A summary of some of the recently published seminal papers in Neuroscience

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Current guidelines for the care of patients with acute spinal cord injuries (SCIs) recommend maintaining mean arterial pressure (MAP) values of 85‑90 mm Hg for 7 days after an acute SCI. However, little evidence supports this recommendation. The authors sought to investigate the relationship between MAP values and neurological recovery. A computer system automatically collected and stored q1 min physiological data for 100 patients with acute SCI from intensive care unit monitors acquiring data over a 6‑year period. Average MAP values as well as the proportion of MAP values below thresholds were explored for values from 120 mm Hg to 40 mm Hg in 1 mm Hg increments; the relationship between these measures and outcome was explored at various time points up to 30 days from the time of injury. A total of 994,875 q1 min arterial line blood pressure measurements were recorded for the included patients amid 1,688,194 min of recorded intensive care observations. A large proportion of measures were below 85 mm Hg despite the generally acceptable average MAP values. Higher average MAP values correlated with improved recovery in the first 2‑3 days after SCI, while the proportion of MAP values below the accepted threshold of 85 mm Hg seemed a stronger correlate, decreasing in strength over the first 5‑7 days after injury. This study provides strong evidence supporting a correlation between MAP values and neurological recovery. It does not, however, provide evidence of a causal relationship. The duration of hypotension may be more important than the average MAP.

Contributed by Dr. Mazda K Turel


With the myriad of treatment options available for the management of acoustic neuromas, the optimal management is still not defined. To evaluate if subtotal resection potentially offers better outcome, the authors conducted a prospective, multicenter, nonrandomized cohort study of patients with vestibular schwannoma ≥2.5 cm who received gross total...
resection (n = 12), near total resection (n = 22), or subtotal resection (n = 39). Patients received radiation if tumor remnant showed signs of regrowth. Seventy-three patients with a mean tumor diameter of 3.3 cm were included. Fourteen (21%) remnant tumors continued to grow, of which 11 received radiation, 1 had repeat surgery, and 2, no treatment. Four of the postradiation remnants (36%) required surgical salvage. Tumor regrowth was related to the non-cystic nature, larger residual tumor, and subtotal resection. Regrowth was 3 times as likely with subtotal resection compared to gross total resection and near total resection. Near total resection did not result in any significant increase in likelihood of tumor recurrence compared to gross total resection. Good cranial nerve VIIth (CNVII) function (House and Brackmann I-II) was achieved in 67% patients immediately and in 81% patients at 1-year. Better immediate nerve function was associated with a smaller preoperative tumor size and percentage of tumor left behind on magnetic resonance image. Degree of resection defined by surgeon and preoperative tumor size showed a weak trend toward better late CNVII function.

**Contributed by Dr. Mazda K Turel**


Adult diffuse low-grade gliomas are slow growing, World Health Organization grade II lesions. They have an insidious onset and may undergo anaplastic transformation. The timing of surgery remains controversial. As a result, the management of these patients is variable. The goal of this questionnaire was to evaluate practice patterns in Canada. An online invitation for a questionnaire including diagnostic, preoperative, perioperative, and postoperative parameters. It also included three cases with magnetic resonance imaging data with questions directed regarding various treatment options in these patients, that was sent to the practicing neurosurgeons. Survey was sent to 356 email addresses and 87 (24.7%) responses were collected. The range of years of practice was less than 20 years in 63% and over 21 years in 37%. 94% of the surgeons believed that they do not know the “right treatment.” 90% of the surgeons did not obtain a formal preoperative neurocognitive assessment. 21% performed a biopsy upon the patient’s first presentation. A gross total resection was believed to increase progression free survival (surgeons: 75%) and to increase overall survival (surgeons: 64%). An intraoperative MRI was only used by 8% of surgeons. Awake craniotomy was the procedure of choice for eloquent tumors by 80% of the surgeons. Of those surgeons who performed an awake craniotomy, 93% performed cortical stimulation and 38% performed subcortical stimulation. Using the aid of three hypothetical cases with progressive complexities in tumor eloquence, a trend for the younger surgeons to operate earlier and use awake craniotomy to obtain a greater extent of resection with the aid of cortical stimulation was detected, when compared to senior surgeons who still more often preferred a “wait-and-watch” approach. Despite the limitations of an online survey study, the study has offered insights into the variability in surgeon practice patterns in Canada and the need for a consensus on the workup and surgical management of this disease. Such a study might generate interesting results in India that has more diverse patient cohorts and institutional practices.

**Contributed by Dr. Mazda K Turel**


Approximately 67,900 new primary CNS tumors are diagnosed each year in the United States (21 per 100,000 persons), of which 44,910 are malignant. A recent joint meeting was held, with the US Food and Drug Administration (FDA), National Cancer Institute (NCI), clinical scientists, imaging experts, pharmaceutical and biotech companies, clinical trials cooperative groups, and patient advocate groups to discuss imaging endpoints for clinical trials in a glioblastoma. This workshop developed a set of priorities and action items including the creation of a standardized MRI protocol for multicenter studies. A standardized Brain Tumor Imaging Protocol (BTIP), along with the scientific and practical justifications for these recommendations, resulting from a series of discussions between various experts involved in different aspects of neuro-oncology neuroimaging for clinical trials, were evolved. The minimum recommended sequences include: (i) Parameter-matched precontrast and postcontrast inversion recovery-prepared, isotropic three dimensional T1-weighted gradient-recalled echo; (ii) axial two dimensional T2-weighted turbo spin-echo acquired after contrast injection, and before postcontrast three dimensional T1-weighted images, to control timing of images after contrast administration; (iii) precontrast, axial two dimensional T2-weighted fluid-attenuated inversion recovery; and (iv) precontrast, axial two dimensional, 3-directional diffusion-weighted images. Recommended ranges of sequence parameters are provided for both 1.5 T and 3 T MR systems. The current recommendations solely involve acquisition of MR images and do not provide...
guidelines for the clinical interpretation or quantitation of tumor extent for the purposes of response evaluation. However, if centres in India decide upon following this protocol, our contribution in large international multicentre trials will be significant and authoritative.

**Contributed by Dr. Mazda K Turel**


Dietary glycemic modulation through high-fat, low-carbohydrate diets, which induce a state of systemic ketosis and alter systemic metabolic signaling, have been incorporated into the clinical management of patients with neurological disease for more than a century. Mounting preclinical evidence supports the antitumor, proapoptotic, and antiangiogenic effects of disrupting glycolytic metabolism through dietary intervention. To date, 3 published studies incorporating novel dietary therapies in oncology have been reported. In this article, the authors review the biochemical pathways, preclinical data, and early clinical translation of dietary interventions that modulate systemic glycolytic metabolism in the management of primary malignant brain tumors. They introduce the modified Atkins diet (MAD), a novel dietary alternative to the classic ketogenic diet, and discuss the critical issues facing future studies. In their series of 8 participants with glioma and seizures treated with a 20 g/day carbohydrate-restricted MAD, the diet was well tolerated without significant toxicity and, although not statistically significant, resulted in improvement in seizure control. All 8 participants are living and survival rates for those with progressive GBM were comparable with the expected survival: 13 months for the participants with secondary GBM compared with 7.8 months expected, and 17 months for patients with recurrent GBM compared with 7.4 months expected. At analysis, the average weight loss was 3.4 ± 6.5 kg. While prospective data are necessary to determine the feasibility and tolerability of the MAD in patients with glioma, these data suggest that the MAD may provide a safe, tolerable, and feasible intervention to explore as a potential method of dietary glycemic modulation and as an adjunct to standard chemoradiation in gliomas. A systematic approach to developing a clearly defined dose, establishing measures of biology activity, and determining optimal endpoints is critical.

**Contributed by Dr. Mazda K Turel**


The authors invited investigators of published cohorts of people aged at least 16 years, identified by a systematic review, to provide individual patient data on the clinical course from the diagnosis of cerebral cavernous malformations (CCMs) until its first treatment or until the last available follow-up. They used survival analysis to estimate the 5-year risk of symptomatic intracerebral hematoma (ICH) due to CCMs (primary outcome), multivariable Cox regression to identify baseline predictors of outcome, and random-effects models to pool estimates in a meta-analysis. Among 1620 people from six studies, 204 experienced ICH during 5197 person-years of follow-up (5-year risk = 15.8%). The 5-year estimated risk of ICH during untreated follow-up was 4% for 718 people with non-brainstem CCM presenting without ICH or focal neurological deficit (FND) without brain imaging evidence of recent haemorrhage versus other modes of presentation, 8% for 80 people with brainstem CCM presenting without ICH or FND, 18% for 327 people with non-brainstem CCM presenting with ICH or FND, and 31% for 495 people with brainstem CCM presenting with ICH or FND. This is the largest analysis of the clinical course of untreated CCMs so far, in which the authors found that brainstem location and CCM presenting initially with ICH or FND were independently associated with the occurrence of ICH after the diagnosis of CCMs had been established. Age, sex, and CCM multiplicity, however, did not contribute any additional prognostic information. These findings can be helpful in deciding the treatment of CCM.

**Contributed by Dr. Mazda K Turel**


The benefit of intervention for patients with unruptured cerebral arteriovenous malformations (AVMs) was challenged by results demonstrating superior clinical outcomes with conservative management from the ARUBA trial. The aim of this multicenter, retrospective cohort study was to analyze the outcomes of stereotactic radiosurgery for ARUBA-eligible patients. The authors combined AVM radiosurgery outcome data from 7 institutions participating in the International Gamma Knife Research Foundation. Patients with ≥ 12 months of follow-up were screened for ARUBA eligibility criteria.
A favorable outcome was defined as AVM obliteration, no postradiosurgery hemorrhage, and no permanently symptomatic radiation-induced changes. An adverse neurological outcome was defined as any new or worsening neurological symptoms or death. The ARUBA-eligible cohort comprised 509 patients (mean age, 40 years). The Spetzler-Martin grade was I to II in 46% and III to IV in 54%. The mean radiosurgical margin dose was 22 Gy and the follow-up was 86 months. Obliteration of the AVM was achieved in 75% patients. The postradiosurgery hemorrhage rate during the latency period was 0.9% per year. Symptomatic and permanent radiation-induced changes occurred in 11% and 3% patients, respectively. The rates of favorable outcome, adverse neurological outcome, permanent neurological morbidity, and mortality were 70%, 13%, 5%, and 4%, respectively.

On the basis of the natural history of untreated, unruptured AVMs in the medical arm of ARUBA, a follow-up duration of 15 to 20 years is necessary to realize the potential benefit of radiosurgical intervention over conservative management in patients with an unruptured AVM.

Contributed by Dr. Mazda K Turel

Turner CL, et al. Elevated baseline C-reactive protein as a predictor of outcome after aneurysmal subarachnoid hemorrhage: Data From the Simvastatin in Aneurysmal Subarachnoid Hemorrhage (STASH) Trial. Neurosurgery. 2015;77:786-93

Aneurysmal subarachnoid hemorrhage (SAH) annually affects 600,000 people on a global level. A proportion of patients with aneurysmal SAH exist who have a good clinical grade at presentation and an unfavorable outcome. The authors conducted this study to assess if biochemical markers sampled on the first days after the initial hemorrhage can predict a poor outcome in good grade (WFNS 1 and 2) patients who have suffered from aneurysmal SAH. All patients recruited to the multicenter Simvastatin in Aneurysmal Hemorrhage Trial (STASH) were included. The modified Rankin Scale (mRS) was utilized to assess a good (mRS 0-2) and a poor outcome (mRS 3-6) at discharge, and again at 6 months after the ictus. Of the 803 patients (18-65 years of age) included within 4 days of SAH, 73% of patients were in a good grade (WFNS 1 or 2); however, 84% had a Fisher grade 3 or 4 on computed tomographic scan. For patients presenting in a good grade at admission, higher levels of C-reactive protein, glucose, and white blood cells and lower levels of hematocrit, albumin, and hemoglobin were associated with a poor outcome at discharge. C-reactive protein was found to be an independent predictor of outcome for patients presenting in a good grade on logistic regression analysis. The authors concluded that early recording of the C-reactive protein might prove to be useful in detecting those good grade patients who are at a greater risk of clinical deterioration and a poor outcome. A forewarning of those at risk provides an opportunity towards more intensive monitoring, investigations, and prophylactic treatment prior to the clinical manifestation of advancing cerebral injury. Since this was post hoc analysis, a prospective study to further validate their observations would be useful.

Contributed by Dr. Mazda K Turel


Although cerebral vasospasm (CV) is one of the most important predictors for outcome in patients with subarachnoid hemorrhage (SAH), no treatment has yet been established for this condition. This study investigated the efficacy of continuous direct infusion of magnesium sulfate (MgSO4) solution into the intrathecal cistern in patients with an aneurysmal SAH. Seventy patients with SAH were treated by surgical clipping within 72 hours and randomized into 2 groups (35 each): A control group of patients undergoing a standard treatment and a magnesium (Mg) group of patients additionally undergoing continuous infusion of 5 mmol/L MgSO4 solution for 14 days. The 2 groups did not significantly differ in age, sex, World Federation of Neurosurgical Societies grade, or Fisher grade. The Mg group had a significantly better CV grade than the control group (P < 0.05). Compared with the patients in the Mg group, those in the control group had a significantly elevated blood flow velocity in the MCA. Both groups were similar in the incidences of cerebral infarction, and the two groups also did not significantly differ in clinical outcomes. Delayed ischemia identified on CT or MRI scans was observed in 9 patients (25.7%) in the control group and in 5 patients (14.3%) in the Mg group, the difference not being statistically significant. The authors concluded that this improvement in CV neither reduced the incidence of delayed cerebral ischemia nor improved the functional outcomes in patients with SAH. Despite the observed reduction in CV, which is the likely cause of delayed ischemia, the vasodilatory effect of Mg on CV did not appear to improve the functional outcomes in this study. A prospective multicenter trial should be conducted to address this need for additional clinical data on CV in patients with SAH.

This AOSpine North America study aimed at evaluating the survival, neurological, functional, and health-related quality of life (HRQoL) outcomes in patients with metastatic epidural spinal cord compression (MESCC) who underwent surgical management. This was a prospective, multicenter, observational, cohort study involving ten North American centers. One hundred and forty-two patients with a single symptomatic MESCC lesion who were treated surgically were enrolled and observed at least up to 12 months. Clinical and HRQoL data were obtained preoperatively, and at 6 weeks and 3, 6, 9, and 12 months postoperatively. The mean age was 59 years. The median survival time was 7.7 months. The most frequent site of the primary lesion was lung (24%). The 30-day and 12-month mortality rates were 9% and 62%, respectively. There was significant improvement at 6 months postoperatively in the ambulatory status, lower extremity and total motor scores, and at 6 weeks and 3, 6, and 12 months in the Oswestry Disability Index, the Euro Quality of Life 5 dimensional (EQ-5D) value sets, and the pain interference scores. Moreover, at 3 months after surgery, the American Spinal Injury Association (ASIA) impairment scale grade was improved. Short Form (SF-36) survey scores improved postoperatively in six of the eight scales. The incidence of wound complications was 10% and 2 patients required a second surgery (screw malposition and epidural hematoma). The authors concluded that surgical intervention, as an adjunct to radiation and chemotherapy, provides immediate and sustained improvement in pain, neurological, functional, and HRQoL outcomes, with acceptable risks in patients with a focal symptomatic MESCC lesion who have at least a 3-month survival prognosis. The study is limited by its small sample size and lack of controls. Generalization of these findings to patient populations with multiple spine metastases requires caution.

Yang EZ, et al. An RCT study comparing the clinical and radiological outcomes with the use of PLIF or TLIF after instrumented reduction in adult isthmic spondylolisthesis. Eur Spine J. 2015 Dec 9. [Epub ahead of print]

The authors prospectively compared posterior lumbar interbody fusion (PLIF) and transforaminal lumbar interbody fusion (TLIF) used in adult isthmic spondylolisthesis (IS) after surgical reduction with pedicle screws. Between January 2009 and December 2010, 66 adult patients with a single-level IS were randomly assigned to the two groups treated using the PLIF technique (n = 34) and the TLIF technique (n = 32). Both groups were followed up for an average of 30 months (range 24-48 months). Clinical and radiographic outcomes were compared between the two groups. The average operative time (125 mins vs 113 mins) and blood loss (521ml vs 433ml) during surgery were significantly more in the PLIF group than in the TLIF group. The degree of spondylolisthesis, disk height and focal lordosis were significantly improved postoperatively in both the groups. There was no obvious difference in the clinical outcomes, as assessed using the Visual Analog Scale, Oswestry Disability Index and Japanese
Orthopedic Association scores, and radiographic outcomes. In the PLIF group, there were two cases of neuropathic pain after surgery. The authors concluded that after instrumented reduction of adult IS, either PLIF or TLIF can provide good clinical and radiological outcomes. With a single cage, TLIF was superior to PLIF in terms of surgical time and blood loss, but these differences may not be clinically relevant. It is essential to conduct a multicenter prospective randomized trial with more patients and a longer follow up, including the measurements of global sagittal alignment and pelvic incidence for a complete understanding of true outcomes.

Contributed by Dr. Mazda K Turel


Single-level disc arthroplasty or arthrodesis in the lower subaxial spine improves headaches after surgery. The authors studied whether this effect may be better appreciated after a two-level arthroplasty. They performed an independent post hoc analysis of two concurrent prospective randomized investigational device exemption trials for cervical spondylosis, one for a single-level treatment and the other for two adjacent-level treatments.

For the one and two-level study, the baseline mean headache scores significantly improved at 60 months for both the cervical disc arthroplasty (CDA) and anterior cervical discectomy and fusion (ACDF) groups (P < 0.0001). The authors concluded that both CDA and ACDF at either one or two levels are associated with sustained headache relief from baseline. Patients undergoing a two-level arthroplasty had significantly greater improvement in headache at all points except at 18 and 60 months. This difference in improvement was not observed in patients undergoing a single-level arthroplasty. The mechanism of greater headache relief after a two-level arthroplasty remains unclear. The limitations of this study include the inability to definitively diagnose cervicogenic headache in the patient population based on the diagnostic criteria proposed by the International Headache Society.

Contributed by Dr. Mazda K Turel


The authors conducted this prehospital, randomized, double-blind, phase 3, placebo-controlled, superiority trial to determine the efficacy of adding intravenous levetiracetam (2.5 g) to clonazepam (1 mg) in the treatment of generalised convulsive status epilepticus (GCSE) in 13 emergency medical service centers and 26 hospital departments in France. Adults with convulsions lasting for longer than 5 min were randomly assigned (1:1) by prehospital physicians to receive levetiracetam (n = 107) or placebo (n = 96) in combination with clonazepam. If the status epilepticus lasted beyond 5 min after drug injection, a second dose of 1 mg clonazepam was given. The primary outcome was cessation of convulsions within 15 min of drug injection. Since interim analysis showed no evidence of a treatment difference, 68 patients in each group were included in the modified intention-to-treat analysis. The etiology of seizures included tumor, trauma, vascular, metabolic, toxic and idiopathic causes. An MRI lesion was seen in 65% of the cases in both the groups. Convulsions stopped at 15 min of drug injection in 84% patients receiving clonazepam and placebo, and 74% patients receiving clonazepam and levetiracetam. Three deaths and 40% serious adverse events were reported in the levetiracetam group; and, four deaths, and 60% serious events were reported in the placebo group. The authors concluded that the addition of levetiracetam to clonazepam treatment presented no advantage over clonazepam treatment alone in the control of GCSE before admission to hospital.

Contributed by Dr. Mazda K Turel


Pushing the envelope of minimally invasive surgery, the authors describe a new technique to perform a selective amygdalohippocampectomy (SAH) through a transpalpebral approach with endoscopic assistance. A mini fronto-orbitozygomatic craniotomy through an eyelid incision was performed in 8 patients. Both a microscope and neuroendoscope were used in the surgeries. An anterior SAH was performed in 5 patients who had the diagnosis of temporal lobe epilepsy with mesial temporal sclerosis. One patient had a mesial temporal lesion suggesting a ganglioglioma. Two patients presented with mesial temporal cavernomas with seizures originating from the temporal lobe. Their results indicate that the anterior approach allowed removal of the amygdala and hippocampus. The image-guided system and postoperative evaluation confirmed that the amygdala might be accessed and completely removed through this route. The hippocampus was partially
Successful treatments for glioblastoma (GBM) are few and far between. The authors report their evaluation of a novel approach to the treatment of GBM using transcutaneous delivery of low-intensity, intermediate-frequency, alternating electric fields, also referred to as tumor-treating fields (TTF). These are purported to arrest mitosis in tumor cells deep inside the brain. In this 83 center randomized control trial, after completion of chemoradiotherapy, patients with GBM were randomized (2:1) to receive maintenance treatment with TTF delivered continuously (>18 hours/day) plus temozolomide \( (n = 446) \) or temozolomide (TMZ) alone \( (n = 229) \). While the original study enrolled 695 patients, the trial was terminated based on the results of this planned interim analysis of 315 patients. The median follow-up was 38 months. Median progression-free survival in the intent-to-treat population was 7 months in the TTF plus TMZ group, and 4 months in the TMZ alone group \( (P = 0.001) \). Median overall survival was 20.5 months in the TTF plus TMZ group, and 15.6 months in the TMZ alone group \( (P = 0.004) \). The authors concluded that in this interim analysis of 315 patients with GBM who had completed standard chemo-radiation therapy, adding TTF to maintenance TMZ chemotherapy significantly prolonged progression-free and overall survival. This study represents the first in a decade to demonstrate an improvement in survival in this disease. As a result, the FDA recently approved this therapy in combination with TMZ for patients with GBM prior to recurrence as well. The current cost of the device is approximately $20,000 per month, partly because the electrodes are disposable and need to be replaced frequently.

**Contributed by Dr. Mazda Turel**

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Moderate cooling after birth asphyxia is associated with reduction in death and disability. In this study, in neonates who have birth asphyxia, the authors evaluated if the addition of xenon gas to moderate hypothermia has any additional beneficial effects. They included 92 neonates, who were randomly assigned (within 12 hours of birth) to either the cooling only group \( (n = 46) \); cooling to a rectal temperature of 33.5°C for 72 hours \( \) group, or, cooling plus xenon therapy group \( (n = 46) \); cooling in combination with 30% inhaled xenon for 24 hours started immediately after randomization). The study group included infants who were at 36-43 weeks of gestational age; had signs of moderate to severe encephalopathy; moderately or severely abnormal background activity for at least 30 minutes or seizures demonstrated on amplitude integrated EEG; and, had at least one of the following: Apgar score of 5 or less 10 min after birth, continued need for resuscitation 10 minutes after birth, or acidosis within 1 hour of birth. The primary outcome was assessed 15 days after birth using magnetic resonance spectroscopy to look for reduction in the lactate to N-acetyl aspartate ratio in the thalamus, and by using MRI to look for preserved fractional anisotropy in the posterior limb of the internal capsule. Thirty-seven infants in the cooling only group, and 41 in the cooling plus xenon group underwent magnetic resonance assessments and were included in the analysis of the primary outcomes. The authors noted no significant difference in both the ratio of lactate to N-acetyl aspartate and fractional anisotropy in both the groups. 11 infants died in the xenon group and 9 died in the cooling only group. The authors conclude that though administration of xenon is feasible and safe, it is unlikely to enhance the neuroprotective effect of cooling after birth asphyxia.

**Contributed by Dr. Anant Mehrotra**

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The authors have conducted a multicenter, double-blinded, placebo controlled, parallel group study with patients of primary progressive multiple sclerosis across 148 centers in 18 countries. As there was protocol amendment of the...
dosages of fingolimod during the course of the study, two cohorts were formed. Cohort 1 received fingolimod 1.25 mg per day or placebo, while cohort 2 received fingolimod 0.5 mg per day or placebo. The inclusion criteria were age 25–65 years, clinical diagnosis of primary progressive multiple sclerosis, 1 year or more of disease progression, and two of the following criteria: Positive brain MRI; positive spinal cord MRI; or positive cerebrospinal fluid. Additional eligibility criteria included disease duration of 2–10 years and objective evidence of disability progression in the previous 2 years. A total of 970 patients were randomly assigned to either the fingolimod group or to the placebo group. In cohort 1, 147 were assigned to the fingolimod and 133 to the placebo group, and in cohort 2, 336 to the fingolimod and 354 to the placebo group. For the purpose of analysis, all patients in the cohort 2 and those assigned to the placebo group in cohort 1 were included (n = 823). The primary endpoint was based on the change from baseline in the Expanded Disability Status Scale (EDSS), 25’ Timed-Walk Test, or Nine-Hole Peg Test to assess the time to 3-month confirmed disability progression in study participants treated for at least 3 years. For the purpose of safety analysis, all patients in both the cohorts were included. Baseline characteristics were similar across the groups. 232 patients in the fingolimod group and 338 patients in the placebo group had disability progression at 3 months which resulted in Kaplan-Meier estimates of 77.2% (95% CI 71.87–82.51) of patients in the fingolimod group versus 80.3% (73.31–87.25) of patients in the placebo group (risk reduction 5.05%; hazard ratio 0.95, 95% CI 0.80–1.12; P = 0.544). Serious adverse events occurred in 84 (25%) patients in the fingolimod group and 117 (24%) in the placebo group, including macular oedema in six (2%) versus six (1%), and basal-cell carcinoma in 14 (4%) versus nine (2%) patients. The authors concluded that there was no significant slowing of disease progression in primary progressive multiple sclerosis on using fingolimod.

Contributed by Dr. Anant Mehrotra


The ankle-brachial index (ABI) is a fast, noninvasive indicator of atherosclerotic burden and perhaps also a predictor of stroke recurrence. The role of ABI as a marker for stroke recurrence and vascular risk were evaluated by a review of the pertinent literature. The authors searched Pubmed, MEDLINE and Embase databases for studies which were prospective and included consecutive patients with stroke and transient ischemic attack. ABI at baseline was measured, and a minimum of 12 months of follow up after the initial stroke or transient ischemic attack was available. For analysis, recurrent stroke and the combined vascular end point (recurrent vascular event or vascular death) were chosen as endpoints. Crude risk ratios and adjusted Cox proportional hazard ratios were combined separately using the random-effects model. Study-level characteristics (e.g., percent of cohort with a history of hypertension, average cohort age, level of adjustment, and mean follow-up duration) were included as covariates in a meta-regression analysis. The authors found 11 studies with a total of 5374 patients, which were not significantly heterogeneous. Pooling adjusted hazard ratios showed that low ABI was associated with both an increased hazard of recurrent stroke (hazard ratio, 1.70; 95% confidence interval, 1.10–2.64) and an increased risk of vascular events or vascular death (hazard ratio, 2.22; 95% confidence interval, 1.67–2.97). The authors concluded that there is a positive association between ABI and stroke recurrence.

Contributed by Dr. Anant Mehrotra


The authors have conducted a non-randomized, open label, single center, phase 2 trial in which they enrolled 59 patients of medulloblastoma aged between 3-21 years. Out of these 59 cases, 39 were with standard risk disease, 6 with intermediate-risk disease and 14 with high-risk disease. All these patients had undergone craniospinal irradiation (using proton radiotherapy) of 18-36 Gy radiobiological equivalents (GyRBE) delivered at 1.8 GyRBE per fraction followed by a boost dose. All these cases received chemotherapy also. The cumulative incidence of ototoxicity at 3 years, graded with Pediatric Oncology group Ototoxicity Scale (with values from 0-4) was taken as the primary outcome, and neuroendocrine toxicity and neurocognitive toxic effects assessed by intention-to-treat were taken as the secondary outcome. The median craniospinal irradiation dose was 23.4 GyRBE (interquartile range [IQR] 23.4–27.0) and the median boost dose was 54.0 GyRBE (IQR 54.0–54.0). The median follow-up of survivors was 7.0 years. Out of 45 evaluable patients, 4 (9%) patients had grade 3-4 ototoxicity in both ears and 3 (7%) had grade 3-4 ototoxicity in one ear, although one later reverted to grade 2. At 3 years, the cumulative incidence of grade 3-4 hearing loss was 12% which increased to 16% at a 5 year follow-up. Out of the 98 ears assessed, the hearing ototoxicity score at a follow-up of 5 years was the same as that at the baseline or improved by 1 point in 34 (35%), worsened by 1 point in 21 (21%),
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worsened by 2 points in 35 (36%), worsened by 3 points in 6 (6%), and worsened by 4 points in 2 (2%) patients. There was a decrease in the Full Scale Intelligence Quotient by 1.5 points per year after a median follow up of 5.2 years. There was no significant change in the perceptual reasoning index and working memory. The cumulative incidence at 5 years of any neuroendocrine deficit was 55%. Growth hormone deficit was the most commonly encountered deficit. There were no pulmonary, cardiac or gastrointestinal late toxic effects. The 3-year progression-free survival was 83% (95% confidence interval [CI]: 71–90) for all patients. In post-hoc analyses, the 5-year progression-free survival was 80% (95% CI: 67–88) and 5-year overall survival was 83% (95% CI: 70–90). The authors concluded that proton radiotherapy had acceptable toxicity and similar outcomes to conventional radiotherapy.

Contributed by Dr. Anant Mehrotra


The authors conducted a systematic review and meta-analysis of observational studies to better understand the possible association between the use of nonsteroidal anti-inflammatory drugs (NSAIDs) and haemorrhagic stroke. The authors searched for case control studies and cohort studies that compared the risk of hemorrhagic stroke among NSAIDs users versus nonusers and reported the odds ratio, relative risk, hazard ratio, or standardized incidence ratio. Point estimates from each study were extracted. Pooled risk ratios (RR) and 95% confidence intervals (CI) for all NSAIDs and individual NSAIDs were calculated using random-effect, generic inverse variance method. A total of 10 studies were included in the analysis and it was seen that that the use of NSAIDs was associated with a small but insignificant risk of hemorrhagic stroke with the pooled RR of 1.09 (95% CI, 0.98–1.22). On analysis on individual NSAIDs, it was found that diclofenac and meloxicam users had a significantly increased risk (RR 1.27; 95% CI, 1.02–1.59 and RR 1.27; 95% CI, 1.08–1.50, respectively). The risk estimate for rofecoxib users was higher, but statistically nonsignificant (RR 1.35; 95% CI, 0.88–2.06).

Contributed by Dr. Anant Mehrotra


Tuberculous meningitis is a lethal form of central nervous system tuberculosis. Early diagnosis and antituberculosis treatment with adjunctive glucocorticoids improve survival, but nearly one third of patients with the condition still die. Therefore, the authors hypothesized that an intensified antituberculosis treatment would enhance the killing of intracerebral Mycobacterium tuberculosis organisms and decrease the rate of death among patients. Study was a randomized, double-blind, placebo-controlled trial involving human immunodeficiency virus (HIV) infected adults and uninfected adults with a clinical diagnosis of tuberculous meningitis, who were admitted to one of two Vietnamese hospitals. They compared a standard, 9-month antituberculosis regimen (rifampin 10 mg/kg/day) with an intensified regimen that included higher-dose rifampin (15 mg/kg/day) and levofloxacin (20 mg/kg/day) for the first 8 weeks of treatment. The primary outcome was death by 9 months after randomization. 817 patients (349 of whom were HIV-infected) were enrolled; 409 were randomly assigned to receive the standard regimen, and 408 were assigned to receive the intensified treatment. During the 9 months of follow-up, 113 patients in the intensified treatment group and 114 patients in the standard-treatment group died (hazard ratio, 0.94; 95% confidence interval, 0.73 to 1.22; P = 0.66). There was no evidence of a significant differential effect of intensified treatment in the overall population or in any of the subgroups, with the possible exception of patients infected with isoniazid-resistant M. tuberculosis. There were also no significant differences in the secondary outcomes between the treatment groups. The overall number of adverse events leading to treatment interruption did not differ significantly between the treatment groups (64 events in the standard-treatment group and 95 events in the intensified-treatment group, P = 0.08).

The authors concluded that an intensified antituberculosis treatment was not associated with a higher rate of survival among patients with tuberculous meningitis than that observed with the standard treatment.

Contributed by Dr. Sanjeev Kumar Bhoi


Recovery from organ-specific autoimmune diseases largely relies on the mobilization of endogenous repair mechanisms and local factors that control them. Natural killer (NK) cells are swiftly mobilized to organs targeted by autoimmunity and typically undergo numerical contraction when the inflammation wanes. Considering the critical role of NK cells in controlling inflammatory responses in the central nervous system (CNS), the authors investigated the possible

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interactions between neural stem cells (NSCs) and NK cells during CNS inflammation and their effects on neurorepair and recovery from brain inflammation. Authors report the unexpected finding that NK cells are retained in the brain subventricular zone (SVZ) during the chronic phase of multiple sclerosis in humans and its animal model in mice. These NK cells were found preferentially in close proximity to the subventricular zone (SVZ) neural stem cells (NSCs) that produce interleukin-15 and sustain functionally competent NK cells. Moreover, NK cells limited the reparative capacity of NSCs following brain inflammation. These findings reveal that reciprocal interactions between NSCs and NK cells regulate neurorepair. They postulated that disruption of these interactions might facilitate regenerative processes during neurological inflammatory disorders.

Contributed by Dr. Sanjeev Kumar Bhoi


Tuberculous meningitis (TBM) accounts for 5 to 10% of extrapulmonary tuberculosis (TB) and 0.5% of systemic TB worldwide. The mortality rate ranges from 44 to 69% in developing countries and one-fourth of the survivors develop permanent neurological damage. At present, there is no established laboratory test with a high yield to diagnose TBM in its early stages. Therefore, the authors of the present study evaluated the effectiveness of the combined peripheral blood T-SPOT.TB and cerebrospinal fluid interferon-c (cIFN-c) detection methods in the diagnosis of TBM. Thirty patients with TBM and 39 control individuals without TBM participated in this study. IFN-c–secreting T cells were detected by enzyme-linked immunospot (ELISPOT), and cIFN-c was detected by enzyme-linked immunosorbent assay (ELISA). The authors collected cerebrospinal fluid from 10 patients in the TBM group at the initial visit and at 4 weeks, to observe the sequential changes. The sensitivity and specificity of peripheral-blood T-SPOT.TB testing in the diagnosis of TBM were 70% and 87%, respectively. The area under the ROC curve of cIFN-c for the diagnosis of TBM was 0.819, and the corresponding sensitivity and specificity were 83% and 85%, respectively. When T-SPOT.TB and cIFN-c results were positive, the specificity and positive predictive value of TBM diagnosis reached 100%. The authors concluded that the combined use of T-SPOT.TB and cIFN-c could improve the diagnostic efficiency in detecting the presence of early TBM. A dynamic observation of cIFN-c is also important in monitoring the progression of TBM because the level of this interferon significantly decreases after treatment.

Contributed by Dr. Sanjeev Kumar Bhoi


The authors assessed if early imaging of stroke patients, primary with CT perfusion, could estimate the size of the irreversibly injured ischemic core and the volume of critically hypoperfused tissue. The study participants were from the prospective randomized trial Stent-Retriever Thrombectomy after Intravenous t-PA vs. t-PA Alone in Stroke (SWIFT PRIME) which was published in N Engl J Med 2015;372:2285-95 by Saver JL, et al. They have also evaluated the accuracy of the ischemic core and the hypoperfusion volumes in predicting the infarct volume in patients with the target mismatch profile. The baseline ischemic core and hypoperfusion volumes were assessed prior to the randomized treatment with intravenous tissue plasminogen activator (IV tPA)-alone vs. IV tPA + endovascular therapy (Solitaire stent-retriever) using RApid processing of PerfusIon and Diffusion (RAPID) automated post-processing software. Reperfusion was assessed with angiographic Thrombolysis in Cerebral Infarction (TICI) scores at the end of the procedure (in the endovascular group) and the Tmax >6s volumes at 27-hours (in both the groups). The infarct volume was assessed at 27-hours on non-contrast CT or MRI scans. 151 patients, with baseline imaging with CT perfusion (79%) or multimodal MRI (21%), were included. The median baseline ischemic core volume was 6 ml (IQR 0-16). The ischemic core volumes correlated with the 27-hour infarct volumes in patients who achieved reperfusion ($r = 0.58$, $P < 0.0001$). In patients who did not reperfuse (<10% reperfusion), the baseline Tmax >6s lesion volumes correlated with the 27-hour infarct volume ($r = 0.78$; $P = 0.005$). In target mismatched patients, the combination of baseline core and the early follow-up Tmax >6s volume (i.e., predicted infarct volume) correlated with the 27-hour infarct volume ($r = 0.73$; $P < 0.0001$); the median absolute difference between the observed and predicted volume was 13 ml. The study concluded that ischemic core and hypoperfusion volumes, obtained primarily from CT perfusion scans, predicted the 27-hour infarct volume in acute stroke patients who were treated with reperfusion therapies.

Contributed by Dr. Sanjeev Kumar Bhoi
**Eisenmenger L, et al.** Evolution of diffusion-weighted magnetic resonance imaging signal abnormality in sporadic Creutzfeldt-Jakob disease, with histopathological correlation. JAMA Neurol 2016;73:76-84

Prion diseases represent the typical brain diseases caused by protein misfolding, with the most common subtype being the sporadic Creutzfeldt-Jakob disease (sCJD). The latter causes a rapidly progressive dementia. Diffusion-weighted imaging (DWI) is the most sensitive magnetic resonance imaging (MRI) sequence for the diagnosis of sCJD, but few studies have assessed the evolution of MRI signal as the disease progresses. The authors had studied the natural history of the MRI signal abnormalities on DWI in sCJD to improve our understanding of the pathogenesis and to investigate the potential application of DWI as a biomarker of disease progression. A histopathological correlation has also been attempted.

Gray matter involvement on DWI was assessed among 37 patients with sCJD in 26 cortical and 5 subcortical subdivisions per hemisphere using a semiquantitative scoring system of 0 to 2 at baseline and follow-up. A total brain score was calculated as the summed scores in the individual regions. In 7 patients, serial mean diffusivity measurements were obtained. Age at baseline MRI, disease duration, atrophy, codon 129 methionine valine polymorphism, Medical Research Council Rating Scale score, and histopathological findings were documented. All participants had a probable or definite diagnosis of sCJD and had at least 2 MRI studies performed during the course of their illness. They correlated the regional and total brain scores with disease duration.

Among the 37 patients with sCJD in this study, there was a significant increase in the number of regions demonstrating signal abnormality during the study period, with 59 of 62 regions showing increased signal intensity (SI) at follow-up, most substantially in the caudate nucleus ($P < 0.001$), and putamen ($P < 0.001$). The increase in the mean total brain score from $30.2 \pm 17.3$ at baseline to $40.5 \pm 20.6$ at follow-up ($P = 0.001$), correlated with disease duration ($r = 0.47, P = 0.003$ at baseline and $r = 0.35, P = 0.03$ at follow-up), and the left frontal SI correlated with the degree of spongiosis ($r = 0.64, P = 0.047$). Decreased mean diffusivity in the left caudate nucleus at follow-up was seen ($P < 0.001$). Eight patients demonstrated decreased SI in cortical regions, including the left inferior temporal gyrus and the right lingual gyrus.

The authors concluded that MRIs in sCJD show an increased extent and degree of SI on DWI that correlates with disease duration and the degree of spongiosis. Although cortical SI may fluctuate, increased basal ganglia SI is a consistent finding and is due to restricted diffusion. Diffusion-weighted imaging in the basal ganglia may prove to be a non-invasive biomarker in future therapeutic trials.

**Contributed by Dr. Sanjeev Kumar Bhoi**

**Turner M, et al.** Stroke patients admitted within normal working hours are more likely to achieve process standards and to have better outcomes. J Neurol Neurosurg Psychiatry 2016;87:138-43

A higher rate of mortality following weekend admission to hospital, the ‘weekend effect’, has been shown in numerous studies across a range of medical conditions, but has not been consistently observed for patients with stroke. The authors investigated the impact of admission time on various processes and outcome measures after stroke. Using routine data from National Scottish data sets (2005–2013), time of admission was categorized into weekday, weekend and weekend/public holidays. The main process measures were swallowing screening on day of admission (day 0), brain scan (day 0 or 1), aspirin (day 0 or 1), admission to stroke unit (day 0 or 1), and thrombolysis administration. After case-mix adjustment, multivariable logistic regression was used to estimate the OR for mortality and discharge to home/usual place of residence.

There were 52276 index stroke events. Compared to weekday, the adjusted OR (at 95% CI) for early stroke unit admission was 0.81 (0.77 to 0.85) for weeknight admissions and 0.64 (0.61 to 0.67) for weekend/holiday admissions; early brain scan 1.30 (0.87 to 1.94) and 1.43 (0.95 to 2.18); same day swallowing screening 0.86 (0.81 to 0.91) and 0.85 (0.81 to 0.90); thrombolysis 0.85 (0.75 to 0.97) and 0.85 (0.75 to 0.97), respectively. The seven-day mortality, 30-day mortality and 30-day discharge for weekend admission compared to weekday admission was 1.17 (1.05 to 1.30); 1.08 (1.00 to 1.17); and 0.90 (0.85 to 0.95), respectively. The study concluded that patients with stroke admitted out of hours and at weekends or public holidays are less likely to be managed according to current guidelines. They experience poorer short-term outcomes than those admitted during normal working hours, after correcting for known independent predictors of outcome and early mortality.

**Contributed by Dr. Sanjeev Kumar Bhoi**

HMG-CoA Reductase (3-hydroxy-3-methyl-glutaryl-CoA reductase) inhibitors (statins) have well known health benefits, the most prominent being the reduction of low-density lipoprotein cholesterol, and cardiovascular and all-cause mortality. With updated guidelines released by the American Heart Association, the American College of Cardiology and the American Diabetes Association, the number of potential statin users may double although up to 15% of patients experience side effects, which include myalgia, myopathy, rhabdomyolysis, insulin resistance, and hepatotoxicity.

The authors evaluated the skeletal muscle structure and contractile function at the molecular, cellular, and whole tissue levels in 12 statin tolerant and 12 control subjects. The results revealed myosin isoform expression, fiber type distributions, single fiber maximal Ca (2+) -activated tension, and whole muscle contractile forces were similar between groups. No differences were observed in the myosin-actin cross-bridge kinetics in myosin heavy chain I or IIA fibers. The study concluded that there was no evidence for statin-induced changes in muscle morphology at the molecular, cellular, or whole tissue levels. The study, therefore, showed that chronic statin therapy in healthy asymptomatic individuals does not promote deleterious myofilament structural or functional adaptations.

Contributed by Dr. Sanjeev Kumar Bhoi


Most studies on intracranial abnormalities among headache sufferers were performed in selected clinical populations. However, general population studies are needed to circumvent the potential referral bias in clinical populations. The latter, therefore, evaluate the actual association between headache and intracranial abnormalities. The author’s aim was to evaluate the relationship between intracranial abnormalities and headache among middle-aged adults in the general population.

Participants in a large epidemiological study (the HUNT 3 study; 2006-2008) who answered a headache questionnaire and participated in a population-based imaging study of the head (HUNT MRI; 2007-2009) were included (n = 864; age, 50-65 years at enrolment). Based on the responses to the HUNT 3 questionnaire, respondents were categorized as having migraine, tension-type headache, or unclassified headache. Logistic regression was used to compare the occurrence of intracranial abnormalities between the groups.

Intracranial abnormalities were more common in headache sufferers than in headache-free individuals (29% vs. 22%, respectively; P = 0.04). Those with tension-type headache had higher odds of having minor abnormalities (OR, 2.13; 95% CI1.18-3.85). This association disappeared when those with only white matter hyperintensities were removed from the analysis. Headache sufferers had increased odds of minor intracranial abnormalities. The increased odds were primarily related to the presence of white matter hyperintensities.

Contributed by Dr. Sanjeev Kumar Bhoi


Migraine is a common condition that often starts in childhood and may progress over the course of one’s life. The transition from adolescence to adulthood is a critical time for those who suffer from migraine. Medication choices may be a challenge during the adolescent years as Food and Drug Administration (FDA) approved options are few and many more studies are needed to understand the benefits and risks of the use of these agents in adolescents. However, as patients transition to adulthood, FDA approved options and the level of evidence improve significantly. Late adolescents may also struggle with a variety of psychiatric comorbidities that may simultaneously create challenges in determining treatment. For late adolescent girls, the beginning of sexual activity, onset of gynecologic conditions, or presence of irregular or painful menses may raise questions regarding the use of oral contraceptives (OCs). The risks of these medications in women with migraine, especially those with aura or those who smoke, may be stratified by conducting conversations between the physicians and their migraine patients. These conversations can also determine the risk/benefit profile for the potential use of these agents. This article attempts to study the transition from adolescence to adulthood for those suffering with migraine from the knowledge currently available in literature.

Contributed by Dr. Sanjeev Kumar Bhoi

Cerebral small vessel disease (SVD) is found to be responsible for about a fifth of all strokes; it also doubles the future risk of stroke and contributes to cognitive impairment. White matter hyperintensities (WMH) predict incident strokes and new lacunes; moreover, WMH may also affect infarct locations. The aim of the present study was to examine the spatial relationship between WMH and acute lacunar infarction.

Five hundred and ninety patients with acute lacunar infarction in the supratentorial region were included. Axial and coronal MRI assessed four situations between infarction and WMH: No contact (Grade 0), contact without overlap (Grade Ia), partial overlap (Grade Ib), and complete overlap (Grade II) with preexisting WMH. Furthermore, they defined infarctions in Grades Ia and Ib as edge localized infarctions and investigated their predictors and short-term outcome. 47.9% (283) of the infarctions were edge-localized infarctions (Grade Ia = 27.6% and Grade Ib = 20.3%), 51.5% (304) were Grade 0, only 0.5% (3) were Grade II. Patients with edge-localized infarction had a larger infarct size, more severe WMH, a higher National Institutes of Health Stroke Scale (NIHSS), and a lower Barthel index (BI) score at admission than those with non-edge-localized infarction. They also had a lower BI score at discharge. Infarctions in the subcortical white matter, the infarct size on diffusion-weighted imaging, periventricular WMH and deep WMH were predictors for edge-localized infarction. The study concluded that half of the lacunar infarctions were located at the edge of WMH. Both periventricular WMH and deep WMH were predictors for edge-localized infarction.

Contributed by Dr. Sanjeev Kumar Bhoi


In this bioinformatic study, the authors attempted to investigate the time-course expression changes of microRNAs (miRNAs) after spinal cord injury (SCI) with a view to decipher the yet unknown mechanisms of self repair after SCI. The authors downloaded miRNA expression profile (GSE19890) of adult female Wistar brown rats (Rattus norvegicus) in SCI (laminctomy and contusion), sham (laminctomy but no contusion), and control (untreated) groups from the Gene Expression Omnibus. Totally, 35 chips were available, including five controls, five SCI-1-day, five SCI-3-day, five SCI-7-day, five sham-1-day, five sham-3-day, and five sham-7-day. Betr and limma packages were used to screen the time-course differentially expressed miRNAs (DEmiRNAs), followed by Bayesian hierarchical clustering (BHC), synergetic and functional enrichment analysis through BHC and cluster profiler packages, respectively. Furthermore, the authors used STRING database and Cytoscape software to construct interaction networks between the time-course DEmiRNAs. GenCLip2.0 software was applied to the pathway enrichment for key genes associated with nervous system. They identified 68 time-course DEmiRNAs which were divided into 15 BHC clusters. Then, 100 time-course DEmiRNA pairs with synergetic function were identified, and time-course DEmiRNAs and target genes interaction networks were constructed, in which 10 genes (AKT1, VEGFA, CTNNB1, IGF1, APP, PTEN, CDC42, BDNF, SOD2, and IFNG) with highest degrees were found. Furthermore, key genes were significantly enriched in the neurotrophin signaling pathway. The authors concluded that following SCI, miRNAs might collectively regulate target genes either facilitating or inhibiting self-repair, the modulation of which might provide novel therapies for SCI treatment.

Contributed by Dr. Sanjeev Kumar Bhoi


Researchers have reported that autopsy results suggest that Alzheimer’s disease may occasionally be transmitted to people during certain medical treatments, but scientists say that none of the result sets are conclusive. Autopsies [Frontzek, K. et al., Swiss Med. Wkly 146 w1287 (2016)] were conducted on the brains of seven people who died of Creutzfeldt–Jakob disease (CJD). Decades before their deaths, the individuals had received surgical grafts of dura mater prepared from human cadavers and were contaminated with the prion protein that causes CJD.

Contributed by Dr. Kuntal Kanti Das


In this single center study, the authors aimed to compare the effect of early and late surgical decompression on the neurological recovery in patients with complete traumatic
spinal cord injury (SCI). They also tried to find out if there existed any impact of surgical timing (early vs late) in determining neurological recovery between cervical or thoracolumbar SCI groups. The authors analyzed 53 patients with complete SCI (33 thoracolumbar and 20 cervical) treated at their center between 2010 and 2013. The neurological status was assessed systematically using the American Spinal Injury Association Impairment Scale (AIS), both at admission and at rehabilitation discharge. They segregated surgeries performed on these patients into early and late using 24 hours from admission as cut off. Potential confounders such as age, Injury Severity Score (ISS), smoking history, body mass index (BMI), Glasgow Coma Scale (GCS) score, and duration of follow-up were recorded.

38 patients were operated early compared to 15 patients who received surgery after 24 hours of admission. It was found that the patients undergoing early surgery were younger in age compared to those undergoing late surgeries ($P = 0.049$). Overall, 28% (15/53) of the patients improved in terms of AIS. While 34% (13/38) of the patients undergoing early surgery showed improvement in neurological status, the figure in the late surgery group was only 13% (2/15) [$P = 0.182$]. Additionally, in the subgroup of cervical SCI, as high as 64% (9/14) of the patients operated early showed an improvement in the AIS as opposed to none in those undergoing late surgery ($n = 6$) [$P = 0.008$].

Hence, the authors concluded that surgical decompression within 24 hours of trauma in complete SCI may optimize neurological recovery in general and in patients with cervical SCIs in particular.

Contributed by Dr. Kuntal Kanti Das


In this paper, the authors set out to determine the cytogenetic/genetic characteristics of atypical meningiomas that could potentially predict their recurrence following gross total surgical resection. Initially the authors analyzed their clinical database that included meningiomas of all grades. They identified 11 common copy aberrations in the above-mentioned pilot study. These 11 aberrations were summed up to devise a score, the cytogenetic abnormality score (CAS). This CAS was then applied to the archived tissue of a separate cohort of 32 patients with gross totally resected atypical meningioma managed solely with surgery at their center. The predictability of the CAS was determined using propensity score adjusted Cox regression analysis. Among the 32 patients who underwent gross total resection of an atypical meningioma, the CAS was not significantly associated with age, gender, performance status, or tumor size/location but was associated with the risk of recurrence on univariable analysis (hazard ratio per aberration = 1.52; 95% CI = 1.08–2.14; $P = .02$). After adjustment in the multivariate analysis, the impact of the dichotomized number of copy aberrations remained significantly associated with recurrence risk (hazard ratio = 4.47; 95% CI = 1.01–19.87; $P = .05$). Thus the authors concluded that the number of copy number aberrations was strongly associated with the recurrence risk in patients with atypical meningiomas following gross total resection. This could help to decide on the appropriate use of adjuvant radiation therapy in these patients.

Contributed by Dr. Kuntal Kanti Das