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# Neurosurgery

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# NEUROSURGERY

## COMMENTARY

For this issue, we have selected four abstracts from recent neurosurgery journals. The selection is a mix of basic science, spine and trauma. The first is an interesting review article in which the authors have attempted to educate the medical community in general and neurosurgeons in particular, with regards to stem cells. The authors have masterfully simplified the topic to the extent that it is now not only understandable but also enjoyable. The article is supported by a thorough literature search, making it a must read for anyone interested.

Pathological fractures with or without metastatic epidural spinal cord compression are a frequent cause of referral to the neurosurgery service and the next article by Patchell et al, looks at the choice of treatment in these patients. Although the authors conclude that decompressive surgery along with postoperative radiotherapy is superior to radiotherapy alone, the study also highlights the importance of conservative and minimal interventions and individualization of care provided to this population in view of high rate of complications.

Disc herniations at the C7-T1 level are uncommon, and the approach difficult. The technique described in the next article appears to be a viable option, but only for a select group of patients with soft disks. Pre-operative evaluation is crucial for patients undergoing this procedure.

The next article joins the series of articles comparing various doses of mannitol with various concentrations of hypertonic saline for control of intracranial pressure in traumatic brain injury. However, the authors have attempted to explore the effect of mannitol and hypertonic saline combined, and the conclusions drawn in the article are encouraging. Larger numbers will be required before the protocol can be recommended.

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Neurosurgery. 2009 Aug;65(2):237-49

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## NEUROSURGEON'S GUIDE TO STEM CELLS, CANCER STEM CELLS, AND BRAIN TUMOR STEM CELLS

Stem cells and their potential applications have become the forefront of scientific, Political and ethical discourse. Whereas stem cells were long accepted as units of Development and evolution, it is now becoming increasingly clear that they are also units of oncogenesis. Although the field of stem cell biology is expanding at an astounding rate, the data attained

are not readily translatable for the physicians who may eventually deliver these tools to patients. Herein, we provide a brief review of stem cell and cancer stem cell biology and highlight the scientific and clinical implications of recent findings regarding the presence of cancer-forming stem cells in brain tumors.

Neurosurgery. 2009 Aug;65(2):267-74

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## VERTEBRAL COMPRESSION FRACTURES IN PATIENTS PRESENTING WITH METASTATIC EPIDURAL SPINAL CORD COMPRESSION

**OBJECTIVE:** Metastatic epidural spinal cord compression (MESCC) is a relatively common and debilitating complication of metastatic disease that often results in neurological deficits. Pathological fractures of the vertebral body in patients with MESCC are not uncommon. The goals of this study were to evaluate the effects of compression fractures on long-term neurological function, as well as understand the factors that predict the development of pathological fractures for patients with MESCC. **METHODS:** One hundred sixty-two patients undergoing decompressive surgery for MESCC at an academic tertiary care institution from 1995 to 2007 were retrospectively reviewed. Multivariate proportional hazards regression analysis was used to assess the effects of pathological vertebral body fractures on ambulatory outcome, whereas multivariate logistical regression analysis was used to identify factors associated with preoperative compression fractures. **RESULTS:** Sixty and 102 patients presented with

and without pathological vertebral body fractures, respectively, and MESCC. Patients were followed for a mean of  $9.7 \pm 2.6$  months. The presence of preoperative compression fractures was independently associated with decreased postoperative ambulatory status (odds ratio, 2.106; 95% confidence interval, 1.123-4.355;  $P = 0.03$ ). This was independent of age, preoperative ambulatory status, preoperative motor deficit, duration of preoperative symptoms, immediate postoperative motor deficit and lytic tumor appearance. The factors strongly associated with preoperative compression fractures in this study include lack of sensory deficits ( $P = 0.01$ ), primary breast cancer ( $P = 0.008$ ), anterior spine metastases ( $P = 0.005$ ), thoracic spine involvement ( $P = 0.01$ ), preoperative chemotherapy ( $P = 0.03$ ), and, possibly, preoperative radiation therapy ( $P = 0.16$ ). **CONCLUSION:** The findings of this study may provide insight into risk stratifying as well as guiding surgical management for patients with MESCC.

Spine. 2009 Aug; 34(17):1879-1883

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## ANTERIOR APPROACH TO DISC HERNIATION WITH MODIFIED ANTERIOR MICROFORAMINOTOMY AT C7-T2

**STUDY DESIGN:** An easy surgical method to reach C7-Th and T1-T2 foraminal disc herniation is described. **OBJECTIVE:** To describe a surgical technique that involves an anterior approach to disc herniation with inverted cone-shaped partial minicorpectomy. **SUMMARY OF BACKGROUND DATA:** Anterior approaches to the cervicothoracic junction are difficult in spinal surgery because the operative area is narrow. The manubrium, the clavicles, and the slope of the vertebral bodies obstruct the view of the surgeon. The vascular and neural structures of the superior mediastinum limit the surgical approach. The thoracic duct and recurrent laryngeal nerve present risks for injury, especially with approaches from the right side. Disc herniations at the C7-T2 level are very rare. Posterior approaches at these levels are advocated because radicular symptoms occur more often than myelopathic symptoms, but anterior discectomy and fusion are generally

preferred by many spinal surgeons, as these are approaches that are more intuitive. **METHODS:** We review the case histories of all of our patients that underwent inverted cone-shaped partial minicorpectomy and fusion at the C7-T2 disc levels between 2000 and 2008. We applied the surgical techniques described in this manuscript. **RESULTS:** The mean follow-up duration was 50 months post operation. Physical examinations were performed and radiographs were taken at the end of the first 6 months postoperative and every 12 months thereafter. No meaningful changes were recorded on either the Visual Analog Scale or the Neck Disability Index. Cervical alignment was unchanged before and after surgery. **CONCLUSION:** Minicorpectomy technique of C7 or T1 vertebra is an easy and appropriate method for treating foraminal disc herniation between the C7-T1 and T1-T2 levels.

Journal of Neurology, Neurosurgery & Psychiatry. 2009 Aug;80(8):916-920

Oddo, M,<sup>1</sup> Levine, J,<sup>1,2,3</sup> Frangos, S,<sup>1</sup> Carrera, E,<sup>4</sup> Maloney-Wilensky, E,<sup>1</sup> Pascual, J,<sup>5</sup> Kofke, W,<sup>1,3</sup> Mayer, S,<sup>4</sup> LeRoux, P<sup>1</sup>

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## EFFECT OF MANNITOL AND HYPERTONIC SALINE ON CEREBRAL OXYGENATION IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY AND REFRACTORY INTRACRANIAL HYPERTENSION

**BACKGROUND:** The impact of osmotic therapies on brain oxygenation has not been extensively studied in humans. We examined the effects on brain tissue oxygen tension (PbtO<sub>2</sub>) of mannitol and hypertonic saline (HTS) in patients with severe traumatic brain injury (TBI) and refractory intracranial hypertension. **METHODS:** 12 consecutive patients with severe TBI who underwent intracranial pressure (ICP) and PbtO<sub>2</sub> monitoring were studied. Patients were treated with mannitol (25%, 0.75 g/kg) for episodes of elevated ICP (>20 mm Hg) or HTS (7.5%, 250 ml) if ICP was not controlled with mannitol. PbtO<sub>2</sub>, ICP, mean arterial pressure, cerebral perfusion pressure (CPP), central venous pressure and cardiac output were monitored continuously. **RESULTS:** 42 episodes of intracranial hypertension, treated with

mannitol (n = 28 boluses) or HTS (n = 14 boluses), were analyzed. HTS treatment was associated with an increase in PbtO<sub>2</sub> (from baseline 28.3 (13.8) mm Hg to 34.9 (18.2) mm Hg at 30 min, 37.0 (17.6) mm Hg at 60 min and 41.4 (17.7) mm Hg at 120 min; all p < 0.01) while mannitol did not affect PbtO<sub>2</sub> (baseline 30.4 (11.4) vs 28.7 (13.5) vs 28.4 (10.6) vs 27.5 (9.9) mm Hg; all p > 0.1). Compared with mannitol, HTS was associated with lower ICP and higher CPP and cardiac output. **CONCLUSIONS:** In patients with severe TBI and elevated ICP refractory to previous mannitol treatment, 7.5% hypertonic saline administered as second tier therapy is associated with a significant increase in brain oxygenation, and improved cerebral and systemic haemodynamics.