead ECGs, noninvasive blood pressure, and peripheral oxygen saturation (SpO<sub>2</sub>) was performed. Oropharyngeal examination was evaluated as Mallampati Class II. Preoperative blood pressure, heart rate, and SpO<sub>2</sub> were 110/70 mmHg, 90 beat/min, and 98%, respectively. Rapid sequence induction of anesthesia was performed with iv propofol 2 mg/kg and rocuronium 0.6 mg/kg and the patient was intubated with a cuffed 7.5 mm of endotracheal tube. Anesthesia was maintained with iv remifentanyl and propofol infusion with approximately 50% O<sub>2</sub>- air mixture during the operation. A central venous and an arterial line were established and the patients' position was changed to sitting position. Neuromonitorization was performed and fetal heart was monitored by obstetricians. In order to avoid a decrease in uteroplacental blood flow, the intraoperative systolic blood pressure was maintained  $\geq$ 100 mmHg and end-tidal carbon dioxide was maintained at 35-40 mmHg. And also bispectral index and body temperature monitorizations were used. By the help of neuromonitorisation, partial C2, C3-4 total laminectomy and excision of mass were performed by the neurosurgeons in 6 hours of duration. Estimated blood loss was approximately 100 mL and urine output was 1200 mL during the operation. Normal fluid (crystalloid and colloid) was administered to counteract insensible loss and no erythrocyte suspension was given. Postoperative analgesia was provided with iv paracetamol 1000 mg infusion. At the end of the operation, the patient was extubated and after a short neurological examination, she was sent to the neurosurgery intensive care unit.

**Conclusion:** A spinal tumor complicating a pregnancy is rare. The serious risks of surgery and anesthesia during pregnancy are important not only for the mother, but also for the baby. During surgery both the selected anesthetic technique and the drugs influence the pregnant woman's hemodynamic status. A potential instability may bear risks for both the mother and the baby. Neurosurgery, especially cervical tumors are rare during pregnancy, but mandates a multidisciplinary approach and careful consideration of the timing of both surgery and delivery.

## P-29

### High Dependency Unit (HDU) Admission Post Meningioma Excision-is it Really Needed?

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**Objective:** To assess demographics, clinical features, intraoperative and immediate post-operative complications in patients admitted to HDU post Meningioma excision in a Tertiary Neurosurgical unit. To analyse the data of patients requiring <48hrs in HDU, looking for consistent features, which may identify a group of patients who may not need postoperative HDU admission.

**Methods:** 75 case notes of patients coded for Meningioma excision from 1<sup>st</sup> January 2010 to 28<sup>th</sup> February 2011 were reviewed and data collected retrospectively onto a proforma sheet. Meningiomas were classified on size (<5 cms - >10 cms) and location. Data collected included: demographics, presenting features, co-morbidities and peri-/post-operative events which would influence the period of stay on the HDU.

**Results:** There was equal sex distribution with an average age of 50.66 years. The main presenting complaints were: headaches, visual field deficits, limb weakness and seizures.

Meningiomas:

By tumour size: <5 cms-33, 5 to 10 cms-37, >10 cms- 7

By location: predominantly Parafalcine, Sphenoidal, Brain Surface.

By average duration of surgery: <5 cms tumors 4.20 hours, 5 to 10 cms 6.5 hours, >10 cms 7.90 hours.

It was noted that haemodynamic instability, bleeding and re-operation for evacuation of haematoma was significantly higher in tumors >5cms.

HDU stay:

Average length stay: tumours <5cms -- 2 day

tumours between 5-10cms and >10cms--- 4 days

78% of tumours <5cms had 2 days HDU stay but only 48% of larger tumours stayed only 2 days.

Post fossa meningiomas and/or respiratory complications were the main factors associated with readmission to ICU.

Patients with no significant co-morbidities with parafalcine/cortical surface meningiomas < 5cm, whose operation was <4.5 hours and without peri-operative complications had an uneventful stay on the HDU with a low risk of readmission.

**Conclusion:** The data for <5 cm parafalcine/cortical surface meningiomas with no significant co-morbidities, surgery <4.5 hours and no peri-operative events, is associated with a short uneventful stay on HDU with minimal risk for readmission. This sub-group of patients may benefit from an extended recovery, surgical review and return to ward with Critical Care Outreach team support rather than being admitted to critical care. This may reduce the ever-increasing pressure on the availability of HDU beds in Neurosurgical Units.

## P-30

### Epidural Anesthesia Used for Intraoperative Spasticity in Patient with Multiple Sclerosis: Case Report

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**Introduction:** Multiplesclerosis (MS) is a chronic progressive and demyelinating disease of the human centralnervous system. It's manifestations include spasticity, weakness of the limbs, diplopia, loss of vision, paresthasias, bowel dysfunction and mental changes. MS appears to be anautoim-

mune disease. Its incidence is approximately one in 100,000 a given population. The prevalence is ranging between 2-150 in 100,000 depending on the country. Several kind of operations could be needed in patients with MS. Also, regional and general anesthesia were used in MS patients.

We presented a patient with MS, who underwent decubitus operation performed under epidural anesthesia given for spasticity instead of anesthetic demand.

**Case Presentation:** A 33 year old female patient with MS planned for decubitus ulcer surgery. In patients history, she got the diagnosis for 8 years; she was paraplegic during last year; there were severe spasticity and tremor in all limbs. Other findings were hyperactive deep tendon reflexes, cooperation difficulty. Cranial nerves examinations were normal. Decubitus ulcers were located on the sacral region and both thighs.

Although there were no pain sensations on wounds, the surgeon wanted an anesthesia for spasticity and vibration. The 18 gauge Touhy needle was inserted at the level of Lumbar 4-5 intervertebral space, and a catheter placed. Then epidural anesthesia was achieved with 5ml incremental doses and total of 15 ml of 2% prilocaine (20 ml flacon Vem İlaç Turkey). The dose arrangement was based on disappearance of tremor and relaxation of lower limbs. Duration of surgery was 118 minutes, and the operation completed without any complication or unexpected side effects.

**Discussion:** MS is frequently diagnosed at the age of thirties and the victims survived for several decades. This relatively long period of life brings MS patients to a considerable surgery risk such as tonsillectomy, adenoidectomy, appendectomy, cardiac, ophthalmic, orthopedic and obstetric surgery. Various anesthetic techniques have been reported in the literature in terms of surgeries required for MS patients. General anesthesia, regional anesthesia and peripheral nerve blocks were used.

In this case, we used epidural anesthesia for spasticity and vibration treatment. Even the patient had paresthesias in her lower extremities and a painful stimulus did not sense. The surgical team requested anesthesia for ongoing tremor and spasticity. We used epidural anesthesia in a multiple sclerosis patient with an unusual indication which was not reported in the literature before.

## P-31

### A Retrospective Audit of the Management of Patients with a Spinal Cord Injury Over a Thirty Month Period and the Implementation of an Integrated Care Pathway

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**Objective:** To retrospectively audit the initial management of patients with a spinal cord injury admitted over a thirty month period at intervals of 4 hours, 24 hours and 7 days.

**Methods:** A structured proforma was designed based upon the national guidelines for Spinal cord injury and ATLS guidelines. Thirty-three patients were identified with a spinal cord injury between June 2011 and December 2013. A retrospective review of the notes and ITU charts was undertaken at intervals of 4 hours, 24 hours and 7 days. These were audited against local Trust protocols and national gold standards.

**Results:** Case notes were available for twenty-one of the thirty-three patients, a 64% completion rate.

Within 4 hours of admission, five patients (24%) had an arterial line inserted and six patients (28%) had a target mean arterial pressure (MAP) documented. No patient had a NG tube inserted and VTE thromboprophylaxis was documented in only 4 patients (19%). Confirmation of anal tone was carried out in only eight patients (38%).

Within 24 hours of admission, fourteen patients (67%) had a NG in situ and VTE thromboprophylaxis was documented in 9 (43%) patients. Only 2 patients (9%) had ASIA scoring within 24 hours. Spinal clearance was documented in fifteen patients (71%) and a secondary survey had only been recorded in ten patients (47%). Implementation of the bowel care protocol was completed for 16 patients (76%).

Over the next seven days, only six patients (28%) had further ASIA assessment scoring. All patients were referred to a Spinal cord injury unit within seven days.

**Conclusion:** This audit highlights that the current management of SCI is not in complete accordance with national guidelines. Although patients are being admitted to the correct destination, both 4-hour and 24-hour targets are not being achieved. Unawareness of the requirement for regular ASIA scoring is highlighted with only two patients having ASIA scoring within 24 hours. Additionally, documentation of anal tone was only undertaken in 38% of patients, which has both diagnostic and prognostic implications.

The results of this audit have led to the design and implementation of an ICP that covers the first 7 days of care for patients admitted with a spinal cord injury at T8 level or above. Additionally we have included ASIA scoring training at induction of new doctors.

## P-32

### Rate and Reasons for Elective Ventilation After Intracranial Tumour Surgery

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**Objective:** Mechanical ventilation (MV) after neurosurgery is often decided by the preoperative neurological status of the patient. However, there is paucity of information regarding the indications and risk factors for continuation MV after intracranial tumor surgery.

**Methods:** A prospective observational study was carried out on consecutive adult patients who underwent elective craniotomy for tumor excision, and postoperatively required MV. Data on anesthesia technique, duration of anesthesia and surgery, blood loss and transfusion, and volume of fluids infused were noted. Intraoperative complications like brain bulge, massive blood loss, brainstem handling, cranial nerve handling, hemodynamic instability, cardiac arrhythmias, venous air embolism, electrolyte abnormality and hypothermia were also recorded.

**Results:** A total of 709 patients enrolled for the study over a period of one year out of which 347 patients (49%) required continuation MV during postoperative period. The mean duration of MV was 17 hrs (4-300 hrs). The reasons for postoperative MV were preoperative lower cranial nerve palsy (10.4%), intraoperative hemodynamic instability (2%), brainstem handling (11.8%), massive blood loss (7.8%), tight brain (4.0%), residual tumor (2%), prolonged surgery (12.7%), unresponsiveness (43.2%), and neurosurgeon's insistence (41.8%). The mean ICU and hospital stay was 92.2 hrs (4-2160 hrs) and 13.7 days (2-210 days), respectively. 47.6% of patients who required postoperative MV on neurosurgeon's suggestion developed complications whereas it was 33.2% for those ventilated other reasons ( $p < 0.05$ ). Glasgow outcome scale (GOS) at discharge was poor in 12.4%. On multivariate analysis, intraoperative blood transfusion, tracheostomy, and duration of ventilation more than 48 hrs were the independent risk factors associated with poor outcome.

**Conclusion:** Although the neurosurgeon's suggestion for elective ventilation should not be ignored, but prolonged and avoidable MV may exacerbate the postoperative morbidities apart from increasing the cost of treatment. Hence, a complete understanding of intraoperative events, cerebral physiology and various factors influencing it during the perioperative period may not be overemphasized.

### P-33

## Neurogenic Stunned Myocardium in a Paediatric Patient with Acute Hydrocephalus - is This Phenomenon on the Stress Cardiomyopathy Spectrum

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A case report of a 13yr old girl presenting with acute hydrocephalus due to ventriculoperitoneal shunt malfunction is described. This required immediate surgical intervention, during which she developed severe cardiovascular instability with profound hypotension and pulmonary oedema necessitating inotropic support and continued postoperative ventilation. Echocardiography revealed acute severe myocardial impairment with akinesia of the apical segments and relative preservation of contraction in the basal segments. However, the cardiac dysfunction rapidly normalised (within 48 hours of resolution of the neurological insult).

The pathophysiological basis of neurogenic stunned myocardium (NSM) is discussed and it is postulated that NSM is in fact part of a spectrum of disorders which describe acute myocardial stunning. The clinical presentation and management of the condition is reviewed together with recent reports of similar cases in the paediatric literature.

Neurogenic stunned myocardium forms part of a wider spectrum of disorders causing transient myocardial dysfunction and is likely to be under-diagnosed. Such conditions include stress-related (Takotsubo) cardiomyopathy in adults and are being increasingly recognised. A high level of suspicion and clinical vigilance is required to recognise the signs and take appropriate action. Due to the minimal number of reported cases and lack of published data in this field, further research is required.

### P-34

## Anesthetic Management to Leprosy: Case Report

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**Objective:** Leprosy occurs as the granulomatous infection of mycobacterium leprae; it basically damages the peripheral sensory nerves and is a chronic progressive disease causing dysfunction in many systems (1).

The anesthetic management of leprosy is particular to the disease due to the accompanying clinicopathologic effects and it is a rarely observed systemic disease. In literature, since there has been no sufficient case study on leprosy cases, our aim is to evaluate the anesthetic method for the intracranial mass excision of a 56 year old leprosy patient in the light of current anesthetic developments and literature.

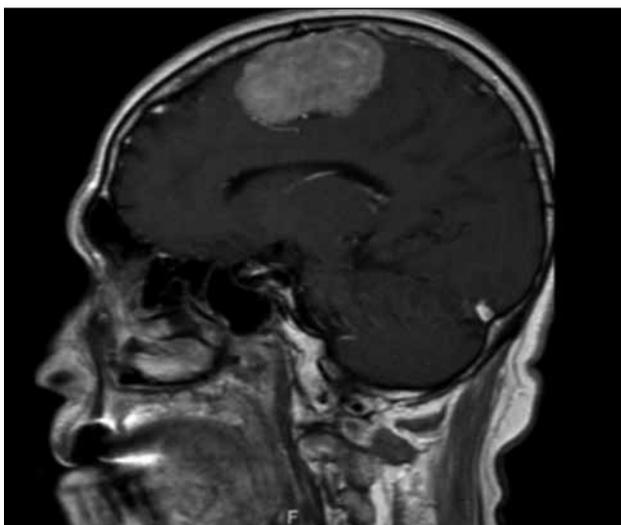


Figure 1. A mass in the left parasagittal region at the magnetic resonance imaging

**Case Presentation:** A 56 yr old man with leprosy was scheduled to undergo intracranial mass excision. He was diagnosed with lepromatous leprosy at the age of 12. He completed the treatment with Dapsone 20 years ago. He had symptoms for cardiovascular disease; left ventricular diastolic dysfunction, hypertension and tachycardia. It was observed during the physical inspection that the lateral eyebrows were lost; there was saddle nose deformity along with flexion deformities in bilateral hands. The magnetic resonance imaging results a mass in the left parasagittal region (Figure 1) after which a surgery was planned. Anaesthesia was provided with total intravenous anaesthesia (TIVA) of propofol and remifentanyl. Monitoring of neuromuscular and the bispectral index were established. There was no change in arterial tension and pulse rate during surgery including intubation and extubation as 2 sign of autonomous dysfunction.

**Conclusion:** The general anesthesia management of the leprosy patient with autonomous dysfunction and cardiac pathologies was carried out with no problem via TIVA.

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## P-35

### Sugammadex Provides Rapid Recovery of TOF, What About Bis?

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**Objective:** After intracranial surgery, it is vital for the patients to regain consciousness in the early stages. Surgeons seek for immediate neurological evaluation. Extubation should be attempted in conscious patients not experiencing problems during surgery or anesthesia and muscle relaxants should be necessarily antagonized to avoid reintubation and to reduce the need for intensive care. Neostigmine has been used as a muscle relaxant antagonist for many years. More recently, sugammadex has been introduced as an alternative. It was demonstrated by TOF monitoring that sugammadex provides rapid recovery of muscle strength (1). Improving muscle strength and responding to voice commands and regaining protective reflexes such as coughing and swallowing and regaining consciousness enhance security after extubation. BIS was used to monitor the degree of loss of consciousness caused by anesthetics such as thiopental, propofol, midazolam and isoflurane (2). In this study, we aimed to compare the increases in BIS values after antagonizing sugammadex and neostigmine with muscle relaxants.

**Methods:** The study included 60 ASA I-III patients (aged 18-65 years) who were scheduled for craniotomy due to supratentorial tumor surgery. Patients who did not receive premedication were randomly divided into two groups. ECG, noninvasive blood pressure and SpO<sub>2</sub> were monitored and vascular access was established using a 120 G intracath and 0.9% SF. Following intubation with thiopental, remifentanyl and rocuronium, the patients were intubated when TOF=0 and

were monitored for invasive blood pressure SVB and diuresis. Anesthesia was maintained with TIVA (50-200 mcg/kg/min propofol + 0.05-0.2 mcg/kg/min remifentanyl + 0.3-0.6 mg/kg/h infusion of rocuronium). Esmolol and ephedrine were used for the prevention of hypertensive and hypotensive attacks respectively. During surgery, TOF and PTK were aimed to be=0 and <10 respectively. After surgery, infusions were ceased and BIS monitoring was initiated. When TOF=2, 2 mg/kg Sugammadex (group S) or 50 mcg/kg neostigmine (group N) was administered. BIS=80, TOF=90 durations and BIS value at TOF=90 and time to onset of spontaneous breathing were recorded. Modified Aldrete Score (MAS) was recorded for 1 hour in patients whose Ramsey Sedation Scale (RSS) reaches 3. When MAS becomes 9, the patients were taken to service. Follow-ups continued for 24 hours. Complications were recorded.

**Results:** Demographic data, duration of surgery and TOF = 0 duration were similar in both groups. TOF=90 (<0.0001) and BIS=80 (<0.005) and time to onset of spontaneous breathing (<0.005) were significantly shorter in Group S. 10-minute Ramsey Sedation Scale was also significantly better in Group S. 10-minute MAS in PACU (post-anesthesia care unit) monitoring was significantly better in Group S. One-hour Modified Aldrete Scores in PACU were similar in both groups. No evidence for residual block was observed in both groups during PACU monitoring.

**Discussion:** Sugammadex provides early recovery in practice but its influence on consciousness can not be demonstrated. Early recovery is a significant advantage for patients who underwent craniotomy. It enables neurological evaluation and postoperative assessment after extubation.

Gelder et al. (1) showed that deep NMB can be achieved in 94% of the patients in 5 minutes with sugammadex. In our study, TOF=90 was found to be significantly shorter. Some researchers found similar improvement in BIS with sugammadex and neostigmine (3). Aho et al. (4) showed early improvement in BIS values with sugammadex. This was parallel with the improvement in EMG. In our study, BIS=80 was significantly shorter and it was also significantly better in 10-minute RSS and MAS.

**Conclusion:** Early recovery in BIS showed that the use of sugammadex is favorable in craniotomy patients. It enables early neurological examination and provides the necessary transports.

## P-36

### Effects of Subanesthetic Doses of Ketamine During Stable Target Controlled Infusion (TCI) General Anaesthesia-A Case Report

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**Objective:** Ketamine is an intravenous anesthetic with analgesic properties in subanesthetic doses. The underlying phar-

macology of ketamine is fundamentally different from that of other hypnotic and analgesic agents. The purpose of the present work is to evaluate the effect of a bolus of ketamine in the bispectral index (BIS), spectral edge frequency (SEF), density spectral array (DSA), cerebral oximetry (rSO<sub>2</sub>) and mean arterial pressure (MAP), during a stable target controlled infusion (TCI) general anesthesia.

**Methods:** A 43 years old male, ASA I, patient undergoing elective surgery for excision of a spinal cord lesion, was submitted to a general anesthesia with a TCI of propofol (200 mL/h until loss of consciousness) and remifentanyl (effect site concentration 3 ng/mL). After induction of anesthesia, the rSO<sub>2</sub> baseline value was defined. When a stable BIS value (45-55) was achieved, with MAP higher than 70% of patient basal value and PaCO<sub>2</sub> between 34-42mmHg we started the automatic recording of BIS, SEF, DSA, rSO<sub>2</sub> and MAP. These data were recorded during 9 minutes. Subsequently, we administered a bolus dose of 1mg/Kg of ketamine and the same parameters were registered for additional 9 minutes. The obtained data was analysed with several measures of central tendency and statistical dispersion; extreme values were also defined.

**Results:** The baseline mean value (standard deviation - SD) for BIS was 40(6,9) and 50(6,7), for left and right hemispheres, respectively. After the administration of ketamine the mean (SD) value for BIS was 67(5,3) for left hemisphere and 67(6,1) for right hemisphere. The maximum recorded value was 75. The baseline mean (SD) for SEF values was 16(0,8) for left hemisphere and 17(0,9) for the right. With the ketamine, the mean (SD) of SEF values was 22(2,4) and the higher recorded SEF was 25. The obtained results showed that BIS numeric values increased by 40% and SEF values by 30%. The mean (SD) value for MAP was 81(0,9) before and 84(2,0) after the administration of ketamine. The baseline mean (SD) values for rSO<sub>2</sub> were 90(0,9) and 79(1,5) respectively for left and right hemispheres. After the bolus dose, these values were 88(0,3) and 77(0,9). The DSA and the EEG recordings demonstrate a shift towards higher frequencies.

**Conclusion:** These results suggest that a bolus dose of 1 mg/kg of ketamine increases the BIS and SEF values. The DSA and the EEG recordings demonstrate a shift in the frequency range and power distribution. Conversely, the MAP values and rSO<sub>2</sub> remained stable.

## P-37

### Effect-Site Concentrations of Remifentanyl and Pain Scores During Awake Stereotactic Brain Biopsy

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**Objective:** Several anaesthetic techniques have been used to manage patients undergoing stereotactic brain biopsies 1-2. There are several advantages to have an awake patient avoiding general anesthesia: the ideal sedation technique should provide adequate analgesia and depth of sedation without significant cardio-respiratory alterations and fast transitions to a full wakefulness state.

We describe an approach using Target Controlled Infusion (TCI) of remifentanyl with scalp block in patients with cerebral tumoral lesion submitted to stereotactic biopsy.

**Methods:** 10 patients submitted to cerebral stereotactic biopsy were prospectively enrolled in this observational study.

Anesthetic technique was based on TCI of remifentanyl (RF), using Minto Pk model, and selective scalp nerves block with 0.75% ropivacaine. Different critical moments of the procedure were identified (after scalp block, frame placement, burr holes and end of surgery). The effect-site (ES) target concentrations of RF at each step was registered in a proper database, as well as the Verbal Analogue Scale of pain. Changes in ES concentrations of RF were made based on hemodynamic and clinical parameters as pain score and discomfort. Additional

Table 1.

Patient	ES Remi initial	ES after block	ES for frame placement	ES start of surgery	ES end of surgery	VAS at end of block	VAS at end of frame placement	VAS en PACU discharge
1	2.5	2.5	3.0	3.0	2.0	1.0	4.0	2.0
2	3.0	3.0	3.5	4.0	2.5	2.0	3.0	1.0
3	2.5	2.5	2.5	3.0	3.2	2.0	2.0	2.0
4	2.5	2.5	3.0	3.0	2.0	2.0	3.0	2.0
5	1.6	1.2	2.0	2.5	2.0	2.0	2.0	1.0
6	3.0	2.0	3.0	3.0	2.5	3.0	3.0	2.0
7	2.0	2.5	3.0	3.5	2.5	4.0	5.0	3.0
8	2.5	2.0	3.0	3.0	2.2	1.0	2.0	2.0
9	2.5	2.0	2.5	3.0	2.0	1.0	2.0	1.0
10	2.0	2.0	3.0	3.0	2.0	2.0	2.0	1.0
Average	2.4	2.2	2.9	3.1	2.3	2.0	2.8	1.7
SD	0.4	0.5	0.4	0.4	0.4	0.9	1.0	0.7

analgesia was provided with IV paracetamol and parecoxib. TCI of RF was slowly decreased in PACU after the procedure end. Data are expressed as average $\pm$ SD.

**Results:** Data from 10 patients, 6 male, 57 $\pm$ 13 years old, 67 $\pm$ 11 kg weight were collected and are shown in the table.

No respiratory complications were registered as well as neurological events.

**Conclusion:** Scalp block with local anaesthetic and TCI of RF are theoretically a safe and efficient approach for management of patients undergoing cerebral stereotactic biopsies. In this set of patients, we identified the predicted ES concentrations of RF in key moments of the procedure providing good pain control measured by VAS.

The absence of complications and the low VAS scores allow to conclude that this approach constitutes a safe and efficient anaesthetic technique.

### P-38

## 4 N for A Safe Anaesthesia in Pediatric Moyamoya Patients

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Moyamoya is a rare chronic cerebrovascular disease characterized by a progressive obstruction of the terminal vessels of the carotid arteries. The aetiology of the syndrome is not clear and it was thought to be found exclusively in Eastern Asia. In recent reports the syndrome is increasingly diagnosed throughout the world making it one of the important differential diagnosis of cerebrovascular stroke of the childhood.

From 2011 to end of 2013 in total 25 patients with Moyamoya disease from 11 different European countries underwent a revascularisation procedure at the University Children's Hospital Zurich. 22/25 of these patients were of Caucasian descent from Middle and Southeast Europe.

The mean age of our children was 89 months with the youngest child 13/12 months of age and the oldest was 18 years old. As reported in previous studies there is a predominance of female gender; we can only confirm this trend having (18/25) among our patients girls.

There is no proof that one anaesthetic management is superior to another for those revascularisation procedures as long as stability of perfusion pressure, normoventilation, normovolemia and a sufficient analgesia and sedation are assured. Our management was a total intravenous anaesthesia with Propofol, Remifentanyl and Atracurium. All patients were started on an intravenous maintenance hydration to compensate for the preoperative fasting time (4 hours for food and 2 hours for clear liquids). The patients were extubated right after the procedure for an immediate postoperative neurological evaluation.

In most cases the surgical approach was that of a bilateral revas-

cularisation with an intervention and anaesthetic time of several hours (median 578 minutes, min 371-max 812 minutes).

As mentioned above there are 4 important factors to ensure a sufficient cerebral perfusion beyond the stenosis: This is preserving the individual perfusion pressure, normovolemia, normoventilation and no excitation with a sufficient depth of anaesthesia, analgesia and muscle paralysis as continuously controlled by neuromuscular monitoring (TOF).

The individual blood pressure of every patient was evaluated during preoperative assessment and was kept in his normal range by preserving normovolemia with crystalloid and colloid infusions and with vasoactive drugs such as epinephrine, norepinephrine or ephedrine. Close attention has been paid to avoid hyperventilation to prevent cerebral vasoconstriction at any point of the procedure. PaCO<sub>2</sub> was measured by arterial blood gas analysis and continuously monitored by endtidal capnography. The median PaCO<sub>2</sub>-value was 5.13 kPa (min. 3.9- max 6.7 kPa)

For Moyamoya patients it is difficult to determine the minimal acceptable level of hemoglobin. The transfusion threshold was 10 g/dL for the first patients; as most patients got to be transfused we lowered the threshold to 8 g/dL to prevent unnecessary transfusions.

The older patients complained of intensive pain in the intensive care unit and the younger patients were extremely excited; the postoperative pain therapy was Morphine combined with Metamizol and Paracetamol. Some had to be sedated with low doses of Propofol in the first few hours.

All our patients emerged from general anaesthesia without any new neurologic defects. They all demonstrated an excellent outcome without any new neurological deficits.

Based on our experience with 25 children and 57 interventions we think that the choice of anaesthetic technique based on Propofol, Opioids, Atracurium and providing normotension, normoventilation, normovolemia and no excitation is a safe and satisfactory choice for Moyamoya revascularisation in children.

### P-39

## Assessment of Brain Death Diagnosed Patients in Intensive Care Unit

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**Introduction:** Giving a detailed and comprehensible information of patients relatives is an important issue in ICU due to organ transplantation procedure. We aim to analyse brain death diagnosed patients for 2 months period retrospectively.

**Case Presentation:** Five patients have been admitted for two months period to ICU. Demographic and medical records of five brain death diagnosed patients in ICU are summarised in Table 1.

Table 1. Datas of the brain deaths patients

	Age	Gender	Additional Medical Condition	Primary ICU Diagnosis	Glasgow Coma Scale	Period after ICU Admission	Brain Death Diagnosis	Permission for Organ Donation
Case 1	51	Male	Diabetes Mellitus	Inoperative Pons Hematoma	3	48 hr		Yes
Case 2	63	Male	Hypertension	Inoperative Brain Tumor	3	48 hr		No
Case 3	39	Male	None	Inoperative Traumatic SAH	3	24 hr		Yes
Case 4	58	Male	Hypertension	Intracerebral Hematoma	3	48 hr		No
Case 5	50	Male	None	Inoperative Spontan SAH	3	60 hr		Yes

**Conclusion:** Whether Glasgow Coma Scale is 3, this is the first step through brain death diagnosis process.

Brain death is a state which is diagnosed by neurological examination in patients who fulfill some specific criteria. Declaration of brain death diagnosis to patients relatives might occur problematic mind according to public culture, traditions and religion (1). At the present time even though patients have formal acceptance for organ donation, patients relatives acceptance is also obligatory. During organ donation process, rapid diagnosis of brain death and care of donor in ICU have critical importance (2). As a result, declaration of brain death to patients relatives have to be clear and scientific besides, this accelerate the organ transplantation procedure.

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#### P-40

## Prevention and Treatment of Cerebrospinal Fluid Fistulas

Sh Z  
Karil

**Introduction:** Adult skull, an inexpendable bony case, is filled by volume of cerebro spinal fluid (CSF), blood volume and brain tissue volume.

If some of these ones volumes are increased, it must be change in volumes of other two or intracranial pressure (ICP) will be increased.

Volume of CSF depends of: 1. Production in choroids plexus in both lateral and in third and fourth ventricles (at rate of 350-700 ml per 24 hours). 2. Resorption occurs by arachnoids' granulations located primarily in the walls of superior sagittal sinus.

3. The third influence factor for the amount of CSF is free circulation to the second sacral vertebra. The total volume of CSF in any time normally is only 120 mL.

If production, circulation or resorption of CSF is compromised, ICP is increased.

Closed lumbar drainage (CLD) via lumbar subarachnoid catheter has been used in neurosurgery for a several indications such as treating of cranial and spinal fistulas, especially in basilar skull fractures with rhino or otoliquorrhea. CLD was placed to decrease ICP and to aid the healing CSF leaks that occur following dural incisions after craniotomy, by decompressive drainage of CSF for several days.

Lumbar drain placement is contraindicated in patients with a large supra tentorial mass lesion, noncommunicating hydrocephalus, local infection of the insertion site, arachnoiditis, extensive previous lumbar surgery, or severe spinal stenosis.

There have been few reports concerning the use of CLD via lumbar subarachnoid catheter for treatment of CSF fistulas, first time described in 1963. Additionally, few reports have dealt with the use of CLD to prevent CSF fistula developing from tenuous dural closures.

**Patients and methods:** We present our experience with CLD in 89 cases (100%), for a period of 15 years, from January 1998, to the end of June 2013. 52 of patients (58%) were male, 37 (42%) female, average age 34±6 years, the youngest was 15 year boy, the oldest 67 year old; GCS 11-15, and average time of duration of CLD 6±2 days.

Patients were divided in four groups: two groups 46 cases (52%), for prevention of CSF fistulas, and two groups 43 cases (48%) for treating of CSF fistulas.

**First group:** 19 patients (21%) underwent CLD after transphenoidal surgery of pituitary adenoma, to prevent CSF fistulas by lowering of ICP, with 100% success.

**Second group:** 27 patients (31%), underwent CLD to prevent postoperative fistulas in cases with a tenuous dural closure after various surgeries, especially meningioma, with 100% success.

**Third group:** 26 (29%) postoperative CSF fistulas, treated to reduce ICP and amount of CSF to give a time to healing the hole of dura, with 85% success, only 4 (15%), underwent surgery.

**Fourth group:** 17 patients (19%) with posttraumatic rhino and otoliquorrheas, treated to prevent neurosurgery, and only 2 were operated, with 89 % success.

Before lumbar puncture, the patient is positioned on his/her side (left or right) and asked to flex the neck and bring the knees up to his/her chest (in a foetal position). Alternatively, the patient may be asked to sit with his/her head and shoulders forward flexed.

After skin cleaning, isolation and local anaesthesia, we made puncture in lumbar area, usually L<sub>3</sub>L<sub>4</sub>, trough Touhy needle

N<sup>o</sup>16 G, used for epidural anaesthesia, with angulations of about 20° cephalic along the interspinous space in the midline.

After biochemical and microbiological sample, 18 gauge teflon epidural catheter was placed in subarachnoid space about 7-10 cm, and was coursed transversely across the back, slightly up, fixed on the side of the abdomen with transparent fluster, and connected through 3 way stopcock, with graduated drainage bag.

Drainage bag was installed 10 cm below the spine canal, depending of amount of CSF. The teflon catheter has large-diameter holes to minimize occlusion.

**Results:** Adequate flow of CSF is verified through the catheter, and output can be titrated within the range of 5-20 mL of CSF per hour, depending of our needs, to give a time to dura healing. Average amount of CSF drainage was 150- 200 mL per 24 hours, in total 700±200 ml at average period of time 6 days (4-8)

#### **CLD might have some complications:**

Headache in 9 (10%) with nausea is the most common and light complication of this procedure which often responds well to analgesics and infusion of fluids and can often be prevented by laying flat for one to two hours. Patients with persistent positional headaches after drain removal should be evaluated for persistent dural leaks, and sometimes needs suture of the skin or even blood patch in the place where catheter was.

Rarely, there is a contact between the needle and a nerve in the subarachnoid space, and it can result in painful sensations in the leg during the procedure; we appeared that in 8 cases (9%), this is harmless and patients can be warned about it in advance to minimize their anxiety if it should occur.

#### **Serious complications were:**

1. Meningitis we found in 4 cases (5%), in our study and all were successfully cured, without reoperation. Any sediment or coloration of the CSF may indicate infection and should be treated with antibiotics, usually cephalosporin's.

2. Overdrainage such serious complication was found in 7 cases (8%). Patients with a lumbar drainage catheter in place must be closely observed to prevent overdrainage with positional changes, such as standing from a seated or lying position without adjustment of the drain. If there is overdrainage we can correct this with elevation of the drainage bag or temporally stopping of drainage.

Overdrainage might be associated with:

3. Cranial neuropathy (particularly of the 6<sup>th</sup> cranial nerve), and formation of a
4. Subdural hematoma,
5. Pneumocephalus and
6. Nerve injury might be occurred, causing a weakness or loss of sensation, but fortunately we did not appear any of these ones.

We needed to reinstall the catheter only in 6 cases (7%), for different reasons: closure of catheter, bad position, repeated leaks etc., in 4 cases (5%) was two times repeated CLD, and in 2 cases (3%) three times, in coordination with surgeons.

We achieved 100% success in 46 cases in two groups for prevention of CSF fistulas, 19 cases in first and 27 cases in second group.

We found only 4 cases (15%) in the third group, with post-operative CSF fistulas that have been undergone to surgery, with success rate of 85%.

In fourth group, there were only 2 patients (11%) of 17 with posttraumatic rhino and otoliquorrhoeas that have been undergone to surgery.

In total, only 6 (7%) patients of 89 (100%) were operated, or 14% of the 43 patients with fistula.

**Conclusion:** Teflon catheter used in a CLD system, is very simple to install and very effective in treatment or prevention of CSF fistulas, with minimal morbidity and no mortality. With a well-informed medical and nursing staff, complications should be minimal.

## **P-41**

### **The Pain of Traumatic Subacute Cerebral and Spinal Subdural Hematoma Successfully Treated with Surgical Combined Lumbar Drainage**

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**Objective:** To report a rare case of traumatic subacute cerebral and spinal subdural hematoma (SDH) caused pain, successfully treated by surgical evacuation for cerebral subdural hematoma and lumbar drainage for the spinal subdural hematoma.

**Methods:** The authors present a rare case of traumatic subacute cerebral and spinal SDH that caused pain. A 39 years old man developed severe pain in his back and both legs spreaded to head also approximately 3 weeks after an injury in the swimming pool. The patient reported pain in the extremity, buttock, spread to head. There was also paresthesia in the L5 and S1 dermatomes belaterally and a walking difficulty because of severe leg pain. He couldn't assessed his pain severity, the patient cried, shouted repeatedly, hit himself. Magnetic resonance imaging of the lumbar spine revealed a spinal SDH extending from the level of the Th 4-L 5 (posterior part >anterior part).

**Results:** The pain disappeared for 1 day after the cerebral SDH was evacuated by surgical. One day after the surgical drainage the pain attack the patient and it couldn't be treated by any drugs. After the first drainage by surgical, the authors decided to drain the spinal SDH by lumbar puncture at the L3-4 level without surgical exploration. The drained blood was 17 ml, the intensity of the pain decreased considerable

immediately, and he was able to walk independently. The patient recovered uneventfully and a follow-up magnetic resonance imaging 5 days after the procedure revealed appearance of the volume of hematoma less than the volume of hematoma at the pre puncture procedure. Dexamethasone was given post lumbar puncture, 5 mg four time a day for 5 days.

**Conclusion:** Traumatic spinal SDH is extremely rare and is usually associated with intracranial injury. Here, the authors report a rare case of traumatic spinal SDH that caused severe pain associated with head injury but not associated with cervical injury, which the pain was successfully treated by surgical evacuation combined with lumbar drainage.

## P-42

### Brain Hypoxia Due to Electrical Shock

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**Introduction:** High voltage electrical shock (1500 volt, 50 hz) causes injuries that affect many organ and systems with high morbidity and mortality rate. Mortality rate of electrical shocks was reported 3-15% (1). Organ failure and dysfunction were encountered in the alive patients.

**Case Presentation:** The 42-year-old building construction worker weighing 75 kg found in coma due to high voltage electrical shock had a cardiac arrest at the scene of accident and came back to life at 5<sup>th</sup> minute after resuscitation. The intubated patient was brought to hospital by 112 Emergency Service and applied mechanical ventilation (mv) support in the Cardiac Intensive Care Unit (ICU). The first examination of the patient performed in Emergency Service 36 hours after the accident revealed 2°-3° burned fields covering 18% of TBSA according to Lund-Browder Scale and necrotic fields considered as electrical exit site at the distal side of his right foot. The patient was initiated Ringer Lactate, analgesics (tramadol) and antibiotics (duocid 4x2g) according to the Parkland Formula (4xweight(kg)XTBSA burned). ICU examination revealed intubated patient with spontaneous eye opening, unconsciousness, GCS:7, (+) pupillary light reflex and isochoric pupils and without no response to painful and verbal stimuli. The patient demonstrated TA:120/80, PHR:110/min, bilaterally equal and crude breath sounds, comfort abdomen, normoactive bowel sounds, present and sufficient diuresis (50ml/hour) and normal urine color. Following admission, percutaneous tracheostomy and percutaneous endoscopic gastrostomy (peg) were opened. Mechanical ventilation was initiated on SIM-VC mode (FIO<sub>2</sub>:40%, PEEP: 3 mmHg,TV: 550 mL/min,f:14/min, PIP:20 cmH<sub>2</sub>O). GCS did not exceed 7. In the 3<sup>rd</sup> admission day,brain hypoxia was diagnosed based on detecting ischemic fields on basal ganglia and increased density by Cranial MRI. In the 8th admission day, amputation was performed from proximal portion of the first, second, third and fourth metatarses. In the 15<sup>th</sup> admission day, es-

charotomy+grafting operation was performed. The patient underwent burn wound dressings under sedoanalgesia. The spontaneous respiration of the patient was insufficient. The patient was connected to home respirator on SIMV-PS mode. The patient with a clinical picture revealing GCS:7 and a vegetative state was transferred to intensive care unit of public hospital in the 60th admission day.

**Conclusion:** We conclude that our patient had brain hypoxia triggered by post CPR anoxia associated with duration of high voltage electrical shock and burn-induced brain injury.

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## P-43

### Cerebral Tissue Oximeter as a Tool in the Diagnosis of Brain Death

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**Objective:** Diagnosis of brain death in a potential organ donor may depend on time-consuming and expensive testing. Continuous measurement of absolute cerebral tissue saturation (StO<sub>2</sub>) may be a quick and non-invasive tool in the diagnosis of brain death.

**Methods:** The Fore-Sight<sup>®</sup> cerebral tissue oximeter was used to monitor StO<sub>2</sub> in patients with severe brain damage admitted to the ICU. During the study period two patients were diagnosed brain death and recordings of their StO<sub>2</sub> were analysed retrospectively.

## Results:

**Patient 1:** Male (48y), cerebral trauma with severe bi-frontal contusions and diffuse cerebral oedema. On day 5, intracranial pressure increased over several hours until it equilibrated with mean arterial pressure. StO<sub>2</sub> decreased from 70% to 60% during this time period. Brain death was diagnosed clinically (absence of brainstem reflexes). However, StO<sub>2</sub> remained at 60%.

**Patient 2:** Male (15y), asystole after hanging with restoration of spontaneous circulation after CPR and ALS. Upon admission to the ICU, StO<sub>2</sub> was 67%. 72 hours later a steep decrease in StO<sub>2</sub> to 55% was recorded over the right side. The left side remained at 65%. 12 hours later brain death was diagnosed clinically and confirmed with a flat EEG, with StO<sub>2</sub> at 55% (R) and 65% (L). Parallel to an increase of pCO<sub>2</sub> during apnoe-testing, a transient increase of StO<sub>2</sub> was observed, reflecting increased cerebral bloodflow due to vasodilatation. Only at circulation stop during organ prelevation procedure, StO<sub>2</sub> quickly decreased to 25%.

**Conclusion:** StO<sub>2</sub> can remain within the normal range in brain death patients. The pathophysiological basis of the changes in StO<sub>2</sub> and its use in clinical decision making needs further investigation.

#### P-44

### Prognostic Significance of Arrhythmia Episodes Occurring During Removal of the Posterior Cranial Fossa Tumors

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**Objective:** During operations on the posterior cranial fossa tumors anesthesiologists observe episodes of arrhythmia in some patients. Most often it is bradycardia due to irritation of special centers or nuclei of cranial nerves, associated with regulation of blood pressure and heart rate. Clinically, they appear as changes in blood pressure, heart rate, heart rhythm, EEG clearly associated with the manipulation in the operating wound. When the surgical manipulation is terminated all the indicators return to their previous level within 1-2 minutes. Repeated exposure to this same area is accompanied by the same set of reactions. We call them "arrhythmias associated directly with the actions of the surgeon". Less often can be observed episodes of arrhythmias unrelated to actions of the surgeon. They are characterized by persistent, gradual increase in blood pressure, changes of heart rate, and signs of depression in bioelectric activity of the brain on the EEG. Brain becomes tense, bleeding increases.

**Methods:** We analyzed 110 patients with the posterior brain fossa tumors with extracerebral localization. The episodes of arrhythmia occurred in all cases. 93 of them were "arrhythmias associated directly with the actions of the surgeon" and in 17 cases-unrelated.

**Results:** 38 patients (41%) with arrhythmias associated with the actions of the surgeon and 10 patients (58.9 %) with arrhythmias not associated with surgical manipulation in the early postoperative period demonstrated the increase of neurological symptoms. Hemodynamic instability and / or a heart rate disorders (bradycardia, arrhythmia, tachycardia) in the postoperative period were observed in all patients with arrhythmias "not associated with the actions of the surgeon" and only in 50% of the patients with "arrhythmias associated with surgical manipulations". Also in these patients we observed complications during early postoperative period.

**Conclusion:** Thus, patients with arrhythmias occur during the removal of the posterior cranial fossa tumors more often demonstrate complications in the early postoperative period and increase in neurological deficit than patients in whose cases the episodes of arrhythmia were not observed.

#### P-45

### Near Infrared Spectroscopy During Aneurysm Re-Rupture in Subarachnoid Hemorrhage

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**Introduction:** Near infrared spectroscopy (NIRS) is a non-invasive, continuous technology that relies on the relative transparency of tissues to near infrared light to determine tissue oxygenation (rSO<sub>2</sub>). It can help in diagnosing of vasospasm following spontaneous subarachnoid hemorrhage (SAH), as well as early intra-procedural neurointerventional complications.

We report a case of a sudden impact on rSO<sub>2</sub> during aneurysm coiling due to re-rupture of the aneurysm and consequent catastrophic SAH.

**Case Presentation:** A fifty-year old female patient with a history of hypertension was transferred from a secondary setting to our tertiary center due to severe spontaneous SAH (WFNS grade IV) caused by rupture of the basilar artery aneurysm. When admitted to a local hospital, she was alert and oriented, complaining on severe headache. However, during the assessment, her consciousness deteriorated and she was intubated, sedated and mechanically ventilated. After admission to our institution she underwent neuroradiological evaluation with digital subtraction angiography and coiling of the aneurysm was chosen as the best option to exclude aneurysm from the circulation. During the procedure an abrupt re-rupture of the aneurysm occurred. Re-bleeding was accompanied with a sudden decrease in rSO<sub>2</sub> values for more than 25% on the left side and for more than 20% on the right side and confirmed with CT scan. Hydro/hemathocephalus and a diffuse brain swelling were seen as well. Despite aggressive conservative antiedematous treatment and external ventricular drainage insertion, her clinical condition deteriorated due to severe cerebral edema not reacting on any therapy and the patient died on the next day.

**Conclusion:** Clinical studies and case reports have demonstrated in a variety of clinical settings the ability of NIRS monitoring to detect episodes of cerebral ischemia. Our case report demonstrated that NIRS monitoring has a potential role in neurointensive care as well as during neuroradiological procedures, for example, for early detection of SAH re-bleeding due to procedural complications such as re-rupture of the aneurysm.

P-46

## Cerebral Oximetry Desaturation During Neurosurgery Performed in Sitting Position

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**Objective:** Sitting position is still being used for patients undergoing cranial operations. These patients have increased risk for serious neurocognitive complications as a result of cerebral ischemia. Near-infrared spectroscopy (NIRS), a noninvasive technique allows continuous monitoring of cerebral oxygenation and demonstrates desaturation episodes accurately. In this case report we are presenting regional cerebral tissue oxygen desaturation (rSO<sub>2</sub>) during craniotomy operation for glioblastoma multiforme performed in sitting position.

**Clinical Features:** A 20 years old, female patient was taken to elective craniotomy operation at the Neurosurgery Clinic. Her past medical history, preoperative laboratory studies and physical examination was unremarkable. Anaesthesia monitoring consisted of three-lead electrocardiography, non-invasive blood pressure, capnography, peripheral pulse oximetry, precordial doppler ultrasound, central venous pressure. rSO<sub>2</sub> was determined by NIRS with an INVOS (INVOS 3100; Somanetics, Troy MI, USA) cerebral oximeter. After cleansing the forehead with an alcohol wipe; two noninvasive NIRS sensors were applied bilaterally to the frontotemporal area with the medial margin at the midline of the forehead and lower margin 1 cm above the eyebrow, thus avoiding the temporalis muscle. After 1 minute, a preoperative rSO<sub>2</sub> baseline was obtained and recorded for both hemispheres 75-80%. After the insertion of 16-gauge intravenous catheter, anaesthesia was induced using intravenous administration of fentanyl 2 µg/kg, pentothal 4 mg/kg. Orotracheal intubation was facilitated by rocuronium 0.6 mg/kg. Anaesthesia was maintained with propofol (8 mg/kg/h) and remifentanyl (0.25 µg/kg/h). Patient was taken to sitting position. A significant decrease in rSO<sub>2</sub> (65-66%) was observed. Non-invasive arterial pressure was 92/47/61 mmHg. To avoid cerebral vascular injury fluid and ephedrine (5 mg) boluses were given at that time and when indicated. Surgery was completed uneventfully. The patient was awake, alert and responsive postoperatively. The patient was discharged from the hospital at the 15 th postoperative day with full recovery.

**Conclusion:** Cerebral oximetry with NIRS allows prompt identification and treatment of cerebral hypoperfusion. Due to this interaction, it would be better to monitor cerebral oximetry improves patient safety during neurosurgery performed in the sitting position.

P-47

## Successful Treatment of a Pregnant Patient Followed Up in the Intensive Care Unit Due to Brain Abscess

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**Introduction:** Though brain abscess is observed rarely in pregnancy, it may result in a poor prognosis for both the mother and the baby. It often develops secondarily after bacterial infections and the mortality rate is around 30%. In this study, we aimed to present the successful treatment of a pregnant patient kept in the intensive care unit due to brain abscess.

**Case Presentation:** The 24-weeks pregnant patient aged 26 years old and with G1P0Y0 was found unconscious at her home and brought to the emergency service. During the evaluation in the emergency service, the patient was on spontaneous respiration, her eyes were open and gave extensor response to the painful stimulant at the upper extremity and demonstrated minimal extraction at the lower extremity. In the cranial MRI applied to the patient whose Glasgow Coma Score was 7/15, areas compatible with the multiple micro abscesses were observed in the bilateral parietal lobe. The patient demonstrating neck stiffness, high CRP and leukocytosis was suggested to be followed in the intensive care unit with pre-diagnoses of meningitis, septic emboli and cardiac emboli by the neurology and infection diseases department. The cardiology department applied echocardiography and trans-esophageal echocardiography. No infective focus was detected. The patient who received lumbar puncture after taken to the intensive care unit demonstrated BOS biochemical values in compatible with the bacterial meningitis; however no fertility was detected in the culture. While the patient whose antibiotherapy (ceftriaxone and vancomycin) was regulated was being followed up in the spontaneous respiration, a respiratory problem arose on the 3th day and upon this, the patient was intubated and connected to the mechanical ventilator. After the patient was followed up on mechanical ventilator for 9 days, she was extubated and received respiratory physiotherapy. The women diseases and birth clinic applied daily ultrasonography. No pathology was observed in the baby. On the 27<sup>th</sup> day, control cranial MRI was applied. Although there was a clinical recovery, it was detected that the lesions increased in terms of number and size. The recovery in motor functions was very slow in neurological examination. On the 32<sup>nd</sup> day, the power loss was 4/6 in the upper extremity and 3/6 in the lower extremity. It was deemed appropriate for the patient to be followed up in infectious diseases clinic.

**Conclusion:** The immunity of the mother decreased due to hormonal imbalance during pregnancy. For this reason, life-threatening infections such as brain abscess can be ob-

served though rarely. The infection focus in these patients can be related with dental problems or helicobacter pylori. However, no focus was detected in our patients. The symptoms of brain abscess are often headaches (75%), neurologic anomalies (58%) and changes in consciousness (67%). MRI is safe out of the first trimester. In the treatment of brain abscess, use of antibiotics peculiar to bacteria growing in the culture and passing through blood-brain barrier for 6-8 weeks is suggested. Early and appropriate treatment saves lives.

## P-48

### Powder Allergy Observed with Convulsion

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**Introduction:** Cornstarch powder (powder) was firstly used to ease wearing medical latex gloves. The glove powders are dangerous for the health of both the personnel and the patients. In this study we aimed to present the powder allergy observed with postoperative tonic-clonic convulsion.

**Case Presentation:** The male patient aged 67 years old was operated by the urology clinic due to malign kidney neoplasm. The patient has been diagnosed with DM, HT and Prostate Adeno Ca. The patient receiving left open radical nephrectomy under general anesthesia demonstrated stability during operation. The patient was extubated without any problem after the operation and taken to the intensive care unit (ICU) after the operation. In the physical examination performed when being taken to the ICU, the general condition was moderate, the patient was conscious and giving motor responses to the painful stimulant. The Fever: 36.6°C, TA: 155/70 mmHg, PR: 72/min. The laboratory findings were within normal boundaries. On the postoperative 1<sup>st</sup> day, the patient underwent tonic-clonic convulsion and received 3 mg intravenous midazolam. However, the patient developed tonic-clonic convulsion again on the 2<sup>nd</sup> day and upon this neurology consultation was requested. Cranial computed tomography was applied to the patient. Since no pathologic findings were detected, cranial MRI was applied. Cranial MRI findings were also normal. Neurology clinic suggest application of 6x400 mg infusion of valproate sodium. On the 3<sup>rd</sup> day of the follow-up, the patient became conscious. In the anamnesis taken from the family, we were informed that the patient had similar complaints after the operation due to Prostate Ca 3 years before; an allergy test was applied to the patient and powder allergy was detected. On the 3<sup>rd</sup> day of the follow-up in the ICU, the patient was conscious, had full cooperation, laboratory findings were normal and the vital findings were stable; and therefore the patient was transferred to the urology clinic.

**Conclusion:** Cornstarch powders cause toxicity in all tissues in the body. Particularly in sensitized persons, latex may function as an allergen and lead to allergic reactions threat-

ening life. 10 years before, use of cornstarch powder was banned in England and Germany due to its negative effects on recovery of wounds apart from being an allergen. Our patient demonstrated isolated tonic-clonic convulsion without demonstrating any allergic reaction. After ceasing exposure to the powder, our patient did not demonstrate convulsion again. It should be taken into consideration that the patients demonstrating convulsion after surgical processes may have powder allergy.

## P-49

### Case Series of 24 Patients with Intracranial Hypotension Treated by Epidural Blood Patch

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**Objective:** A retrospective study of all patients in our hospital treated with epidural blood patch for intracranial hypotension diagnosed by a neurologist over 3 years. We examined the: symptoms, investigations prior to treatment, number of blood patches performed, effect of them and any complications.

**Methods:** Using data from case notes we looked at: symptoms, investigations for diagnosis and patient preparation for blood patch. We examined the number of blood patches performed, spinal level, amount of blood injected and if it was targeted using X-ray or CT scan. Their effectiveness was evaluated from patient report at 24 hours and follow up clinic.

**Results:** We looked at 24 patients. Symptoms: All patients presented with postural headache. 4 presented with diplopia, 4 had hearing changes, 5 had dizziness and 3 had confusion. 3 patients had a depressed level of consciousness, 2 of them requiring intubation and ventilation.

Investigations and results: 22 patients had MRI scans. 14 patients had MRI findings for intracranial hypotension. These included: subdural collections, meningeal enhancement, slumping of the midbrain and descent of the cerebellar tonsils through the foramen magnum. 8 patients had no MRI findings for intracranial hypotension.

Blood patches: 22 patients had lumbar, 2 had thoracic and 1 a subsequent cervical epidural blood patch. 2 of these used X-ray and 1 required CT guidance. 15-30ml of blood was injected in the lumbar and thoracic blood patches and 7ml was injected in the cervical one.

Number of blood patches and effect of treatment: 16 patients had subsequent resolution of symptoms: 10 required 1 blood patch, 3 required 2 blood patches and 3 required 3 or more blood patches.

8 patients had no resolution of symptoms at follow up: 4 had 1 blood patch, 2 had 2 blood patches and 2 had 3 or more. 1 of these 8 patients had surgery, with resolution of symptoms.

Complications of the epidural blood patch: 1 patient complained of back pain and 1 patient had pain in the right leg on injection of blood, both of which resolved within 24 hours.

**Conclusion:** Epidural blood patch is a safe and effective treatment for intracranial hypotension. There was no MRI evidence of intracranial hypotension in the 8 patients for which epidural blood patch was not effective. Therefore, MRI evidence is mandatory for treatment to be successful. If symptoms persist after 1 blood patch, with such evidence, it is worth repeating.

## P-50

### Cerebral Oxygenation and Neurocognitive Outcome After Arthroscopic Shoulder Surgery

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**Objective:** The beach chair position (BCP) is commonly used in arthroscopic shoulder surgery because of its good intra-articular visualization without traction of the brachial plexus. However, this position is associated with reductions in mean arterial pressure and cerebral oxygen saturation (SctO<sub>2</sub>). A series of case reports described dramatic adverse neurological events after shoulder surgery in BCP. Furthermore, subtle changes in neurocognitive functioning induced by cerebral hypoxia may go unnoticed without extensive monitoring.

**Methods:** After IRB approval and with written informed consent, we included 70 consecutive patients scheduled for elective arthroscopic shoulder surgery under general anesthesia in the BCP or lateral decubitus position (LDP). Anesthetic management was similar in both groups. Allocation into BCP and LDP groups was determined by surgical preference. SctO<sub>2</sub> monitoring was started before induction of anesthesia and continuously measured throughout surgery with the FORE-SIGHT technology (CASMED). Intra-operative decline of SctO<sub>2</sub> ≥20% from baseline or absolute values ≤55% was defined as cerebral desaturation event (CDE). Patients were subjected to pre- and postoperatively neurocognitive testing for memory (SRT), attention (CVST, symbol digit) and executive functioning (stroop). As control group, 42 healthy volunteers were subjected to the same neurocognitive tests at the same time-interval.

**Results:** The three groups were equal concerning age (BCP: 54 years ± 9, LDP: 53 years ± 11, control: 55 years ± 5; p=0.537) and

sex (p=0.478). Thirty-eight patients underwent surgery in the BCP, 32 in the LDP. Length of anesthesia between these two groups was not significantly different (BCP: 95 min ± 36 vs LDP: 87 min ± 26 p=0.258). Pre-induction SctO<sub>2</sub> values were equal in both patient groups with 71% ± 4 and 71% ± 4 for patients in BCP and LDP respectively (p=0.481). Patients in the BCP (59% ± 5) showed significantly lower perioperative SctO<sub>2</sub> values compared to patients in LDP (69% ± 4) (p<0.001). The incidence of CDE during surgery was 24% in the BCP group compared to 0% in the LDP group.

Healthy volunteers showed no significant difference (with a trend towards improvement) in neurocognitive results between the first and second tests. Patients who underwent surgery scored significantly less in postoperative memory-tests (SRT) compared to pre-operative tests (p<0.001). However, there was no significant difference between the two patient groups on postoperative testing results.

**Conclusion:** These preliminary results show that shoulder surgery in the BCP is associated with significantly lower SctO<sub>2</sub> values compared with the LDP. Furthermore, CDEs occurred in 24% of the patients in BCP. First analysis of the raw data from the neurocognitive tests revealed no differences between both groups.

## P-51

### Transfusion Requirements in Craniotomy

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**Objective:** Craniotomy is a surgical operation in which a bone flap is temporarily removed from the skull to access the brain and is often a critical operation performed on patients suffering from brain lesions or traumatic brain injury. In this study, we aimed to evaluate transfusion requirements in patients undergoing craniotomy operations.

**Methods:** Data of all patients, who were operated in our hospital's neurosurgery clinic in the year 2013, were studied retrospectively and 159 patients were included in this study. Pediatric patients and emergency operations were not included, only elective craniotomy operations were included. Demographics, operation type, preoperative hemoglobin level, operation duration and transfusion amount were recorded.

**Results:** Mean ± SD age of all patients was 48,70 ± 18,38 years, 65 were female and 94 were male. Intracerebral tumors were operation reasons in 47,79%, aneurysms in 25,78%, meningioma in 5,6%, supratentorial tumors in 5,6%, recurrent malignancies in 5,6% and other reasons 9,63% of the patients. Preoperative hemoglobin level was 13,23 ± 7,28 g/dL. Operation time was 266,87 ± 7,07 minutes. RBC was transfused in 18 (11,32%) patients (1 U RBC in 6 patients, 2 U RBC in 8 patients, 3 U in 2 patients and 6 U in one patient);

FFP was transfused in 2 patients. Postoperative hemoglobin level was  $12.38 \text{ g/dL} \pm 3.95 \text{ g/dL}$ .

**Conclusion:** Craniotomy operations in our hospital's neurosurgery clinic did not require increased blood transfusions. Transfusion amount was 0.21 U per patient. With 29.7% aneurysms and 29.7% intracerebral tumors required most of the transfused RBC.

## P-52

### Subdural Hematoma Caused by Sildenafil in a Patient with Glanzmann's Thrombasthenia

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Glanzmann's Thrombasthenia is a rare inherited platelet disorder, characterized by lack of platelet aggregation due to a defect in the platelet membrane receptor complex (IIa/IIIb) for fibrinogen. Bleeding is a common clinical manifestation. Sildenafil should be used with caution in patients prone to bleeding. Subdural hematoma is commonly related to severe head injury and mortal.

An unconscious 59 years old male, living in a different country applied to the emergency department of our hospital and was accompanied by his friends. He had a history of sildenafil intake, but history of Glanzmann's Thrombasthenia was not known by his friends. Physical examination and laboratory findings indicated subdural hematoma. He was immediately referred to the operation room, where he was spontaneously breathing with a Glasgow Koma Score (GKS) of 5. When intravenous access was provided, bleeding was observed even around the intravenous catheter. Perioperative surgical hemostasis could be achieved only after thrombocyte apheresis infusion. The patient was suspicious of a bleeding disorder. A total of 3 Units of fresh frozen plasma (FFP), 3 Units of red blood cells (RBC) and 2 Units of thrombocyte apheresis were infused, tranexamic acid and Vitamin K were given to maintain hemodynamical stability. At operation end the orotracheally intubated patient was transported to the neurosurgical intensive care unit (ICU). He underwent two more intracranial operations the same day. When his family members came to visit him, history of Glanzmann's Thrombasthenia arose. He received a total of 6 U FFP, 8 U RBC and 6 U apheresis during 12 days of ICU admission and died.

Anesthetic management is challenging in Glanzmann's Thrombasthenia, because of difficulty in invasive procedures and maintaining hemostasis due to bleeding. In emergency cases the operating team should be aware of bleeding disorders, when they encounter a prolongation of the bleeding time, and think of thrombocyte replacement.

## P-53

### Anesthesia for Pediatrics with Meningomyelocele

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**Objective:** Meningomyelocele is a type of spina bifida, a kind of birth defect in which the spinal canal and the backbone don't close before birth. In this study, we aimed to evaluate our anesthetic management in pediatrics undergoing meningomyelocele operations.

**Methods:** Data of all patients, who were operated in our hospital's neurosurgery clinic in the year 2013, were studied retrospectively and 10 patients, who underwent an operation because of meningomyelocele, were included in this study. Demographics, amount of propofol, fentanyl, rocuronium, intubation tube, neuromuscular blocker antagonisation and operation duration were recorded.

**Results:** Mean  $\pm$  SD age of all patients was  $45.8 \pm 0.70$  days, 6 were female and 4 were male. Weight was  $4380 \pm 707$  gr. One patient was orotracheally intubated at admission to the operation room, 2 patients received anesthesia induction with sevoflurane, 7 patients received propofol for anesthesia induction. Propofol amount was average  $13.7 \pm 7.07$  mL, fentanyl  $4.4 \pm 2.12$   $\mu\text{g}$  and rocuronium  $2.8 \pm 0.35$  mg. Intubation tubes were uncuffed number 3.0 in 50% of patients (smallest cuffed 2.0 and biggest cuffed 4.0). Operation duration was  $125 \pm 7.07$  minutes. Neuromuscular blocker antagonisation was done with sugammadex in 3 patients, atropin-neostigmine in 3 patients and none in 4 patients. 2 patients were transported orotracheally intubated to the pediatric ICU.

**Conclusion:** Meningomyelocele operations consider increased attention of the anesthesiologist, because of the very young patient population. Propofol seems to be a safe agent for anesthesia induction even in these patients. Sugammadex seems also to be safe. For further conclusions prospective clinical studies need to be provided.

## P-54

### A Case of Horner's Syndrome Following Interscalene Brachial Plexus Block Monitored with Near-Infrared Spectroscopy and Transcranial Doppler

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**Introduction:** Interscalene brachial plexus block (ISBPB) is a popular upper extremity block for postoperative analgesia

after shoulder surgery. A potential side effect is however a Horner's syndrome due to an inadvertent blocking of the stellate ganglion (incidences 1% to 12%) [1]. We report on the cerebral effects of a Horner's syndrome by near-infrared spectroscopy (NIRS) and transcranial Doppler (TCD) monitoring.

**Methods:** A healthy 43-year old man was scheduled for elective arthroscopic decompression of his right shoulder. After skin preparation and local infusion of lidocain, ultrasound guided ISBPB was performed using 30 mL of 0.7% ropivacaine. Cerebral tissue oxygen saturation (SctO<sub>2</sub>) was continuously measured before and during 20 minutes after ISBPB using FORE-SIGHT™ technology (Casmed) with sensors applied bilaterally to the frontotemporal area. Cerebral blood flow velocity in the middle cerebral artery (CBFV<sub>MCA</sub>) at the ipsilateral side of the ISBPB was measured before and 20 minutes after the ISBPB using TCD (SONARA/tek™, Natus neurology).

**Results:** Before ISBPB, SctO<sub>2</sub> was identical on both sides (77% on the right and 76% on the left side) and the patient had a mean CBFV<sub>MCA</sub> of 46.2 cm/sec and a pulsatility index of 1.08. Immediately after ISBPB, SctO<sub>2</sub> started to change even before clinical signs of Horner's syndrome became visible. More specifically, at the blocked side, SctO<sub>2</sub> increased from 77% to 83% at 20 minutes after ISBPB. On the non-blocked side however, SctO<sub>2</sub> decreased from 76% to 70%. At the same moment, there were no relevant changes in vital parameters (blood pressure, heart rate or peripheral oxygen saturation). Neither did we observe any significant change in TCD recordings, nor in mean CBFV<sub>MCA</sub> (42.4 cm/sec) nor in pulsatility index (0.90) compared to the baseline measurements.

**Conclusion:** Horner's syndrome after ISBPB led to diverging SctO<sub>2</sub> values between the blocked side and the non-blocked side. However, there was no relevant difference observed in CBFV<sub>MCA</sub> at the blocked side before and after ISBPB. From this case report it is not yet clear if the observed change in SctO<sub>2</sub> values is caused by extracerebral and/or intracerebral changes in oxygen saturation, due to the stellate ganglion block.

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#### P-55

### Anesthetic Management in a Newborn Infant with Giant Occipital Encephalocele

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**Introduction:** Encephalocele is a midline cranial fusion defect and it is characterized with protrusion of meninges and cerebrum localized in the occipital region. We aimed to pre-

vent the anesthetic management of a newborn infant with a giant occipital encephalocele.

**Case Presentation:** A 4340-g baby girl was born via cesarean section at 41 weeks and 5 days of gestation from a 25-year-old G2P2 mother. She was transferred to our hospital's neonatal intensive care unit (NICU) due to a cervical mass. The cerebral/cervical MRI examination revealed a 15x12 cm lesion compatible with occipital encephalocele associated with Dandy Walker malformation. In the NICU she was breathing spontaneously, and received i.v. dopamine and p.o. sildenafil treatment due to pulmonary hypertension. The patient was transferred to the operating room without any premedication and after standard monitoring with ECG, NIBP and SpO<sub>2</sub>, anesthesia induction was achieved with 8% sevoflurane in 100% O<sub>2</sub> in the lateral position. After maintaining peripheral venous line, 2mcg/kg fentanyl and 0.5 mg/kg rocuronium were added and endotracheal intubation was achieved without any problem with a 3.0 size uncuffed tube in the lateral position. Then the baby's position was changed to prone. Encephalocele sac was suspended via a fixed setup with fixation sutures. At the end of the operation that lasted for 1.5 hours without any problem, the baby was transferred to the NICU. The patient was extubated at the same day and discharged at the postoperative 4<sup>th</sup> day.

**Conclusion:** Giant occipital encephalocele sacs can limit the motion of the atlanto-occipital joint and may cause difficult intubation. To give optimum position to patients for both airway management and surgery several positions including lateral position were suggested (1). Draining the sac before surgery is one of the suggestions. Lateral position has advantages over supine position to avoid reflection of the weight of the head to the sac. Anesthesiologist has to be aware of possible problems in the airway management.

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#### P-56

### Posterior Reversible Encephalopathy Syndrome

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**Introduction:** Posterior reversible encephalopathy syndrome (PRES) is a condition manifested by altered mental status, seizures, headaches, and visual loss. Early recognition is importance for prompt control of blood pressure or removal of precipitating factors and treatment of epileptic seizures or status epilepticus. Delay in the diagnosis and treatment may in fact results in death or in irreversible neurological sequelae.

We want to discuss PRES in the light of 5 years old pediatric case who has hemolytic uremic syndrome(HUS).

**Case Presentation:** A 5 years old boy admitted to pediatrics clinic with the complaint of abdominal pain,diarrhea and vomiting which are followed by decreased urine output. The patient was unuric for last 2 days. His lab test levels was BUN 205 mg/dL,creatinin 4.9 mg/dL, potassium 4.9 mmol/L, AST 131U/L, ALT 84U/L, LDH1210U/L, WBC 17,6/mm<sup>3</sup>, Hgb 7.2 gr/dL, Hct 21.2%, PLT 97000/mm<sup>3</sup> and peripheral blood smear showed fragmented red blood cells which is a sign of hemolysis. Acute renal failure, hemolytic anemia and trombocytopenia suggested HUS in this case and patient was referred to hemodylisis unit. During hemodylisis the patient had a epileptic seizure and fallowed at intensive care unit. In the second day of his treatment the patient had a second epileptic seizurewhich was followed with pulmonary edema. Due to hypoxia and insistent convulsions,the patient was entubated and support by mechanical ventilation. The level of ultrafiltration was increased in order to obtain negative fluid balance.The patient was extubated at the 20<sup>th</sup> day of his intensive care. The patient had intermittant epileptic seizures and hipertension attacks. His cranial CT,MRI suggested Hipertensive Reversible Encephalopathy. He treated with oral hipertension drugs and become normouric at the 48th day. He was discharged at the 60th day of his admittance.

**Conclusion:** The mechanism is not entirely understood but is likely related to hyperperfusion with blood-brain barrier breakthrough, extravasation of fluid containing blood or macromolecules, and resulting cortical andsubcortical edema.Causesof PRES include eclampsia, hypertension, immunosuppressive agents, and cytotoxic chemotherapy. Most recently, bevacizumab, a monoclonal antibody that binds to the vascular endothelial growth factor(VEGF) has been linked to PRES. Imaging findings include subcortical edema, predominantly involving the parietal and occipital lobes.

## P-57

### Maintaining the Balance Between the Airway Pressure and the Intracranial Pressure: Patient Undergoing Craniotomy with Tracheal Stenosis, A Case Report

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**Introduction:** Tracheal stenosis is a rare but a life-threatening condition and anesthesia of a patient with tracheal stenosis is challenging for anesthesiologists. Also anesthetic management of craniotomy requires special attention to maintain stable cerebral hemodynamics. We describe a case who had tracheal stenosis undergoing craniotomy for supratentorial mass.

**Case Presentation:** A 58-year-old woman admitted to hospital for intracranial mass. She had tracheal stenosis because of prolonged intubation. Since then she is having dyspnea, ortopnea and limited effort capacity. In her preoperative evaluation, her breath sounds were rough, arterial blood gas analysis indicated mild impairment of oxygenation and the stenosis was 2 cm distally to vocal kords in thorax CT. We were prepared for difficult intubation. Induction was maintained with pentothal and after ensuring safe mask ventilation rocuronium was given. When laryngoscopy applied the stenosis could be seen just under the vocal cords and Cormack Lehane score was I. At first intubation attempt tube number 7 tried but could not pass the stenosis, then 6 and the 5.5 no tubes tried. We did not want to use a smaller tube because the increased airway pressure would compromise the cerebral pressure .We decided to see ventilation parameters with tube no 5.5. Even we could not pass the tube distally to the stenosis, we could manage ventilation. In case of failure with the ventilation we were ready for tracheostomy. We set tidal volume 400 ml, frequency as 14/ min, the peak pressure was 27 and ETCO<sub>2</sub> was 35 mmHg. We followed the peak pressure and ETCO<sub>2</sub> values. As airway peak pressure and ETCO<sub>2</sub> remained stable, we decided to perform the surgery. The parameters were stable during surgery for 6 hours. After surgery the patient extubated safely, and followed in ICU.

**Conclusion:** Maintaining stable hemodynamics and ventilation parameters are important issues in neuroanesthesia. Any increase in airway peak pressure and ETCO<sub>2</sub> will result in increase in intracranial pressure which must be avoided during craniotomies. Tracheal stenosis could be a reason for increased airway pressure. Patients with tracheal stenosis undergoing craniotomies would need special attention about these issues. Detailed preparation for intubation, to stabilize airway dynamics and to make the right decision for the surgery were important points. Maintaining a good balance between cerebral dynamics and airway dynamics were the pearls of this case.

## P-58

### Bis Monitoring May Help Detection of Intraprocedural Rupture of Intracranial Aneurysms During Balloon-Assisted Coiling

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**Objective:** Endovascular coiling is an established modality of treatment for intracranial aneurysms. Bispectral index (BIS) monitoring has increasingly been used to monitor the depth of anaesthesia to reduce intraoperative awareness and optimization of anaesthetic usage. This case highlights yet another utility of BIS for early detection of intraprocedural rupture of an intracranial aneurysm.

**Methods:** A 74-yr-old female, known hypertensive for 30 years on multidrug therapy, presented with subarachnoid hemorrhage. With a computed tomographic (CT) scan of brain she was provisionally diagnosed with an aneurysm of the anterior communicating artery, was shifted to the neuroradiology suite for balloon-assisted endovascular coiling. Anaesthetic induction and approach to the aneurysm was uneventful. During balloon inflation, a fall in BIS upto zero was noted (Fig 1) which was followed by hypertension. The neuroradiologist was alerted about the possibility of aneurysm rupture, which was confirmed by deflation of the balloon showing leakage of injected contrast material (Fig 2). Recovery of BIS value >40 occurred in 8 minutes, and the procedure was continued with protamine reversal. However, there was another episode of fall in BIS upto zero (proven irretrievable) recorded 30 minutes later, accompanied by a Cushing's response. Balloon was inflated to cover the site of aneurysm rupture as tamponade. After administration of neuroprotection (propofol) and Labetalol, the procedure was abandoned and the patient was shifted to the neurosurgical intensive care unit for elective ventilation, monitoring and extraventricular drain placement. She was pronounced dead after 48 hours.

**Results:** BIS monitoring can rapidly detect intraoperative intracranial aneurysm rupture, especially during balloon-assisted coiling, as contrast injection for detection of rupture is not possible without deflation and loss of tamponade effect, if any. This effect precedes the hemodynamic consequences of aneurysm rupture.

**Conclusion:** Routine use of BIS monitoring should be encouraged for all neuroradiologic therapeutic procedure. Large randomized controlled trials may shed light on the rapid detection of cerebral ischemia and prediction of patient outcome using this modality.

## P-59

### The Incidence of Intestinal Complications in the Neurological Intensive Care Unit

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**Objective:** Critically ill patients have frequently unexplained gastrointestinal dysfunctions: gastro paresis, paralytic ileus, ischemic colitis and intestinal hemorrhage which contributes to poor outcomes especially in case of gut distension or perforation. This article analyses the incidence and possible causes of intestinal complications focusing on patients with acute colonic pseudo-obstruction. The situation is particularly important due to influence of the increased intra-abdominal pressure on the intracranial pressure and hence perfusion of the brain in the neurological patients.

**Methods:** This is a retrospective study of 235 patients taken in the neuro intensive care unit last year. The incidence of intestinal complications, pseudo obstruction and possible risk factors (age, basic neurological pathology, sedation, consti-

pation periods, different laxatives and co-morbidities) were analyzed. Patients with gastro paresis were excluded.

**Results:** 15 patients (6,8%) developed one of the intestinal complications, 10 of them (4,4%) developed pseudo obstruction and half of them bowel perforation requiring surgery. Possible predictors of ileus development could be the severity of brain injury, cumulative sedation period/dosage and comorbidities.

**Conclusion:** Gastrointestinal motility is a complex function regulated by the central, autonomic and enteric nervous system, modulated by plenty of local peptides, neurotransmitters and hormones. The enteric nervous system contains the largest collection of neurons outside the central nervous system. These neurons can operate independently from the brain and generate their own motility patterns. Exact interaction between different regulation mechanisms is still not well understood. Critical illness almost always affects gastrointestinal motility. This may be due to impaired intestinal muscle function, enteric pacemaker functions or nerve activity impairment. Our impression is that neurological patients have a higher incidence of intestinal motility derangements. Brain injury possibly plays an important role, could be due to disbalanced interaction between central inhibition and excitation. Insufficient number of affected patients did not produce reliable answers to the cause of this complication. A larger prospective study is needed.

## P-60

### Anesthesia for Epilepsy Surgery-Complications Occurred in Three Years

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**Objective:** In recent decades there has been an increase of the surgical approach for refractory epilepsy treatment. The evolution of anesthetic and surgical techniques has contributed to better results and to decrease the incidence of postoperative complications such as cerebral ischemia, cerebral hematoma, cerebral edema, infection and death (1).

The aim of this study is to characterize the population of patients undergoing epilepsy surgery and to evaluate the incidence of postoperative complications.

**Methods:** Retrospective analysis of patients that underwent epilepsy surgery between January 2011 and December 2013 in our hospital. Data was collected through the registration of diagnosis codes ICD9CM for epilepsy, clinical and hospital discharge reports. Data was processed and analyzed using descriptive statistics.

**Results:** During the period studied, 57 patients underwent epilepsy surgery (25 males, 32 females), mean age  $38 \pm 12.1$  years, ASA II in 44 patients and ASA III in 13.

Mesial temporal sclerosis (24), ganglioglioma (10) and precentral dysplasia (8) were the most common causes of refractory epilepsy (74%).

The following procedures were performed: amygdala-hippocampectomy (25), lesionectomy (16), excision of dysplasia (3), excision of dysplasia with functional mapping (2) and placement of vagus nerve stimulator (11).

55 patients underwent propofol and remifentanyl in target controlled infusion (TCI), midazolam and rocuronium in bolus or perfusion, 44 with superficialization of anesthesia for ECoG and 2 with sedoanalgesia with propofol TCI (asleep-awake-asleep technique).

The average length of stay in the PACU was  $6 \pm 1.2$  hours and  $7.2 \pm 4.6$  days for the length of hospital stay.

18 (31.6%) patients experienced complications: cerebral hematoma (3), seizures (8), altered state of consciousness unrelated to seizure activity (4), dysphagia and dysphonia (2), hypoacusia and increased quadrantopia (1).

There were no deaths and all patients were discharged without sequelae.

**Conclusion:** The incidence of adverse events was 31.6%, which is in agreement with what has been previously stated in literature (1).

Most complications had a benign and self-limited nature.

Only two patients required additional surgery (drainage of cerebral hematoma).

The low incidence of serious complications may be due to a judicious preparation of patients by a multidisciplinary team and the existence of good anesthetic and surgical protocols in our institution.

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## P-61

### Time Taken for Motor Evoked Potentials to Return to Baseline Following Neuromuscular Blockade

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**Objective:** To determine the time it takes for motor evoked potentials (MEPs) to return to baseline following an intubating dose of atracurium in patients undergoing spinal surgery.

**Methods:** We carried out an observational pilot study in a specialist neurosurgical hospital setting, involving 26 patients undergoing spinal surgery with intraoperative MEP monitoring. The patients were induced with or without an intubating dose of atracurium in accordance with the preferred technique of the attending anaesthetic consultant. Once MEP monitoring was established, a neurophysiologist recorded the time it then took for the transcranial MEP amplitude to

return to baseline. The ease of intubation and the anaesthetic maintenance regimen was also recorded.

**Results:** All patients ( $n = 26$ ) received total intravenous anaesthesia (TIVA) with a propofol target plasma concentration (C<sub>pt</sub>) of 4-10  $\mu\text{g/mL}$  at induction. Seventeen patients were given atracurium (mean dose 0.52 mg/kg) at induction, and nine patients were intubated without any neuromuscular blockade. The time taken for the MEPs in the atracurium group to return to baseline ranged from 0 to 90 minutes (median 30 mins). Eight of the nine patients intubated without neuromuscular blockade had no delay (0 mins) in achieving a baseline MEP response. All patients had an anaesthetic maintenance regimen consisting of a propofol target controlled infusion (TCI) and a titrated remifentanyl infusion. There were no difficulties with intubation in either group.

**Conclusion:** In this observational pilot study we conclude that there is a marked inter-individual variation in the rate at which MEPs return to baseline after neuromuscular blockade with atracurium. This variation can make intraoperative MEP interpretation difficult, even in patients who have only received a single dose of muscle relaxants at induction.

## P-62

### Lumbar Microdiscectomy Under Spinal and General Anesthesia: A Comparative Study

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**Objective:** The aim of this study was to compare the safety and efficacy of Spinal Anesthesia (SA) with General Anesthesia in patients undergoing Lumbar Microdiscectomy (LM).

**Methods:** We evaluated 180 patients who underwent LM between 1 January 2012 and 5 July 2013. Demographic, clinical, laboratory, and pre-, intra-, and postoperative information was acquired from the patients' medical records.

**Results:** Total anesthetic times were longer in the GA. There was less bleeding at the incision site in the SA group. Intraoperative blood pressure was significantly lower in the SA group. Meanwhile, tachycardia was significantly higher in the GA group. The analgesic requirement in post-anesthesia care unit (PACU) was higher in the general anesthesia group. At PACU admission, analgesic requirement, heart rate, and the mean arterial pressure were higher in the GA group. Postoperative nausea and vomiting was more frequent among patients recovering in general anesthesia group. SA patients had an increased incidence of urinary retention compared with

GA patients. Pulmonary complications requiring specific treatment were insignificantly higher among GA patients.

**Conclusion:** In this study, we find that spinal anesthesia has a low rate of nausea/vomiting postoperatively, decreased blood loss during surgery, reduced analgesic requirement in PACU and increased incidence of post operative urinary retention compared with general anesthesia in patients undergoing lumbar micro discectomy.

## P-63

### Haemostasis Disturbances Correction in Neurosurgical Patients

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Massive blood loss and DIC complication during brain tumour removing may occur if from 50 to 100% and more blood circulation lost for short period.

2 cases of massive blood loss were happened in 2 young woman with hondrosarcoma of hiasmal-cellaris region and anaplastic meningioma during cerebral tumour removing: 3.0-3.5 l for 1 hour. Acute hemorrhage lead to deficit of coagulation factors and DIC diagnosis. Transfusion therapy included 47 ml/kg crystalloids, 33 mL/kg colloid HES solutions, 35 ml/kg frozen plasma, 11 mL/kg erythrocyte mass. Bleeding and DIC wasn't stoped. Next action was administration of complex of factors II, VII, IX, X, protein C, antithrombin III, heparin ("Protromplex 600"). The clinical effectiveness was estimated according to local haemostasis organization - at mean of 20 min. After operation ending the laboratorial control of haemostasis system was carried out at the ICU department. In the both cases there was the positive dynamics of prothrombin index (from 29% to 67% and 61% correspondently).

Intraoperative use of coagulation factors complex "Protromplex 600" in situation of acute blood loss, DIC and bleeding restorates and supportes blood haemostatic potential in neurosurgical patients with brain tumour removing.

## P-64

### Case Series of 24 Patients with Intracranial Hypotension Treated by Epidural Blood Patch

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**Objective:** A retrospective study of all patients in our hospital treated with epidural blood patch for intracranial hypotension diagnosed by a neurologist over 3 years. We examined the: symptoms, investigations prior to treatment, number of blood patches performed, effect of them and any complications.

**Methods:** Using data from case notes we looked at: symptoms, investigations for diagnosis and patient preparation for blood patch. We examined the number of blood patches performed, spinal levels, amount of blood injected and if it was targeted using X-ray or CT scan. Their effectiveness was evaluated from patient report at 24 hours and follow up clinic.

**Results:** We looked at 24 patients.

**Symptoms:** All patients presented with postural headache. 4 presented with diplopia, 4 had hearing changes, 5 had dizziness and 3 had confusion. 3 patients had a depressed level of consciousness, 2 of them requiring intubation and ventilation.

**Investigations and results:** 22 patients had MRI scans. 14 patients had MRI findings for intracranial hypotension. These included: subdural collections, meningeal enhancement, slumping of the midbrain and descent of the cerebellar tonsils through the foramen magnum. 8 patients had no MRI findings for intracranial hypotension.

**Blood patches:** 22 patients had lumbar, 2 had thoracic and 1 a subsequent cervical epidural blood patch. 2 of these used X-ray and 1 required CT guidance. 15-30ml of blood was injected in the lumbar and thoracic blood patches and 7ml was injected in the cervical one.

**Number of blood patches and effect of treatment:** 16 patients had subsequent resolution of symptoms: 10 required 1 blood patch, 3 required 2 blood patches and 3 required 3 or more blood patches.

**8 patients had no resolution of symptoms at follow up:** 4 had 1 blood patch, 2 had 2 blood patches and 2 had 3 or more. 1 of these 8 patients had surgery, with resolution of symptoms.

**Complications of the epidural blood patch:** 1 patient complained of back pain and 1 patient had pain in the right leg on injection of blood, both of which resolved within 24 hours

**Conclusion:** Epidural blood patch is a safe and effective treatment for intracranial hypotension. There was no MRI evidence of intracranial hypotension in the 8 patients for which epidural blood patch was not effective. Therefore, MRI evidence is mandatory for treatment to be successful. If symptoms persist after 1 blood patch, with such evidence, it is worth repeating.

## P-65

### Anesthesiologist Contribution on Navigation of Brain Tumor with Intraoperative Ultrasound: A Case Report

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**Objective:** Ultrasound method has been used in intraoperative neurosurgery more than two decades. There are studies

indicate that intraoperative ultrasound can better determine the extent of brain tumors. Also, the ultrasound can help for finding the most proper entry point after removal of the bone window. Ultrasound can help the differentiation between solid tumors and cystic components. The precise localization guided by ultrasound imaging shortens the duration of surgery and increases the safety in comparison with intraoperative Magnetic Resonance.

Ultrasound was used for a long time by anesthesiologists, especially in regional anesthesia. Intensive care is another place for practising ultrasound for anesthesiologists. Beyond a doubt, ultrasound in pain management should also be mentioned. Furthermore, ultrasound guided approach for big veins and arteries are ever increasing and commendable technique in care of special patients. Anesthesiologist's growing interest on ultrasound use in daily practice has considerable value. In terms of ultrasound use, well trained anesthesiologist can interpret hypo or hyper echoic tissues, cystic structures and also distinguish arteries, veins, nerves, muscles, bones and tendons.

In this case, we present a collaboration of neurosurgeon and anesthesiologist in terms of intraoperative use of brain ultrasonography.

**Case Presentation:** Sixty-one year old female patient was prepared for semi-urgent brain tumor surgery. She had a diagnosis of malignant melanoma for six months. There are three months history of brain metastasis. Acutely manifested left side weakness and imbalance recorded during last three days were considered as an indication for surgery. There were no other neurological signs or symptoms. The patient had 10 years of hypertension history, impaired blood sugar levels without diagnosis of diabetes mellitus, perioperative risk status as ASA-II and euthyroid state after thyroidectomy for five years. On the beginning of the surgery, the surgeon asked to anesthesia team if the team could help him using ultrasound guidance to find an entry point, to measure the extent of the tumor, and to obtain data about the nature of the structures intraoperatively. He appended that the magnetic resonance images did not provide enough resolution for navigation as precise as ultrasonography could. Also, the assistance of a radiologist was not available readily. The surgeon asked for this demand on the basis of his previous awareness about the extensive ultrasound experience of the anesthesia team. After opening of the bony window, the surgeon handed on the sterile dressed probe, than the images sized up and interpreted by the anesthesiologist. The entry point on the cortex was identified, and the radius of the tumor was measured. The surgery was completed uneventfully. The patient extubated and discharged from post anesthesia care unit just 60 minutes after the extubation to the neuro-intensive care clinic.

**Conclusion:** We present a collaboration between neurosurgical and anesthesia teams in terms of intraoperative ultrasound use. A number of questions can be discussed in this particular topic. Could the anesthesiologist's experience be useful in intraoperative brain ultrasonography? Is there any concern about such a sharing about aspects of neurosurgery, radiology or anesthesiology?

In this case report, we put forward the causal and helpful joint work of neurosurgical and anesthesia teams regarding the intraoperative use of ultrasonography.

## P-66

### Deep Brain Stimulation for Parkinson's Disease in Awake/Sedated Patients: Evaluation of an Anaesthetic Protocol

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**Objective:** Deep brain stimulation (DBS) is an effective treatment for Parkinson's disease (PD) when severe or medication-refractory symptoms develop and the patient has a good physical and cognitive status. Awake techniques for DBS insertion are preferred as they provide optimal surgical conditions and patient's cooperation for neurocognitive and sensory-motor testing. This study aimed to evaluate the adequacy of the DBS insertion protocol used in our hospital and the incidence of intra-operative events.

**Methods:** Data from 24 consecutive patients submitted to DBS implantation for PD from February 2003 to January 2014 in our centre, were retrospectively analyzed by descriptive statistics. DBS insertion was performed in awake/sedated patients under standard monitoring plus invasive pressure, diuresis and arterial blood gas analysis. The protocol consists of: local anesthetic infiltration, midazolam, propofol TCI, non opioid analgesics and antiemetics, followed by general anaesthesia with TCI propofol, remifentanyl, rocuronium with tracheal intubation for generator placement. Patients are pre-operatively evaluated by a multidisciplinary team.

**Results:** Population composed by 50% males, age  $56.8 \pm 9.6$  years, 42% ASA II and 58% ASA III. Surgery was performed  $13.6 \pm 6.9$  years after diagnosis, mainly due to refractoriness of symptoms. In 79% bilateral subthalamic electrode insertion and generator placement was performed in the same operative time; 16.7% needed a second surgery for generator placement and in 1 only one electrode was inserted due to respiratory depression that lead to surgery interruption. Another case of hypoxemia solved with mask ventilation. MAP ranged from 9.5% above and 33.4% below baseline values; variations were transient and easily corrected. Patients were able to cooperate in neurological evaluations. No other complications occurred. Mean anesthesia time 11h36min. Permanence in PACU  $7.1 \pm 2.5$ h.

**Conclusion:** Our protocol proved to be adequate and efficient as optimal surgical conditions and patients' collaboration were obtained with few complications. Pre-operative patient motivation and a good relationship with the staff are crucial. Providing good analgesia, anxiolysis, psychological support and physical comfort avoids surgery-related stress and keeps the patient cooperative. As this approach doesn't

include airway instrumentation, ventilatory adequacy should be closed monitored and oversedation avoided in order to prevent serious complications.

## P-67

### Awake Patient Craniotomy and Dexmedetomidine-Our Experience

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**Objective:** The awake patient craniotomy has important applications, especially in onconeurology, pain therapy, brain functional and epilepsy surgery, allowing the mapping of noble areas (1).

Multiple anaesthetic approaches have been used being this surgery, in most cases, a long-term challenge to the anaesthesiologist.

Dexmedetomidine is a selective  $\alpha$ -adrenergic agonist, known for its sympatholytic, sedative, amnestic and analgesic properties, enabling conscious sedation without respiratory depression (2). Thanks to these properties, it is presented as the almost ideal drug for use in these surgical procedures (3) and it has been introduced in our department in 2013.

**Methods:** We made a retrospective study that included all patients undergoing awake patient craniotomy under dexmedetomidine, during a year.

**Results:** During 2013, 183 craniotomies were performed with 10 of them under conscious sedation. All of the patients were male with mean ages  $34.8 \pm 14$  years. In 70% of cases, the craniotomy was indicated for space-occupying lesion excision, in 20% for chronic pain control and in the remaining 10% for epilepsy surgery. The mean duration of surgery was  $303 \pm 129$  min, with the shortest lasting 180min and the longest lasting 625 min.

In all patients, the initial sedation with midazolam and/or propofol was executed to implement invasive monitoring (arterial line) and skin anesthesia (ropivacaine and lidocaine) for placement of cranial pins. In 2 cases, there was a need for supplemental analgesia with intraoperative opioids due to insufficient analgesia. In 9 cases, a concomitant infusion of esmolol was initiated, in order to reduce the sympathetic response (no change in TA than 20% of baseline) and promote hemodynamic stability. In all patients, there was cardiovascular and respiratory stability with no change in the degree of consciousness. Regarding adverse effects, there were 2 cases of xerostomia in patients and only 1 of nausea.

**Conclusion:** The data collected, albeit with a small sample size, allow us to believe in the effectiveness of our use of dexmedetomidine. We have achieved levels of conscious sedation to allow surgery (not always quick), with the patient cooperation in the stages of neuro-stimulation, comfortable and without ventilation, hemodynamic or mental status changes.

Our expertise has proved productive and capable of future technique improvements.

## P-68

### Neurological Complications in Patients with Severe Preeclampsia and Eclampsia

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**Objective:** Despite advances in medical practice, preeclampsia/eclampsia has remained a leading cause of maternal mortality throughout the world. The incidence of progression of preeclampsia to the convulsive form occurs in 2% to 3% with severe preeclampsia as defined by a systolic blood pressure of 160 mmHg or greater, diastolic blood pressure of 100 mmHg or greater, nephrotic range proteinuria ( $>3.5$  gr/24 hours urine), thrombocytopenia, hepatocellular injury, pulmonary edema and neurologic disturbances. Cerebral hemorrhage has been reported to be the most common cause of death in patients with preeclampsia.

In this study, over a period of three years we collected the data from pregnant women hospitalized at Istanbul Kanuni Sultan Suleyman Education and Training Hospital, at perinatology intensive care unit as a result of uncontrolled and severe preeclampsia and eclampsia. Our study aimed to assess the prevalence of patients developed cerebrovascular events, their neuroimaging abnormalities and clinical presentations.

**Methods:** With the approval of the Istanbul Kanuni Sultan Suleyman Research and Training Hospital's Local Ethics Committee, we reviewed retrospectively the records of all obstetric patients treated at Perinatology Intensive Care Unit, between January 2011 and January 2014, for the diagnosis of severe preeclampsia and eclampsia with neurologic symptoms.

**Results:** 222 patients who had admitted to perinatology intensive care unit due to one or more complications of pregnancy induced hypertension were observed. Of the 222 patients, 26 had diagnosed as severe preeclampsia and 10 patients as eclampsia. 15 patients underwent computed tomog-

Table 1. The spectrum of recorded morbidity and mortality for patients (n=18)

	n	%
Coma	4	23
Stupor	2	11
Eclampsia	7	39
Blurring Vision	2	11
Retinal Detachment	2	11
Seizures	8	44
Death	2	11

raphy of the brain. 35 patients had identified for the neurologic symptoms of severe preeclampsia and eclampsia. Of the 35 severe preeclamptic and eclamptic patients, 18 had developed neurological features depending on pregnancy-induced hypertension and eclampsia. These 18 patients and their spectrum of recorded symptomatology has shown in Table 1. The presenting symptoms varied, the most common being generalized tonic-clonic seizures (eight, 44%). However, all the eight patients developed seizures during their intensive care course seven had the diagnosis of eclampsia, 1 had a tonic-clonic seizure according to epilepsy acquired before pregnancy. Two patients died after eclamptic crisis-related intraparenchymal hemorrhage. Computed tomography images of one of the mortal cases has shown in Figure 1.

**Conclusion:** A wide spectrum of neurological symptoms like seizures, blurring visions or decreased level of consciousness from the ischemic lesion to severe intracranial hemorrhage can be observed in complicated cases of hypertensive diseases of pregnancy. We believe that women who have severe preeclampsia or eclampsia and severe systolic hypertension (160 mm Hg) are at special risk for hemorrhagic stroke. These patients deserve immediate and special attention in intensive care units and antihypertensive therapy to reduce their risk of such neurological events.

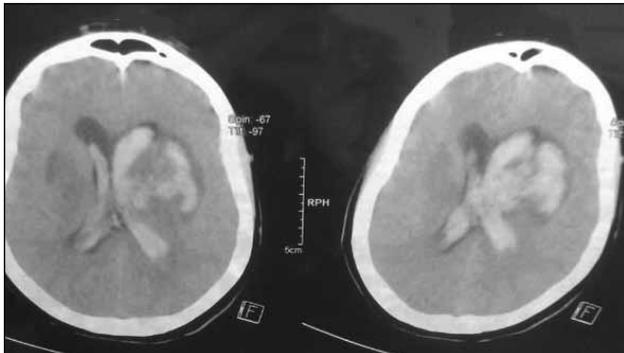


Figure 1. Noncontrast computed tomography (CT) of one of the mortal eclamptic patients showing basal ganglia hemorrhage open through the 4<sup>th</sup> left ventricle and moderate hydrocephalus

## P-69

### Our Anesthesia Experience During Electroconvulsive Therapy in Pregnant Patients

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**Objective:** Remote location anesthesia, analgesia and sedation practices in pregnant patients have increased in recent years. Psychiatric disorders emerging or repeating during pregnancy may cause severe problems both for the woman and the fetus. Psychotropic drugs used in the treatment of

psychiatric disorders occurring during pregnancy lead to side effects on mothers and fetuses. Electroconvulsive therapy (ECT), can be used either as an alternative or complementary to psychopharmacologic drugs, in pregnant women. In these case reports we wanted to share our anesthesia experiences on four pregnant women with psychiatric disorders who scheduled for ECT treatment during their pregnancy.

**Case Presentation:** The diagnoses of pregnant undergoing ECT treatment were bipolar disorder (2 of them), atypical psychosis and depression. All patients were monitored with ECG, saturation, heart rate, supplementary oxygen and aspiratory was prepared. Propofol and Succinylcholine were used in anesthesia induction and maintenance in all cases via a mask ventilation with oxygen. Mean age of patients were 28 (24-31) years, mean gestational ages were 23 weeks (12-28) and mean ECT application were 10 times (8/13). No maternal or fetal complications occurred.

**Conclusion:** Choice of the anesthetic agent that has no maternal and fetal toxic effects is important during remote location anesthesia in pregnant women.

Our cases showed that the patients had an unproblematic termination of pregnancy and the treatment did not have any adverse effects for the baby and the mother. However, there is need for further research in this area.

## P-70

### Decompressive Craniectomies in Traumatic Head Injury - Outcome in 37 Patients

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**Objective:** Decompressive craniectomy for control of refractory intracranial pressure in traumatic brain injury remains contentious. Uncertainty continues despite publication of the DECRA trial (1) and findings of the RESCUEicp trial are still awaited (2).

**Methods:** OxHEAD is a large prospective database with inclusion of all traumatic head injury patients admitted to Oxford University Hospitals NHS Trust during the 5 year period 2008-2013 (3). Here we look at the subgroup of patients within the baseline population requiring decompressive craniectomy for control of ICP. Evaluation includes aspects of clinical presentation and outcome measures of mortality and extended Glasgow Outcome Scale (GOSE) score at 1 year (4).

**Results:** Of the 793 patients entered in the database, 37 (4.7%) required decompressive craniectomy for control of refractory ICP. The mechanism of injury for this patient group comprised falls (38%), assaults (16%), road traffic accidents (11%) and the remaining 35% a combination of cyclists, motor bike accidents, pedestrians, sporting injury and

other causes. There was no clear pattern of presenting GCS, with 30% patients having an admission GCS of 13-15.

Mortality at 1 year was 30% (11/37), with 7 deaths occurring during hospital admission and a further 4 deaths by the 1 year follow up.

70% (26/37) patients survived to 1 year and 25 were followed up by GOSE. Of these, 1 was in persistent vegetative state, 5 patients were severely disabled (4 lower, 1 upper), 12 patients were moderately disabled (5 lower and 7 upper) and 6 patients had a good recovery (5 lower and 1 upper). 32% (12/37) of the decompressive craniectomy subgroup were either dead or had severe disability at 1 year. In contrast 16% (6/37) of this subgroup had a good recovery with return to premorbid functional activity at 1 year.

**Conclusion:** The patient subgroup defined in this study is complex. Further, initial GCS is a poor indicator of severity and outcome, with 30% of this patient population presenting with a GCS of 13-15. Treatment decisions are confounded by the wide variation in outcome from death or severe disability to full recovery with no functional limitation.

We plan to evaluate this data further and in addition compare the observed outcome data against a CRASH prognostic modeling tool applied retrospectively to the dataset. In this way we hope to inform the decision process for treatment intervention in this patient group.

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## P-71

### Craniosynostosis - Characterization of Paediatric Population Undergoing Cranioplasty and Perioperative Complications

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**Objective:** The anaesthetic management of cranioplasty for correction of craniosynostosis can be a challenge once it has been associated with significant morbidity. Massive transfusion, coagulopathy, severe hypotension, air embolism and seizures are some of the complications which incidence may be related with the blood loss and the need to transfuse blood products (1).

The purpose of the present study is to characterize the paediatric population submitted to craniofacial reconstruction in our hospital and evaluate the need of transfusion of blood products and the incidence of complications in the perioperative period.

**Methods:** The authors performed a retrospective review of all craniofacial reconstruction accomplished in 2012. The data were collected from patient's charts and processed by descriptive statistics. Data are presented as means and standard deviations.

**Results:** 11 patients undergoing craniofacial reconstruction were analyzed. 4 were female and 7 male, age of  $12.4 \pm 3.6$  months, body weight of  $8.7 \pm 1.4$  kg, American Society of Anesthesiologists (ASA) physical status classification 1 in 6 patients and ASA 2 in 5 patients. Idiopathic craniosynostosis was present in 7 patients, while in the other 4, it was related to Pfeiffer and Saethre-Chotzen syndromes.

Transfusion of blood products was needed in all patients. The quantity of packed red blood cells (PRBC) transfused was  $25.1 \pm 13.5$  mL/kg, fresh frozen plasma (FFP)  $18.3 \pm 4.1$  mL/kg and human albumin 20%  $3.5 \pm 0.2$  mL/kg.

The most common complications were postoperative bleeding (3 children) and respiratory failure (1 child). The average time spent in the Paediatric Intensive Care Unit was superior in this group of patients (66 hours vs. 25 hours in those that did not have complications).

The quantity of blood products transfused in the intra-operative period was higher in those that had post-operative complications ( $41.9 \pm 13.6$  mL/kg vs.  $24.3 \pm 7.6$  mL/kg of PRBC;  $18.7 \pm 3.8$  mL/kg vs.  $11.7 \pm 8.1$  mL/kg of FFP).

**Conclusion:** In this study, the craniofacial reconstruction of idiopathic craniosynostosis was more often. Transfusion of blood products was needed in all patients as it is expected for a major surgery related with abundant hemorrhagic losses. Higher requirements of transfusion of blood products were associated with a higher incidence of complications. In this group of patients, the prevention, early detection and treatment of coagulopathy are crucial (2).

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## P-72

### Retrospective Investigation of Neuroanesthesia Patients

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**Objective:** Patients who had Neurosurgery are generally patients with high risk levels and usually used general anesthesia. Complications of anesthesia are frequently seen. Our aim was to observe and analyze the complications occurring with Neurosurgery patients retrospectively.

**Methods:** The patients who had Neurosurgery between January 2013 and January 2014 in our clinic were analyzed retrospectively. Patients' age, gender, ASA, type of operation, mortality, morbidity and postoperative needs of intensive care were analyzed.

**Results:** A total of 379 patients were analyzed. This study included 183 male and 194 female patients. The average age was 47.5. 9 of the patients were between 0-12 months old. 325 of these operations were done with general anesthesia, 7 of them with sedoanalgesia, 46 of them with local anesthesia and 1 of them blocking axillary nerve.

**Conclusion:** Patients who had Neurosurgery are ranked in a higher risk level than other patients. Anesthesiologists should be more attentive to avoid possible complications.

### P-73

## Patient Satisfaction After Anaesthesia and Neurosurgical Procedures

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**Objective:** Patients' satisfaction is an important component of the health care provided in modern era as it is considered a good quality indicator. Its audit gives useful data on patients' perception and satisfaction with care that may not be apparent on traditional audit measures, which focus more on a unit's efficiency. The objective of this study is to determine the level of patient satisfaction during the stay at the Post Anaesthetic Care Unit (PACU) and the Nursery of the Neurosurgery Department of our hospital.

**Methods:** 71 participants admitted in the Neurosurgery Department for elective surgery between December 2013 and February 2014 were randomly selected. The survey was carried out by a confidential written questionnaire with closed answer questions completed prior to hospital discharge. The following parameters were evaluated: preoperative evaluation (information of the disease and the proposed therapeutic), quality of the facilities (nursery and PACU), cordiality of the staff, incidence and treatment of perioperative morbidity (PONV, severe pain and thermal discomfort), incidence of awareness and overall satisfaction. Data was processed by descriptive statistics.

**Results:** In the 71 participants, 69% were satisfied with the information provided about the disease and the suggested treatment. 95.1% considered the PACU comfortable; however, 60.5% complained about the noise. The nursery was considered comfortable by 86.6%. Pain was treated more efficiently in the PACU than in the nursery (100% vs. 76.1%). In both units, the vast majority of the health care providers (97.9%) were considered friendly and polite. In the postoperative period, 24.9% of the patients referred PONV, 29.6% severe pain and 50.7% felt thermal discomfort related to hy-

pothemia in immediate postoperative period. Awareness occurred in 1 patient. 90.1% of the patients were satisfied with the treatment provided and 84.5% would recommend these Departments to other patients.

**Conclusion:** This study reveals high levels of patient satisfaction with anaesthetic, neurosurgical and nurse practice. It also highlights areas that need more attention and care, such as postoperative pain, PONV and thermal discomfort. Noise should be avoided in the PACU in order to provide a smooth environment during the recovery of anaesthesia. All factors associated with dissatisfaction can be preventable or better treated. Patients attending our hospital are responsible for spreading a good image, which is important to gain the trust of the target population.

### P-74

## 10 Years of Deep Brain Stimulation for Parkinson Disease - Complications and Follow-Up

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**Objective:** Deep brain stimulation (DBS) is used for the treatment of patients with functional neurologic disorders usually not accompanied by gross structural or anatomical changes like Parkinson's disease. DBS insertion is a minimally invasive procedure; however, it is not absent of complications, which may have an incidence of 15% (1). Our hospital started a program for surgical treatment of PD in 2003 and since then 24 patients were treated. The purpose of the present study is to evaluate the incidence of complications and the clinical follow-up in this population.

**Methods:** We did a retrospective analysis of the patients (n=24) submitted to DBS insertion for advanced Parkinson's disease in our centre from January 2003 to February 2014. Data was collected from anaesthesia charts and clinical reports. Complications were classified into operation-related, hardware-related, stimulation-related and other. Data was processed by descriptive statistics.

**Results:** 24 patients were submitted to bilateral DBS of the subthalamic nuclei (12 male and 12 female, 56.8±9.6 years old, ASA II in 10 and ASA III in 14). Surgery was performed 13.6±6.9 years after the diagnosis. All patients were submitted to awake craniotomy with sedation. The average time spent in the post anaesthetic care unit was 7.1±2.5 hours and length of hospital stay of 14.5±4.7 days. In the follow-up period, complications occurred in 10 patients (41%). The distribution of the complications was as follows: operation-related in 1 patient (intracranial haemorrhage); hardware-related in 4 (1 fracture of electrodes, 2 electrode displacement, 4 infection and erosion); stimulation-related in 4 (3 sensorimotor changes, 2 psychiatric conditions) and other in 1 (pulmonary embolism). In

22 patients the motor symptoms improved (4 discontinued the anti-parkinsonic medication and the other 18 reduced the doses); in 2 patients the motor symptoms worsened.

**Conclusion:** In the majority of the patients (91.7%) there was an improvement of the motor symptoms, which resulted in a better life quality. The incidence of complications was 41% and may reflect our limited experience in this type of surgery. However, most of the complications were transient with a benign evolution. In the future, we hope that a multidisciplinary and dedicated specialized team consisting of neuroanaesthesiologists, neurosurgeons, neurologists, neurophysiologists and nurses will be the key to avoid adverse events and to improve even more the outcome.

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#### P-75

### Intubation in Cervical Pathology: LMA CTRACH, LMA FASTRACH or Machintosh Laryngoscope?

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**Objective:** Direct laryngoscopy, most common way of intubation causes cervical spine (C-spine) extension. Previous studies comparing various airway devices on motion of C-spine during intubation were carried out on healthy subjects. The optimal technique to manage airway in patients presenting with cervical pathology rather than spinal injury remains unclear. It was aimed to assess the movements of the upper C-spine by fluoroscopy in patients with lower cervical pathology during intubation via LMA CTrach, LMA Fastrach and Macintosh laryngoscope and compare duration and success of intubation.

**Methods:** Sixty patients, aged 18-70 years, ASA physical status I-III scheduled to undergo elective C-spine surgery were enrolled. Exclusion criteria included cervical trauma/injury, previous neck surgery, BMI > 35 kg/m<sup>2</sup>, possibility of pregnancy. Standard monitors were placed. Anesthesia was induced with propofol, remifentanyl, rocuronium and maintained with sevoflurane in air-oxygen and remifentanyl infusion. Patients were randomly assigned to one of 3 groups: LMA CTrach (C), LMA Fastrach (F) and Macintosh laryngoscope (M). Using portable X-ray machine two lateral cervical radiographs were taken: 1-In neutral position, 2-When best view of the glottis was achieved or prior of tracheal tube insertion. Motion of C-spine was examined by measuring angles formed by adjacent vertebrae: Cervical segments C1/2 and C2/3. Intubation time and success ( $\leq 2$  attempts) were also recorded.

**Results:** Patients characteristics were similar between groups. Mean cervical movement with LMA CTrach and LMA Fas-

trach versus Macintosh laryngoscope did not differ at C1/2 segment but LMA CTrach significantly reduced extension compared to LMA Fastrach and Macintosh laryngoscope at C2/3 segment. Duration of intubation was significantly shorter in Group M than Group F and C. Intubation via Macintosh laryngoscope and LMA CTrach was successful at most two attempts. In Group F three attempts were required for successful intubation in 4 patients. Success rate for intubation was 80% via LMA Fastrach, 100% via LMA CTrach and Macintosh laryngoscope.

**Conclusion:** Use of LMA CTrach was found superior to LMA Fastrach in limiting motion of upper cervical spine without causing an increase in the duration of intubation for patients with lower cervical pathology in whom cervical stability is demanded.

#### P-76

### Evaluation of Perioperative Coagulation in Patients Undergoing Brain and Spine Surgery

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**Objective:** Surgical conditions during brain and spine surgery caused by trauma, surgery, general anesthesia, infusion fluids, hypothermia and patient's inactivity can be associated with coagulation disorders leading to hemorrhage or thrombosis. Thus, we aimed to determine coagulation tendency and related factors.

**Methods:** After obtaining Ethics Committee approval and patient informed consent, 58 adult ASA I-III patients undergoing brain and spine surgery were prospectively included in the study in 2012. The patients with coagulation disorders and those taking anti-coagulant medication were excluded. Fluid requirements were replaced with balanced crystalloid solution by using standard 4:2:1 formulas, and colloid solution were randomly used as 6% HES or 4% gelatine solutions in selected patients. Patients' coagulation were monitored with haemoscope 5000 (Thrombelastography hemostasis analyser) parameters and standard coagulation parameters preoperatively, at the end of surgery and 24 hrs after surgery. The paired t tests and pearson/spearman correlation analysis were used in the study.

**Results:** The changes of maximum amplitude values were significantly associated with age, crystalloid volumes and lowest temperature, intraoperatively; with lowest temperature, and volumes of bleeding, total fluid and crystalloid after 24 hrs postoperatively. There were significantly positive correlations between fibrinogen concentrations and coagulation index values. There were no relationships between TEG pa-

rameters with the type of colloids, red blood cell transfusion and durations of surgery and anesthesia of these patients. All changes at standard coagulation laboratory and TEG values were within normal. No patients needed intervention. Highest volume of colloid among the patients receiving replacement was 14 mL/kg.

**Conclusion:** Although positive or negative correlations between age, bleeding, crystalloid and total volumes, lowest temperature with TEG values, it is indicated that colloids may be added safely for fluid replacement at judicious amounts in patients undergoing neurosurgery. These patients should be protected from perioperative hypothermia because of the adverse effects on coagulation determined with TEG. In conclusion, hemostasis, fluid replacement and blood product usage strategies should again be considered to control of coagulation changes.

## P-77

### Destructive Structural Versus Nonstructural Brainstem Lesions Leading to Brain Death in Adults: Brainstem Death is Brain Death

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**Objective:** Brain death consists of irreversible coma, absent brainstem reflexes and apnea. The cause of coma can usually be evaluated by history, examination and neuroimaging. Use of ancillary testing in the diagnosis of brain death varies through countries. We present two cases with posterior circulation strokes leading to brain death.

#### Case Presentation

**Case 1:** A 47-year-old man was admitted with acute bilateral posterior circulation ischemic stroke due to mid-basilar artery occlusion. Coma (GCS:8) occurred 34 hours after clinical onset due to expansion of the brain stem infarction with compression of the fourth ventricle followed by progressive hydrocephalus. Occipital decompressive craniectomy was performed. Cranial imaging demonstrated severe hydrocephalus 72 h after surgery (GCS:3). There was hip and knee flexion response to painful stimuli, but all brain stem reflexes were absent 96 h after surgery. All brain stem reflexes including cold caloric test and response to pain were absent at 134 h after surgery. Apnea test was positive confirming absence of respiratory drive. As Transcranial Doppler (TCD) revealed total cerebral circulatory arrest, brain death was declared.

**Case 2:** A 55-year-old man admitted with right PICA and left SCA extensive infarctions due to bilateral vertebral artery disease, but with preserved basilar artery flow. All brain stem reflexes and

response to pain were absent 24 h after admission. Control cranial MRI demonstrated bilateral extensive cerebellar and bilateral total brain stem infarctions comprising medulla oblongata infarction. Apnea test was positive confirming absence of respiratory drive. Cerebral flow pattern was within normal limits as shown on TCD as an ancillary test. Brain death was not declared due to Turkish regulatory rules. Patient died 6 h after TCD.

**Conclusion:** In Turkey an ancillary test is required for the diagnosis of brain death. In the first case, the diagnosis of brain death was a classic process. However, in the second case total areflexia and absence of spontaneous breathing was due to whole brainstem destructive lesion which was irreversible. This case was a possible organ donor candidate with "brain stem death". However brain death could not be declared as the TCD findings did not support this diagnosis. We believe that cases of "brainstem death" due to total brain stem infarction who fulfill all the clinical criteria with positive apnea test should be excepted as "brain death" cases without or with whatever the ancillary test results are.

## P-78

### A HIV (+) Case Presenting with PML

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**Introduction:** Progressive multifocal leucoencephalopathy (PML) is a demyelinating disease caused by reactivation of John Cunningham virus (JCV). It is a rare and fatal neurological disease mostly occurring in immunosuppressed patients and often requires follow up in neurologic intensive care unit (ICU).

**Case Presentation:** A 38 year-old woman presented with a 1 month history of progressive behavioral changes, memory loss, slurred speech and general weakness. Due to these symptoms she was admitted to psychiatric clinics but was non responsive to treatment (risperidol 2 mg/day). There was no prior medical history. On neurological examination, she was agitated and uncooperative with moaning like vocalizations. Nuchal rigidity and meningeal irritation signs were (+), plantar reflexes were bilaterally extensor. The laboratory investigation showed normal hemogram and biochemistry findings. Infection markers showed HIV (+). Cerebrospinal fluid (CSF) analyses revealed normal biochemistry and cytology, nonreactive VDRL, (-) tubercular and cryptococcus antigens and (-) CMV, HSV and tuberculosis by PCR, the result of JC virus in CSF was not obtained yet. Asymmetrical, diffuse subcortical white matter demyelination without mass effect and contrast enhancement were found on MRI. The lesions were hypointense on T<sub>1</sub>W, hyperintense on T<sub>2</sub>W and on FLAIR sequences. MR spectroscopy revealed minimally reduced N-acetylaspartate (NAA) peak and mild increase in choline peak. The NAA/Creatine ratio was 0.62, the Choline/Creatine was 1.81 and NAA/Choline was 0.30. A decrease in magnetization transfer ratio (MTR) was found in the lesion compared to the normal white matter (lesion: 70,

Normal white matter: 110). Patient was started on HAART along with prophylaxis of opportunistic infections.

**Conclusion:** PML usually presents as a progressive neurological deficit in patients diagnosed with HIV, but it may also be an initial presentation on HIV patients. We want to remark that for patients followed up for rapidly progressive neurological deficits in neurological ICU, PML might take place among possible diagnoses.

## P-79

### Encephalitis: Etiology and Management

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**Objective:** Encephalitis is a diagnosis based on clinical, radiological and laboratory findings. Most of the patients are generally followed up at intensive care units (ICU) due to rapid progression.

**Methods:** A total of 23 (8F, 15M) patients, aged 18-84 years (mean:  $49 \pm SD$  years) followed up at Bakırköy Dr. Sadi Konuk Training and Research Hospital between 2009-2014 were evaluated in terms of clinical features, laboratory, EEG and neuroimaging findings, hospitalization time and intensive care requirements, retrospectively.

**Results:** In these 23 encephalitis patients, the most frequent symptoms were *cognitive or behavioral changes* in 19 (82%), followed by seizure in 11 (47%), nuchal rigidity and meningeal irritation signs in 5 (21%) and focal neurologic deficits in 2 (8%), respectively. Cerebrospinal fluid (CSF) was abnormal in 18 (78%) cases, typically consisting of a lymphocytic pleocytosis, markedly elevated protein and normal glucose levels. MRI showed hyperintense lesions in T2 sequences with partially contrast enhancement located mainly in temporal and parietal lobes in 11 patients (47%). EEG revealed diffuse slow activity in 9 (39%), epileptiform activity in 7 (30%) and normal findings in 7 (30%) patients. Specific agent was identified (viral n: 4, bacterial n: 2) only in 6 (23%) patients. Four patients (17%) were followed up at ICU due to status epilepticus (n: 3) and increased intracranial pressure (ICP) (n: 1). The length of ICU follow up was 2-42 days (mean: 19 days). Mortality rate among encephalitis cases was 13% (n: 3). The mean length of hospital stays was 16 days. Acyclovir was administered to all patients, ceftriaxone was added in 13 and metronidazole to 2 patients.

**Conclusion:** Etiology of encephalitis is still unknown in more than half of the patients despite of developed modalities and technics. MRI, EEG and CSF may yield findings in half of the cases. Although specific agent could not be identified in some of our patients, most of the encephalitis cases recovered unless they need to be followed up at ICU due to status epilepticus and ICP. In our cases, we could identify in the following years.

## P-80

### Intravenous Tissue Plasminogen Activator Administration in Intensive Care Unit

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**Objective:** The treatment of acute ischemic stroke patients with intravenous tissue plasminogen activator (IV-tPA) 4.5 hours after onset has proven benefit. *Early administration of r-TPA* may be an important factor in preventing probable *hemorrhagic* complications. The aim of this study was to evaluate the acute stroke patients treated with IV-tPA, after 24 hour monitorization in intensive care unit (ICU).

**Methods:** Between May 2011 and December 2013, 20 acute ischemic stroke patients were admitted to our hospital and treated with 0.9 mg/kg body weight IV-tPA based on the guidelines of EFNS. The patients were followed up in ICU during administration of IV-tPA and an average of 24 hours following the treatment by National Institutes of Health Stroke Scale (NIHSS). Modified Rankin scales (mRS) of patients at the 1<sup>st</sup> week, and 1<sup>st</sup> month were also assessed, retrospectively.

**Results:** Seven female, 13 male patients (n: 20) aged between 47-80 years (mean:  $61.1 \pm 12.0$  years) were treated with IV-tPA. Time from symptom onset to door was  $65.8 \pm 52.5$  min. and from symptom onset to thrombolysis was  $185.2 \pm 65.0$  min. (approximately 3 hours). Baseline NIHSS score was  $12.4 \pm 5.3$  and the 24<sup>th</sup> hour NIHSS in ICU was  $9.1 \pm 7.2$ . mRS at the 1<sup>st</sup> week and 1<sup>st</sup> month was  $3.7 \pm 0.8$  and  $2.7 \pm 1.2$ , respectively. Overall, two patients developed hemorrhagic transformation following IV-tPA administration. Meanwhile, ICU follow up of these two patients was persisted, the left 18 patients were transferred to the neurology floor after 24 hours.

**Conclusion:** IV-tPA is an effective treatment in acute ischemic stroke patient. Although this study is small and retrospective, provides preliminary evidence of the importance of management of these patients in ICU. A prolonged ICU stay might be beneficial in patients' morbidity.

## P-81

### Initial Experiences in Deep Brain Stimulation

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**Objective:** Deep brain stimulation (DBS) recently gained acceptance in the treatment of many movement disorders such as Parkinson's disease and other functional neurological disorders.

Different anesthetic techniques for DBS have been described based on local anesthesia, monitored anesthesia care (MAC) or general anesthesia; however, there is still no consensus on the best anesthetic technique. The purpose of this study is to describe our initial experience during DBS performed mostly under MAC.

**Methods:** Nine patients presented with various movement disorders that undergone DBS requiring microelectrode recording (MER) were reviewed. Patients' data were obtained from anesthesia and surgery records. Placement of the stereotactic head-frame and imaging studies were performed under local anesthetic infiltration. Scalp block was administered to all patients in the operation room. Only one patient with severe dystonia required general anesthesia for the whole procedure. The other eight received dexmedetomidine and propofol infusions during placement of the DBS electrodes. Anesthetic infusions were ceased before MER. During implantation of the stimulator general anesthesia was administered to all patients. Bispectral index (BIS) monitoring was used to estimate the level of consciousness and Ramsey Sedation Scale (RSS) for testing usability.

**Results:** Nine patients (5 male/4 female) underwent DBS surgery for Parkinson's disease (n=6) and movement disorders (n=3). Mean age was  $47 \pm 11.747$  y. The mean duration of anesthesia and surgery lasted  $8.75 \pm 1.407$  h,  $8.46 \pm 1.39$  h respectively. BIS was maintained between 60-80 (RSS=3-4) during burr hole opening and placement of electrodes, and during wakefulness in the unmedicated stage  $>80$  (RSS=2). Dexmedetomidine and propofol together provided patient comfort and surgical satisfaction with adequate mapping in all cases. The mean dexmedetomidine consumed was calculated  $135.25 \pm 17.66$   $\mu$ g and propofol  $705.625 \pm 163.869$  mg. No complications were observed.

**Conclusion:** Effects of anesthetic drugs on MER, requirements of the procedure which often include an awake and cooperative patient, possibility of perioperative complications are special concerns for an anesthetist in DBS surgery. During DBS placement, conscious sedation with dexmedetomidine and propofol did not interfere with electrophysiologic mapping, provided hemodynamic stability and patient comfort when BIS was used.

## P-82

### Comparison of Preoperative and Postoperative Electrocardiographic and Echocardiographic Changes Following Aneurysmal Subarachnoid Hemorrhage

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**Objective:** *Primary:* Pattern of Electrocardiography (ECG) and Echocardiographic (Echo) changes, preoperatively and till seven days following surgery.

*Secondary:*

- i) Incidence of ECG and Echo Changes following aneurysm rupture.
- ii) Correlation of ECG and Echo Changes with Clinical and Computed Tomography (CT) grades.

**Methods:** This prospective, observational study was conducted in the patients undergoing clipping with subarachnoid hemorrhage (SAH) secondary to aneurysm rupture. Patients with known cardiac disease and unfit for surgery, were excluded from the study. Baseline parameters, such as, Blood Pressure, Heart Rate, ECG, Echo; Hunt & Hess, WFNS and Fisher's Scores will be recorded after admission in the hospital. All patients received general anaesthesia as per our institutional protocol. ECG and ECHO changes with respect to the baseline, were recorded till seven days following surgery. Serum electrolytes were kept within the normal range through out the study period in all the patients.

**Results:** 60 patients were analyzed. 38 patients developed ECG Changes and 3 patients developed Echo changes pre-operatively. 3 patients were lost to follow up. ECG changes got reversed in 31 cases within 7 days of study period. ECG changes were not reversed in 7 cases. Amongst these patients 2 had ST Depression with T-wave inversion along with left ventricular hypertrophy. That might be LV-Strain pattern. 3 patients had borderline QTc prolongation and 2 patients had Non-specific ST Changes.

SAH induced Echo changes were reversed in all the 3 patients. One patient had stunned myocardium reversed immediately following clipping and decompression of brain. Two patients had regional wall motion abnormality (RWMA). In one patient RWMA worsened on postoperative day one. CT showed development of hemi-infarct. RWMA in that patient reversed immediately after decompression by removing bone flap.

We did not find association between ECG and echo changes. Higher clinical grades are predisposed to get QTc prolongation.

**Conclusion:** ECG and Echo changes are well known in patients having SAH. Early therapeutic intervention can hasten the recovery of these changes and can reverse the stunned myocardium.

## P-83

### Mostly Hypoactive Subtype of Delirium is Seen in Mixed Intensive Care Unit Patients

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**Objective:** Studies show that ICU delirium in critically ill patients is an independent predictor of higher mortality, longer length of ICU and hospital stay and is associated with clinical complications. Every year approximately 700 patients admit

to our mixed intensive care unit (ICU) with different diagnoses (plural) which affect their short-term and long-term outcomes. This study is designed to determine the incidence of delirium and outcome in our unit by using CAM-ICU.

**Methods:** 101 patients older than 18 years were included. A trained research assistant evaluated the patient's mental status and recruited for the study if patient is conscious. CAM-ICU test was applied to all patients twice a day. When the patient had delirium, he is excluded from follow-up otherwise they were kept on evaluation. Data were collected about participant's demographics, comorbidities, medications, catheters, mechanical ventilations period, length of stay, hospital discharges, and mortality.

**Results:** Prevalence of delirium was 31.68 % (32 of 101) in our mixed ICU. Hypoactive subtype and hyperactive subtype delirium was detected as 68.7% and 31.2%, respectively. The mean age of patients with delirium was significantly higher than other patients (63y vs. 45y,  $p=0.000004$ ). APACHE II score was significantly higher in delirium patients (mean: 17 vs. 12,  $p=0.000006$ ). Diagnosed ICU delirium lengths of ICU stay was 13 days (13 vs. 12.8 day  $p=0.96$ ). Delirium was associated with higher mortality (25% vs. 11.5%  $p=0.08$ )

**Conclusion:** Delirium occurred approximately at least once in every 3 patients in our population. Every ICU clinician should use routine monitoring for delirium in the ICU, seek to reduce the impact of risk factors for delirium when possible, and use treatment options when necessary.

## P-84

### Geriatric Brain Tumors and Postoperative Management

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**Objective:** The world's population is ageing, and it is predicted that when this ageing reaches its peak in 2050, 27.6% of Europeans will be over 65 years of age (1). The incidence for all primary central nervous system tumors is highest among those 75 to 84 years. The diagnosis of brain tumors is based on clinical presentation, imaging studies, and histology. The majority of tumors in the geriatric population are in the cerebral hemispheres. Headaches and seizures are the most common symptoms at presentation. Surgery is the first therapeutic treatment option. But geriatric patients are especially at risk of developing postoperative complications. The objective of this study was to investigate the brain tumors surgery treatment, postoperative complications and outcomes in patients with geriatric populations.

**Methods:** Patients over 65 years of age who were undergoing surgery for a brain tumor were obtained for a retrospective analysis between 2013 and 2014. Population data included sex, family story, comorbidities, tumor localization, his-

tologic type of tumor, type of surgical treatment, preoperative seizures, re-operation. And systemic postoperative complications (pulmonary, cardiac, endocrine, hematological, neurological, infections) were identified. The length of intensive care and hospital stay, duration of mechanical ventilation were recorded. The results of descriptive statistical analysis will be summarized and presented.

**Results:** In total, the data of 28 patients were analysed. The cases comprised 10 female and 18 male patients. 17 patients presented with headaches, 2 with seizures, 3 with motor deficits, 1 with sensory deficits, 2 with language deficits and 5 with mental status changes. Tumor was involving the frontal lobe in 8, temporal lobe in 1, parietal lobe in 11 and occipital lobe in 6, supracellar in 1. 13 tumors were localized to right hemispheres and 7 tumors were localized to left hemispheres. The most common histologic type of brain tumor was meningioma. 14 meningioma, 4 glioblastoma multiforme, 6 metastatic tumors, 1 oligodendrogial tumor, 1 epidermoid tumor, 1 schwannoma, 1 pleomorphic adenoma were reported. Total resection for tumor was achieved in 17 patients, subtotal resection in 11 patients. A total of 2 patients were reoperated. Patients had a total of 28 postoperative complications. The most common complication was pulmonary disease, hypotension and high glucose level. Postoperative hematoma in patients with craniotomy occurred in 0%. Mean duration of mechanic ventilator was 1 day and intensive care unit stay was 3.5 days. Mean total length of hospital stay was 9 days. The postoperative mortality rate was 3.57%.

**Conclusion:** The risk of postoperative systemic complications in elderly patients with brain tumors increase. For example malignancy is a risk factor for deep vein thrombosis and pulmonary embolism. By maintaining cerebral perfusion pressure >60 mmHg, controlling blood glucose level, lowest dose administered to dexamethasone, anticoagulation, prophylactic antibiotics administered, follow up the change to neurological status in intensive care, we have obtained improved short-term outcomes (postoperative morbidity and mortality) after craniotomy for tumor resection in the elderly patients.

## P-85

### Single Centre Retrospective Review of Peripartum Admissions to a Specialist Neurointensive Care Unit

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**Objective:** The CEMACE report of 2006-7 highlighted neurological conditions as the second highest cause of indirect maternal deaths in the UK. Therefore we decided to review peripartum admissions to our tertiary neurointensive care unit over a 4-year period from 2010-2013 and compare them to the ICNARC report of 2007, which summarised the number, and nature of obstetric admissions to ITU in the UK.

Tablo 1.

	Obstetric NITU admissions	Unplanned NITU admissions	ICNARC reference
Total	22 (1.1%)	1925	513 (all obstetric ITU admissions)
Length of stay/days	6.2	4.9	8
Proportion level 3	59.1% (13)	63.3% (1219)	100%
Currently pregnant	50% (11)		18.5% (95)
Recently pregnant	50% (11)		81.5% (418)
Average APACHE score	10	10.9	12
Mortality	4.5% (1)	12.90%	2%

**Methods:** Data was collected retrospectively on patients admitted to the neurointensive care unit who were currently pregnant (CP) or recently pregnant (RP), within 42 days of delivery. Patient demographics, diagnosis, comorbidities, length of stay, neurosurgical or radiological intervention, organ support and maternal and fetal outcome were recorded.

**Results:** Average age was 32 (18-43). 3 (13.6%) were hypertensive (1 pregnancy induced, 2 primary hypertension) and 2 (9.1%) known epileptic. 4 (18.1%) patients had venous sinus thrombosis, 3 (13.6%) eclampsia, 3 mass lesions, 2 (9.5%) posterior reversible encephalopathy syndrome, 2 following cardiac arrest during LSCS, 2 neurovascular anomalies, 2 Guillain Barre and 2 pseudoseizures. 3 admissions followed home birth. 4 received inotropes and 6 anti-hypertensives. 9 required neurosurgical intervention and 1 neuroradiological. 12 (54.5%) patients made a full neurological recovery, 3 had residual cranial nerve palsy, 3 motor deficit. 1 baby died and there was one termination of pregnancy.

**Conclusion:** Peripartum neurological complications cause significant morbidity and mortality. Any loss of life or function is a tragedy with far reaching consequences. However, as shown in the ICNARC report and our case series, specialist care allows for a full range of intervention and management to achieve better outcomes than would be expected for similar age and severity matched controls.

## P-86

### Anesthetic Management of A Newborn Infant with Myelomeningocele Connected with Pleura

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**Introduction:** Myelomeningocele is a complex congenital anomaly derived from neural tube defect that occurs in the period of the first 4 weeks of the pregnancy (1). We aimed to present the anesthetic management of a newborn with myelomeningocele that found a connection between the sac and pleura during the operation.

**Case Presentation:** Microcephaly and myelomeningocele were diagnosed in a baby girl during the follow-up of a 24-year-old G2P2 mother at 16<sup>th</sup> week of the pregnancy. The baby was born via cesarean section at 37 weeks and 1 day of gestation with 2060-gram weight and transferred to the neonatal intensive care unit (NICU). Lumber spina bifida and ventriculomegaly were diagnosed with cranial/cervical/thoracic/lumber MRI. There was not any abnormality in the echocardiography and the patient was scheduled for excision of spinal menigomyelocele sac at the 10<sup>th</sup> day of her life. The patient was transferred to the operating room without any premedication and after standard monitoring with ECG, NIBP and SpO<sub>2</sub>, anesthesia induction was achieved with 8% sevoflurane in 50-50% O<sub>2</sub>-air in the lateral position. After maintaining peripheral venous line, 2 mcg/kg fentanyl and 0.5 mg/kg rocuronium were added and endotracheal intubation was achieved without any problem with a 3.0 size uncuffed tube in the lateral position. Then the baby's position was changed to prone. During the operation after the incision of the sac and drainage of the cerebrospinal fluid, a second sac was observed. When this second sac was drained, a connection with the pleura was observed. Despite any hemodynamic and/or respiratory abnormalities, pediatric surgery consultant was invited to the operating room. After surgical repairs, a chest tube was inserted and the intubated patient was transferred to the NICU. The baby was extubated at the same day and discharged at the postoperative 10<sup>th</sup> day.

**Conclusion:** Hydrocephalus associated with Arnold-Chiari Malformation Type II exists in most of the myelomeningocele patients that may lead to cervical cord and brainstem compression due to cervical extension during tracheal intubation. Airway management problems can occur with giant hydrocephalus. In most of these patients there is reduction of hypoxic drive and postoperative apnea is a potential problem. To obtain fluid-electrolyte balance, normothermia and proper surgical position are other important issues particularly for newborn infants.

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## P-87

### Neurological Complications After Liver Transplantation: Differential Diagnosis

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**Objective:** Neurological complications (NC) are reported in 13-47 % of patients after liver transplantation (LT) and increase

morbidity, length of hospital stay and mortality. Although the toxic effect of immunosuppressive drugs is known as the major factor for neurological complications after LT, in this report we aimed to share our experience in 4 cases who suffered from neurological disorders due to uncommon aetiologies.

**Methods:** Between January 2009-February 2014, 148 patients have been admitted to our intensive care unit (ICU) after LT. Four patients who became unconscious independent of their hepatic functions during their ICU stay and in whom drug toxicity was excluded as a reason of this clinical status were included to this study. The clinical course and cerebral magnetic resonance imaging (cMRI) and/or cerebral computed tomography (cCT) findings of these patients were evaluated.

**Results:** One of the aetiologies of NC was severe cerebral haemorrhage which occurred in a 51 year old man and diagnosed easily by cCT. He stayed in a comatose stage for 3 months after operation till death. The other reasons of unconsciousness were really complicated and difficult to diagnose with well-known radiological and biochemical methods. Wilson like lesions, manganese accumulation, central pontine myelinolysis were thought in differential diagnosis in a 39 years old female patient. She required mechanical ventilation support because of her neurological status for 64 days and stayed 200 days in ICU. She is still living with speech disorder and polyneuropathy. Wernicke-Korsakoff, epilepsy were discussed as aetiological factors in another patient. He was a 37 year old man with hepatitis B and died because of septic shock after 240 days. In his last brain MRI beside bifrontal sub-cortical cerebral white matter abnormalities, atrophy was common. The 34 years old patient who was unconscious in her first days after LT had the best outcome. Her cMRI showed differences compatible with kernicterus which was thought due to a short period of hyperbilirubinemia. Plasmapheresis had been performed severally. She is conscious and alive but has mild polyneuropathy and visual abnormalities.

**Conclusion:** NC are frequently encountered after LT. In addition to neurotoxic effect of immunosuppressive drugs; cerebral haemorrhage, Wernicke-Korsakoff, manganese accumulation, central pontine myelinolysis and kernicterus should also be considered as aetiological factors.

## P-88

### Geriatric Brain Trauma and Neurosurgical Intensive Care

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**Objective:** Head injuries of any severity have a worse prognosis in the geriatric population. The risks of mortality and poor functional outcomes increase progressively with age. Accidental injury was the fifth most frequent cause of mor-

tality among the elderly in 2009 and 2010 (1). Researchers have also consistently found that higher severity injuries, lower Glasgow Coma Scale (GCS) scores on admission, pre-injury anticoagulant therapies and increased vascular vulnerability are all associated with poor neurologic outcomes in this population. The aim of the study was to assess clinical characteristics, different injury patterns and outcomes of patients with geriatric brain trauma.

**Methods:** We retrospectively collected the data of brain trauma, aged 65 and older, presenting to Izmir Tepecik Education and Research Hospital Department of Neurosurgery between January 2013 and February 2014. Patients data including demographics (age, gender, pre-existing comorbidities), mechanism of injury, body regions injured, initial brain CT scan, initial Glasgow Coma Scale (GCS), intensive care unit length of stay (LOS), mechanical ventilation, blood transfusion, complications, hospital LOS, mortality were analyzed. Alcohol intake was recorded. The results of descriptive statistical analysis will be summarized and presented.

**Results:** A total of 14 patients were included. The mean age of the study was 73.2 years and there were 9 males. We had three types of mechanisms of injury. Those are as follows: 3 car accident, 10 fall, 1 pedestrian struck. The mean value of initial GCS is 10. The first CT scan obtained 6 patients had subdural haemorrhage, 7 patients had intracerebral hemorrhage, 1 patients had sefal hemorrhage. Mean duration of mechanical ventilator was 8.7 days. The average intensive care unit LOS was 11.2 days and hospital LOS was 17 days. In-hospital death rates were 57% (8 of 14).

**Conclusion:** Response of the elderly population to trauma and their physiological reserves are inadequate. Early diagnosis and treatment of significant injuries is therefore critical. Changes from the initial GCS score are important in following clinical progress. The elderly have mortality rates two to five times that of younger patients with the same Glasgow Coma Scale. The increased hospital LOS in elderly trauma patients has been attributed to an increased incidence and severity of complications. Better outcomes in elderly trauma patients can be improved by an experienced physician, with the intensive monitoring, aggressive management, and comprehensive care.

## P-89

### Establishing Loss of Consciousness by Changes in EEG, Propofol Concentration and Clinical Correlates

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**Objective:** It is not clear which is the exact moment of loss of consciousness (LOC) after administration of propofol. Loss

of responses to different stimuli like verbal command (LVC) or eyelash reflex (LER) has clinically been used as surrogate measures. The EEG spectrogram allows exploring LOC assessed by the shift in alpha activity to frontal areas. The objective of the present study is to evaluate changes of different somatic or EEG derived indicators of LOC during propofol induction.

**Methods:** Under IRB approval and informed consent from 7 female alopecic patients undergoing surgery for breast cancer under general anesthesia were included. The EEG electrodes were positioned frontal and parietal (qCON Quantum Medical, Spain). Two BIS VISTA™ bilateral sensors (Covidien, USA) were applied, one frontal and one parietal. Propofol was administered by TCI system using the Schnider model (1). The effect site target was 2.5 µg/mL (slow induction). The following indicator values were recorded at LVC, LER, and shift of alpha activity: Time from reaching target, Pred Ce Pro, BIS (frontal) and qCON (frontal).

**Results:** Propofol target biophase concentration was achieved before loss of response to verbal command in all 7 cases. The EEG spectrogram showed a shift in alpha activity from parietal to frontal in all patients. The desired propofol effect-site concentration was reached before clinical LOC and anteriorization. The time (mean (SD)) between the desired propofol effect-site concentrations and clinical LOC were 3.33 (1.63) min for LVC and 5.47 (1.57) min for LER. The qCON and BIS were compared by *prediction probability* (Pk) (2). At infusion start qCON and BIS were 95.6 (5.38) and 90.5 (4.71), respectively. At LVC the qCON was 70.2 (14.7) Pk=1.0 (0.0) while Bis was 77.7 (10.1) Pk=0.9 (0.04). For LER the qCON was 67.3 (16.1) with Pk=1.0 (0.0) and BIS 69.0 (12.4) with Pk=0.96 (0.05). There was a very high correlation between qCON and BIS.

**Conclusion:** Anteriorization of alpha activity occurred with a median of 205 s before LVC and 304 s before LER. The shift between parietal and frontal activity can be used as a surrogate of LOC in which case a parietal-frontal EEG montage is recommended.

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## P-90

### Blood Patch in Intracranial Hypotension Syndrome

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Spontaneous Cerebrospinal Leak is an uncommon but well recognized syndrome that causes intracranial hypotension (1).

The clinical features include headache, nausea, vomiting, vertigo and dementia. Characteristically, magnetic reso-

nance imaging (MRI) shows descent of the brain with effacement of subarachnoid cisterns and crowding of posterior fossa. Epidural blood patch has recently been reported as treatment (2).

We report a case of a 47-year-old male, previously healthy, who's admitted in the emergency department with occipital headache, neck pain, nausea and vomiting worsened by upright position. Brain computerized tomography (CT-Scan) was normal and he was discharged at the same day. The patient returns 35 days later with the same symptoms plus altered sound perception. MRI and CT-Scan showed bilateral subdural frontal and occipital hematoma and crowding of posterior fossa, without tonsillar herniation. He was diagnosed with intracranial hypotension.

The patient suffered a progressive worsening of the symptoms. A second MRI showed epidural cerebrospinal fluid at thoracic and cervical levels, without identification of the leak site. He was submitted to epidural blood patch therapy 10 days after the admission. Twenty milliliters of autologous blood were injected in epidural space at L1-L2 level, after which the patient was positioned in Trendelenburg position for 30 minutes.

There was an improvement of patient's neurological status during the first week after the procedure, followed by a recall of symptoms that lasted about 2 weeks. Then, he suffered a progressive improvement and 37 days after the blood patch technique the patient was discharged, asymptomatic.

The cause of spontaneous leaks is predominantly at the thoracic level. Blood patch therapy may have had a role in the improvement of the clinical symptoms in the first week after the procedure, after which conservative treatment may have been essential to improvement of the clinical status.

We must consider the role of blood patch as a possible option in cases of cerebrospinal fluid leakage, especially when the site of dural breach is unknown.

#### References

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## P-91

### Experiences in Pediatric Neuroanesthesia

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**Objective:** Pediatric neuroanesthesia is a specific branch involving both principles of neuroanesthesia and pediatric an-

esthesia. Pediatric neurosurgery in Gazi University is one of the most experienced centers in Turkey. All recent advances in pediatric neurosurgery field like intraoperative electrophysiological neuromonitoring (IONM), neuroendoscopy, neuronavigation have been performed regularly. The authors aim to present their experience on this highly specific topic.

**Methods:** Pediatric patients who underwent surgery for neurological diseases between June 2012-February 2014 were retrospectively analyzed. Demographic data, primary pathology, ASA, anesthetic management and complications were evaluated. The anesthetic technique for IONM was mentioned.

**Results:** The accessed 109 patients' (62 boys/47 girls) data were included. The median age of the patients was 72 months. The percentage of the ASA I, II and III patients were 75.3, 19.1 and 5.4, respectively. The 77.1% of surgery were performed for cranial and 22.9% for spinal pathologies. Most of the patients were operated in supine position (66.3%) whereas 30.9% of the patients were operated in prone position and 1.8% of the patients were operated in sitting position. All patients were operated under general anesthesia. Choice of anesthetic technique for all cranial pathologies was inhalation anesthesia. Neuronavigation was used in three patients. Scalp block was performed in 14 of 29 patients whose head was fixed with Mayfield. None of the patient experienced serious complication except one patient in whom venous air embolism was observed. Twenty patients with spinal pathologies who required IONM were operated under TIVA without using neuromuscular blocking agents. Intravenous paracetamol was most preferred agent for postoperative analgesia. Besides intravenous patient controlled analgesia with morphine was used in 14 patients over 6 years old.

**Conclusion:** Anesthetic management of pediatric neurosurgical procedures presents many difficulties. Recent surgical advances like neuronavigation and IONM requires the adaptation of anesthesiologists to these techniques. A basic understanding of age and disease related variables and strong co-operation of surgeon and anesthesiologist is important to minimize perioperative morbidity and mortality.

## P-92

### Susseful Treatment of Refractory Trigeminal Neuralgia with Acupuncture: A Case Report

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**Objective:** Trigeminal neuralgia (TN) is a chronic facial pain, with an incidence of approximately 0.3%. Due to his difficult management, acupuncture has been emerging as adjunct to pharmacological/surgical therapy (1). Our aim is to highlight benefits of acupuncture in TN's treatment by re-

porting a case of refractory TN that responded favorably to a combination of acupuncture and medication/surgery.

**Methods:** Male, 42 years-old, with TN for 5 years, waiting for surgery. Physical exam reveals skin changes, allodynia, hyperalgesia and worsening of pain caused by brushing of teeth and shaving. Treated with gabapentin, carbamazepine, amitriptyline, metamizol, alprazolam. Referred to Chronic Pain Unit (CPU). No satisfactory response to the different treatments, reporting episodes of pain at level 7 on the VAS scale. Started acupuncture, 6 hours after the first session stating pain at level 4 and after 24 hours at level 2.

Treated with 11 sessions, one per week. Local points: 21S-J/19SI/6GV/6ST/20LI/24REN/23SJ/2BL. General points: Yintang/6BP/4Li/36ST/2LV. Reduction in medication, intensity and spacing of pain episodes. Surgery-microdecompression of trigeminal root, remained asymptomatic and no therapy needed for 7 months.

Literature research: Medline ("Acupuncture Points" [MAJR] OR "Acupuncture Therapy" [MAJR]) AND "Trigeminal Neuralgia" [MAJR].

**Results:** Firstly Acupuncture had a good result, with reduction in medication, intensity and spacing of pain episodes. Then surgery seemed to be the solution for the TN, nevertheless there was a recurrence of an intense pain. The patient restarted the same therapeutic regimen of pharmacotherapy and acupuncture, with important relief of symptoms.

**Conclusion:** Acupuncture was effective in relieving short and long term pain. As described in the literature, this case highlights the importance of acupuncture in TN, which proves to be safe and contributes to clinical improvement.

## Reference

1. Altern Ther Health Med 2010; 16: 30-5.

## P-93

### Predictors of LV Dysfunction in Patients with Subarachnoid Haemorrhage

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**Objective:** Subarachnoid haemorrhage (SAH) is known to be associated with echocardiographic and biochemical evidence of cardiac injury. We set out to discover the incidence of left ventricular (LV) dysfunction within a group of patients who had suffered SAH, and if any other physiological or biochemical variables were predictive of developing this complication.

**Methods:** We retrospectively identified 31 patients (9 male), median age 55, with SAH who underwent echocardi-

graphic examination in two tertiary neurocritical care centres in North West England between April 2012 and April 2013. Data was collected for the following variables using Microsoft Excel: presence of echocardiographic abnormalities, age, sex, ethnicity, medications, comorbidities, sodium, creatinine, troponin I, haemoglobin, type of aneurysm, Fisher grade, admission ICP and GCS, presence of hydrocephalus, need for vasopressors, need for ventilation and mortality. Statistical analysis was carried out using a multiple regression model constructed with StatsDirect. The following echocardiographic abnormalities were recorded: Takotsubo cardiomyopathy (diagnosed using Modified Mayo Clinic Criteria), reduced ejection fraction and the presence of regional wall motion abnormalities.

**Results:** A total of 31 patients were identified, of whom 7 had evidence of Takotsubo cardiomyopathy. 17 patients had evidence of LV dysfunction characterised by reduced ejection fraction or regional wall motion abnormalities. Troponin was raised in 19 patients, whilst only two patients with a raised troponin had a normal echo. Using multiple regression analysis, admission GCS ( $p=0.004$ ) raised troponin ( $p=0.028$ ) were identified as the only two statistically significant predictors of LV dysfunction or Takotsubo cardiomyopathy in patients with SAH.

**Conclusion:** LV wall motion abnormalities have recently been shown to be associated with poor clinical outcome and delayed cerebral ischaemia in aneurysmal SAH. Furthermore the degree of troponin rise after subarachnoid haemorrhage has been shown to be associated with severity of neurological injury. We suggest that further investigation is required into the association between biochemical evidence of myocardial injury and mortality. In the interim, it may be prudent to screen all patients with SAH for a rise in TnI so that those with a rise may be cared for in a critical care environment.

## P-94

### Three Years of Epilepsy Surgery-Six Month Follow-Up

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**Objective:** Surgical approach in treatment of refractory epilepsy has been increasing. The evaluation of long-term seizure control in patients with epilepsy consider several factors, including seizure frequency, severity, change in epilepsy symptoms over time, concomitant neurologic disability, and quality of life. The Engel rating scale, first introduced in 1987, is commonly used outcome classification for these patients. Our aim is to characterize the population of patients that underwent epilepsy surgery and to evaluate the follow-up 6 months after surgery.

**Methods:** Retrospective analysis of patients who underwent epilepsy surgery between 1/1/2011 and 30/6/2013 in our hospital. Outcome was evaluated 6 months after surgery ac-

ording the Engel rating scale. Data collected from the registration of diagnosis codes ICD-9-CM for epilepsy, clinical and hospital discharge reports. Data was processed by descriptive statistics.

**Results:** During the period studied, 46 patients (23 males and 23 females) underwent anaesthesia for epilepsy surgery with propofol and remifentanyl in target controlled infusion (TCI), midazolam and rocuronium in bolus or perfusion, 44 with superficialization of anaesthesia for ECoG and 2 with sedoanalgesia with propofol TCI (asleep-awake-asleep technique), mean age  $38 \pm 12.1$  years, ASA II in 38 patients and ASA III in 9. Mesial temporal sclerosis (20), tumoral lesions (15) and precentral dysplasia (8) were the most common causes of refractory epilepsy (93.5%).

6 months after the procedure, the outcome was evaluated according to the Engel rating scale: 41 patients were free of disabling seizures (30 were totally free of epileptic seizures - Class IA, 11 had non-disabling simple partial seizures - Class IB), 3 patients revealed worthwhile seizure reduction (Class IIIA), 2 patients didn't reveal improvement in the quality of life (1 had a significant seizure reduction - Class IVA and 1 did not show an considerable change in the frequency of seizures-Class IVB).

**Conclusion:** In our population, overall results were very good. 96% revealed improvement in the quality of life and 65% were totally free of epileptic seizures. These results are consistent with others referred in literature; however they are limited to a 6 months follow-up. In our institution, further studies will be done to evaluate the follow-up for a longer period. Surgical approach seems to be a valid option for the treatment of refractory epilepsy.

## Reference

1. J Epilepsy Clin Neurophysiol 2007; 13: 71-4.

## P-95

### Efficacy of Holding the Patients in the Lateral Position in Reducing Hypotension Related to Prone Position

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**Objective:** When patients' position is turned from supine to prone for lumbar discectomy, a reduction can be seen in arterial blood pressure and cardiac index. To attenuate the fall in blood pressure, fluid replacement and vasopressor therapy are suggested. The aim of this study is to investigate the efficacy of holding patients in left lateral position for 3 minutes before changing the patients' position from supine to prone in reducing hypotension.

**Methods:** After ethical committee approval, 96 adult patients undergoing lumbar laminectomy were included in

the study. The patients with known cardiovascular disease, chronic obstructive pulmonary disease, on  $\beta$  blocker therapy and BMI>35 were excluded from the study. The patients were monitored for ECG, NIBP and SpO<sub>2</sub>. Anesthesia induction was achieved with propofol 2.5 mg/kg, fentanyl 2 mcg/kg and rocuronium 0.5 mg/kg. Maintenance of anesthesia was achieved with sevoflurane 2-3% in 50-50% O<sub>2</sub>-air and remifentanyl 0.5-1.2 mcg/kg/min. After induction, the patients were randomized into two groups: Group P: the patients were turned directly from supine to prone (n=48), group L: the patients were held in left lateral position for 3 minutes before turning to prone (n=48). The non-invasive blood pressure (NIBP) (systolic/diastolic/mean), heart rate (HR), and SpO<sub>2</sub> were recorded in 9 different timing in both groups: Before anesthesia induction (T1), after anesthesia induction (T2), after intubation (T3), before changing the position (T4), and in the 1<sup>st</sup> (T5), 2<sup>nd</sup> (T6), 5<sup>th</sup> (T7), 10<sup>th</sup> (T8) and 20<sup>th</sup> (T9) minutes after changing the position. In group L, evaluation was done in three different timing in addition to these 9 evaluation timings: 1<sup>st</sup> (L1), 2<sup>nd</sup> (L2), and 3<sup>th</sup> (L3) minutes in lateral position. The patients whose NIBPs changed >40% in respect to the initial NIBPs were excluded from the study. Statistical analysis was done with Student's t test and chi-square test and p<0.05 was considered as significant.

**Results:** Demographic data were similar between two groups. In group L, levels of mean NIBP in T5, T6, and T7; levels of systolic NIBP in T5, and T6; levels of diastolic NIBP in T6, and T7 were higher than Group P (p<0.05). There was not statistically significance between L1, L2, and L3 results (p>0.05). The number of patients who need ephedrine therapy and whose NIBP decreased >40% were higher in group P than group L (p<0.05).

**Conclusion:** Holding patients in left lateral position for 3 minutes before turning prone was found to be efficient in reducing hypotension. We are in the opinion that holding the patient in the lateral position gives time for adaptive mechanisms to regulate the blood pressure in patients undergoing lumbar discectomy who are turned to the prone position.

## P-96

### Effect of Maintaining Blood Pressure at Pre-Insult Range on Short-Term Outcome in Hypertensive Spontaneous Intracerebral Hemorrhage

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**Objective:** Recent studies suggest that acute lowering of blood pressure in acute hypertensive intracerebral hemorrhage. We investigated whether maintaining blood pressure

at pre-insult range offers any benefit in hypertensive patients.

**Methods:** Patients with a history of hypertension, presenting with intracerebral hemorrhage, and a mean blood pressure higher than 130 mmHg were retrospectively analyzed for initial glasgow coma score, intracerebral hemorrhage score, hematoma expansion, mortality within 7 and 30 days and the National Institutes of Health Stroke Scale (NIHSS) score at day 30 after ICH onset. Patients who died within 3 days, required surgical intervention, or diagnosed with brain death were excluded.

**Results:** Data of 46 patients (21 female, 25 male, mean age 59.2±12.9 years) were analyzed. Patient charts showed that all patients received steroids as anti-edema treatment, and nitrates as antihypertensive treatment. Median initial glasgow coma score was 5±2.9, median intracerebral hemorrhage score was 3±1.2. Maintenance of blood pressure at pre-insult range (n=18) resulted in 0% mortality at day 7, 33.3% mortality at day 30. Lowering of blood pressure (n=28) resulted in 35.7% mortality at day 7, 78.6% mortality at day 30 (p=0.012 and 0.006, respectively). During the treatment course, hematoma expansion was noted in 2 patients (12.5%) in the first group, and 4 patients (16.6%) in the second group. The difference was not significant. NIHSS score at day 30 was lower in first group (20.3±4.9) compared with second group (27.8±2.8) (p=0.001).

**Conclusion:** The main limitation of this study is the lack of standardization of doses in the antihypertensive treatment. Maintaining the blood pressure at pre-insult levels may benefit hypertensive patients in terms of improved survival and outcome, without an obvious risk of hematoma expansion. Large, prospective, randomized trials are required to confirm these findings.

## P-97

### Effect of Maintaining Blood Pressure at Pre-Insult Range on Short-Term Outcome in Hypertensive Acute Ischemic Stroke Patients

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**Objective:** High blood pressure is common in acute ischemic stroke patients with undertreated chronic hypertension. We investigated whether maintaining blood pressure at pre-insult range offers any benefit in these patients.

**Methods:** Patients with a history of hypertension presenting with acute ischemic stroke and a mean blood pressure higher than 130 mmHg were retrospectively analyzed for initial glasgow coma score, hemorrhagic transformation of the cerebral infarct, cerebral edema formation, mortality within 7 and 30 days and the National Institutes of Health Stroke

Scale (NIHSS) score at day 30 after stroke onset. Patients who died within 3 days, required surgical intervention, or diagnosed with brain death were excluded.

**Results:** Data of 78 patients (34 female, 44 male, mean age  $65.4 \pm 15.5$  years) were analyzed. Patient charts showed that all patients received mannitol as anti-edema treatment, and nitrates as antihypertensive treatment. Median initial glasgow coma score was  $4.5 \pm 2.6$ . Maintenance of blood pressure at pre-insult range ( $n=46$ ) resulted in 6.5% mortality at day 7, 34.8% mortality at day 30. Lowering of blood pressure ( $n=32$ ) resulted in 34.4% mortality at day 7, 59.4% mortality at day 30 ( $p=0.004$  and  $0.0004$ , respectively). During the treatment course, no hemorrhagic transformation was noted, however cerebral edema was noted in 3 patients (6.5%) in the first group, and 6 patients (18.7%) in the second group. The difference was not significant. NIHSS score at day 30 was lower in first group ( $24.4 \pm 3.7$ ) compared with second group ( $27.7 \pm 1.96$ ) ( $p < 0.0001$ ).

**Conclusion:** The main limitation of this study is the lack of standardization of doses in the antihypertensive treatment. Maintaining the blood pressure at pre-insult levels may benefit hypertensive patients in terms of improved survival and outcome, with no obvious risk of cerebral edema formation. Large, prospective, randomized trials are required to confirm these findings.

## P-98

### Effect of Beta Blocker Therapy on Hematoma Expansion and Short-Term Outcome in Hypertensive Spontaneous Intracerebral Hemorrhage

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**Objective:** Bleeding may continue after the initial insult in hypertensive intracerebral hemorrhage due to persistent elevation of blood pressure, which is a neuroadrenergic response to cerebral tissue hypoxia. We investigated whether beta blocker therapy offers any benefit in these patients.

**Methods:** Patients presenting with hypertensive intracerebral hemorrhage, a systolic blood pressure higher than 200 mmHg, and a heart rate higher than 100/min were retrospectively analyzed for initial glasgow coma score, intracerebral hemorrhage score, hematoma expansion, mortality within 7 and 30 days and the National Institutes of Health Stroke Scale (NIHSS) score at day 30 after stroke onset. Patients who died within 3 days, diagnosed with brain death, or received fresh frozen plasma were excluded. Patients, who received beta blocker therapy within 24 hours following the insult, were included in the beta-blocker group. Patients who

did not receive any beta blocker therapy during the course of treatment were included in the standard-therapy group.

**Results:** Data of 32 patients (14 female, 18 male, mean age  $59.7 \pm 13.3$  years) were analyzed. Median initial glasgow coma score was  $5 \pm 3.3$ . Median hematoma volume was  $34.5 \pm 33.9$  mL. Mean blood pressure was significantly high in the beta-blocker group ( $n=16$ ) ( $95.3 \pm 22.6$  mmHg), compared with the standard-therapy group ( $n=16$ ) ( $83.3 \pm 20.8$  mmHg) ( $p=0.03$ ). Mean heart rate was significantly low in the beta-blocker group ( $76.6 \pm 6.2$ /min), compared with the standard-therapy group ( $114.8 \pm 7.4$ /min) ( $p < 0.0001$ ). No hematoma expansion was noted in the beta-blocker group, compared with 6 patients (60%) in the standard-therapy group ( $p=0.02$ ). Beta blocker therapy resulted in 6.25% mortality at day 7, 56.25% mortality at day 30, compared with the other group ( $n=16$ ) resulted in 68.7% mortality at day 7, 100% mortality at day 30 ( $p=0.001$  and  $0.01$ , respectively). NIHSS score at day 30 was  $24.9 \pm 5.2$ , and there was no significant difference between groups.

**Conclusion:** The main limitation of this study is the lack of intracranial pressure monitorization. Beta blocker therapy may be effective in preventing hematoma expansion in hypertensive intracerebral hemorrhage, and provide improved survival. Large, prospective, randomized trials are required to confirm these findings.

## P-99

### Effect of Beta Blocker Therapy on Occurrence of New Endoscopic Findings and Gastrointestinal Hemorrhage in Stroke Patients

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**Objective:** Stroke patients commonly present with a neuroadrenergic response to cerebral tissue hypoxia. While this response results in hypertension, it is also associated with vasoconstriction. Therefore we are concerned if it is a cause of stress-induced ischemic gastrointestinal hemorrhage. We investigated whether beta blocker therapy confers any protection from gastrointestinal hemorrhage in acute stroke patients.

**Methods:** Patients presenting with acute ischemic or hemorrhagic stroke, with no gastroduodenoscopic findings during the first 3 days, and who received regular proton pump inhibitor prophylaxis were retrospectively analyzed for occurrence of new gastroduodenoscopic gastrointestinal hemorrhage. Patients presenting with acute or chronic kidney failure, receiving vasoconstrictors, and steroids at any time during the treatment, receiving no enteral feeding or who were diagnosed with brain death were excluded. Patients, who received

beta blocker therapy within 24 hours following the insult, were included in the beta-blocker group. Patients who did not receive any beta blocker therapy during the course of treatment were included in the standard-therapy group.

**Results:** Data of 72 patients (31 female, 41 male, mean age  $65.37 \pm 18.4$  years) were analyzed. According to patient charts, received pantoprazole 40 mg two times a day. Mean blood pressure was significantly high in the beta-blocker group ( $n=37$ ) ( $104.3 \pm 39.5$  mmHg), compared with the standard-therapy group ( $n=35$ ) ( $81.8 \pm 60.6$  mmHg) ( $p=0.002$ ). Mean heart rate was significantly low in the beta-blocker group ( $81.1 \pm 7.4$ /min), compared with the standard-therapy group ( $118.8 \pm 6.2$ /min) ( $p < 0.0001$ ). Following discharge from intensive care unit, gastric or esophageal erosions were noted in 16 patients (43.2%) in beta-blocker group, and in 14 patients (40%) in the standard-therapy group. Gastric ulcer and accompanying gastrointestinal hemorrhage was noted in 3 patients (8.1%) in the beta-blocker group ( $n=37$ ), and 3 patients (3.5%) in the standard-therapy group, and there was no significant difference between groups.

**Conclusion:** The main limitation of this study (other than the retrospective nature) is lack of helicobacter pylori testing, and lack of standardization of nasogastric feeding tube placement. Beta blocker therapy did not prevent or lower incidence of gastric or esophageal erosion or ulceration, despite a higher mean blood pressure.

## P-100

### Cerebral Aneurysms: Risk Factors and Complications Associated to Poor Clinical Grade

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**Objective:** Intracerebral aneurysmal hemorrhage is a neurologic emergency with profound effects on the central nervous system. The purpose of this study is to analyze the risk factors and complications associated to poor clinical grade on admission according to Hunt & Hess (H&H) scale.

**Methods:** We performed a retrospective analysis of hospital records including operative, anesthetic, nursing notes, computed tomographic scans and angiographic films of 66 patients undergoing surgery for ruptured and unruptured cerebral aneurysms from 2012 June to 2013 May. Throughout this manuscript, the term "good clinical grade" has been used to describe patients with H&H grades I to III, whereas "poor clinical grade" describes those with H&H grades IV and V. Parameters were expressed as the mean  $\pm$  standard deviations and statistical analysis was carried out using SPSS software (version 20.0). Nominal and interval scales were evaluated with either Pearson  $\chi^2$  test or Fisher Exact test, and continuous variables were compared using a Student  $t$  test.

**Results:** A total of 66 patients surgically treated cerebral aneurysm cases were identified. The mean of age was  $54 \pm 12$  years, predominantly female (65%). 79% were ruptured aneurysms and 21% unruptured aneurysms; both mainly located in ACoA, 38% and 41%, respectively; 65% and 35% of ruptured aneurysms were H&H I/II/III and H&H IV/V, respectively. Risk factors related to poor clinical grade were older patients ( $p=0.069$ ) and history of hypertension ( $p=0.004$ ; odds ratio [OR] 6.24). Prolonged mechanical ventilation ( $p=0.008$ ; OR 6.3) and higher incidence of postoperative complications ( $p=0.017$ ; OR 5.6) were associated with such clinical grade. Postoperative complications were observed in 56% of patients and included peripheral nerve paralysis ( $n=16$ ), hydrocephalus ( $n=10$ ), vasospasm ( $n=9$ ), pneumonia ( $n=7$ ) and cerebral infarction ( $n=4$ ), intraoperative rupture occurred in a single patient and the mortality rate was 6%. Those complications were related to prolonged hospital stay ( $p=0.002$ ; mean  $26.3 \pm 17.5$  days), history of hypertension ( $p=0.02$  OR 2.6) and prolonged mechanical ventilation ( $p < 0.001$ ; OR 13).

**Conclusion:** This study results indicated that arterial hypertension and older patients carries a significant risk of poor clinical grade on ruptured aneurysms at admission. This poor clinical grade was related to postoperative complications and prolonged mechanical ventilation.

## P-101

### Airway Management By Pre-Hospital Emergency Teams in a Simulated Multitrauma Scenario

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**Objective:** Effective management of airway in multitrauma patients in pre-hospital setting by healthcare providers working in 112 Ambulance Service as first responders has a vital importance, since it is associated with a higher incidence of difficult or failed intubations.

The aim of this study was to assess airway management by paramedics in case of a simulated scenario where ventilation was impossible.

**Methods:** Paramedics working as crew member of Antalya 112 Ambulance Service were involved in the management of a simulated multitrauma patient scenario of needing tracheal intubation for severe traumatic brain injury, using medium fidelity mannequin - SimMan (Laerdal). Manual in-line stabilization (MILS) was used for cervical spine immobilization. The manikin was settled to make tracheal intubation under direct laryngoscopy impossible at the first attempt and to make bag valve mask (BVM) ventilation hardly performed after the second attempt. The devices utilised in a randomised order were classic laryngoscope with Macintosh

blade with guidance of Gum Elastic Bougie (GEB) and an instrumented LMA (ILMA) and a cricothyrotomy set to use in occurrence of failed intubation. Success rate and time taken to tracheal intubation were measured.

**Results:** Sixteen paramedics took part in the simulation. Participants reported a mean of 4,2 years of service. Thirty seven intubations were attempted by the participants. Five paramedics (A) succeeded at their 3rd attempt using Macintosh blade with GEB. Eleven paramedics preferred to use ILMA after failure of their 2nd intubation attempt. Six (B) of them succeeded to place ILMA at their first attempt, and the other 4 (C) succeeded at their 2nd attempt and performed intubation. One paramedic performed cricothyrotomy. Time to tracheal intubation from insufficient ventilation with BMV in A, B, C were 28,2 seconds, 36,16 seconds, 47,75 seconds respectively.

**Conclusion:** In this manikin study, ILMA was more preferred by paramedics than standard intubation technique when intubation failed and ventilation with BMV is hard. Nonetheless intubation with Macintosh blade with GEB associated with the fastest time to intubation.

## P-102

### Promising Results Using Amantadine in Traumatic Brain Injury Patients

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Traumatic brain injury (TBI) is a major health issue throughout the world. TBI is among the three leading cause of death in young population (between 5-44 year) according to World health organization (WHO). There are many studies which investigate the possibilities for preventing and decreasing the morbidity from TBI but no new treatment has been approved in the past 30 years.

Our objective is to determine whether usage of Amantadine influences the course of the treatment and outcome in TBI patients.

The study was designed as open randomized retrospective prospective study, and 75 patients were enrolled in this investigation. Cause, severity and type of injuries were estimated in patients in two groups.

Comparison between the groups show significantly higher scores for severity of injuries in treated group with Amantadine Gr. II-tr (n=15), (ISS  $57.33 \pm 18.53^*$  vs.  $23.80 \pm 16.24$ ). Although the severity of injuries is higher in group II (treated with Amantadine) the course and outcome was better. The immediate therapy with Amantadine leads to higher survival on the third, tenth and thirtieth day (100% vs. 83.3%; 86.66% vs. 66.6%; 73.33% vs. 66.6%).

According to obtained results it can be concluded that urgent specific therapy in patients with brain trauma including cytoprotective therapy with Amantadine decreases the mortality and improves the course of treatment. These are preliminary results which demand further verification.