Microsurgery Yields Better Outcomes in Multiple Cerebral Cavernomatous Malformations

Long-Term Outcome of Patients With Multiple Cerebral Cavernous Malformations.

Kivelev J, Niemelä M, et al:

Neurosurgery 2009; 65 (September): 450-455

Microsurgical removal of the active lesion in patients with multiple cerebral cavernomatous malformations reduces the risk of bleeding and helps control drug-resistant epilepsy.

**Background:** Cerebral cavernous malformations exist in both sporadic and familial forms. In the sporadic form, only a single lesion is usually present, whereas multiple lesions occur in the familial form. Very little is known regarding the prognosis of patients with multiple cavernomas.

**Objective:** To inspect the outcome of patients with multiple cavernomas.

**Participants/Methods:** Of 264 consecutive patients with cerebral cavernomas treated at the authors' institution over a 27-year period, 33 had multiple lesions on MRI and were included in the study. Data were analyzed retrospectively. Glasgow Outcome Scale was used to assess the outcome of patients. The Engel classification was used to assess epilepsy-related outcome in patients who had undergone surgery. The Zabramski MRI classification scale was used to categorize the lesions.

**Results:** 1 patient was found to have 237 lesions and was therefore removed from the study. Fifteen patients were treated conservatively and 18 had surgery. The cavernomas targeted for surgery were the largest with signs of recent bleeding. At a mean follow-up of 7.7 years, 79% of patients had no disability, 18% had moderate disability, and 3% had severe disability. Four of 33 patients were found to have intracranial hemorrhage on follow-up. All 4 had been treated conservatively, and all except 1 recovered with no disability. No significant statistical difference was found between nonsurgical and surgical patients regarding the outcome. Of the 14 patients with epilepsy, 4 were treated conservatively and 10 had surgery with the following results: 70% had Engel class I outcome (ie, free of disabling seizures); 20% had class II (ie, rare disabling seizures); and 10% had class III outcome (ie, worthwhile improvement). All 14 patients received long-term prophylactic anticonvulsant therapy. Only 1 of 4 patients who were treated conservatively still had epileptic seizures despite anticonvulsant therapy.

**Conclusions:** Microsurgical management of multiple cerebral cavernous malformations is the most beneficial treatment modality, specifically in bleeding cases. The authors advocate microsurgery as an effective treatment of drug-resistant epilepsy in select cases. In cases with high-risk location such as the brainstem, the risks of surgery should be weighed against the natural history risk of the disease.

**Reviewer's Comments:** This paper sheds light on the interesting issues revolving around the care of patients with multiple cavernomas. The paper suggests a beneficial effect of removing larger lesions that present with extralesional hemorrhage. The impact on epilepsy is less clear from this study, but the results do suggest the need for more detailed future studies. Epilepsy localization remains the main challenge in these patients. (Reviewer-Bernard R. Bendok, MD).

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Keywords: De Novo Cavernomas, Epilepsy, Follow-Up, MRI, Multiple Cerebral Cavernous Malformations, Prognosis

Print Tag: Refer to original journal article
Safety of MVD for TN Depends on Patient Health Rather Than Age

Microvascular Decompression for Trigeminal Neuralgia in the Elderly: Long-Term Treatment Outcome and Comparison With Younger Patients.  

MVD is safe for both young as well as older patients and should be considered as a first-line treatment for TN refractory to medical treatment.

Background: In young patients, microvascular decompression (MVD) for trigeminal neuralgia (TN) refractory to medical treatment has demonstrated superior safety and efficacy. Due to the potential for higher morbidity in older patients, it has been postulated that microvascular decompression should be reserved for younger patients.

Objective: To compare the outcome of MVD for TN in patients aged >65 years with the outcome in a matched group of younger patients.

Design/Methods: Data of patients operated on between 1979 and 2001 were collected and retrospectively analyzed. Data were collected on long-term pain control, surgical complications, and clinical status postoperatively. The patients were divided in 2 groups: patients aged ≥65 years and patients aged ≤64 years.

Results: MVD was performed on 362 patients with TN during the study period. In total, 112 were aged >65 years and 250 patients formed the younger patient group (ie, age <65 years). There was no significant statistical difference between the 2 groups regarding surgical complications or recurrence risk. No mortalities were noted in the older group. The highest success rate was noted when there was combined arterial and venous compression, whereas the lowest was in patients with venous compression alone. The highest recurrence rate was found to be in the first 12 months after the surgery, regardless of age. Overall, 75% of the older population were pain free at mean follow-up of 90 months. Pain control rates were statistically similar in both the older and younger groups.

Conclusions: The outcome of MVD depends on the patient’s general condition rather than on his age. The authors state that the experience of the surgeon is a large contributing factor to the outcome. They recommend that MVD be the treatment of choice in patients with medically refractory TN regardless of their age, unless their general condition prohibits it.

Reviewer’s Comments: This study raises questions regarding the widespread notion that MVD for TN should be done mainly in younger individuals. Clearly, patient selection and surgeon experience played a major role in this study. For the more experienced surgeon, MVD should be considered as an option for all patients regardless of age as long as their medical risk is acceptable. (Reviewer-Bernard R. Bendok, MD).

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Keywords: Elderly, Long-Term Follow-Up, Microvascular Decompression, Surgical Morbidity, Trigeminal Neuralgia

Print Tag: Refer to original journal article
Motor Cortex Stimulation Gives Long-Term Pain Relief in CRPS

Motor Cortex Electrical Stimulation Applied to Patients With Complex Regional Pain Syndrome.

Velasco F, Carrillo-Ruiz JD, et al:

Pain 2009; September 28 (): Epub ahead of print

A trial of motor cortex stimulation should be considered for CRPS patients who have failed all other therapies and have pain over a body area too large to be covered by spinal cord stimulation.

**Background:** While spinal cord stimulation is successful in patients with complex regional pain syndrome (CRPS), in some cases the area to stimulate is too extensive. Motor cortex stimulation is a reasonable alternative.

**Objective:** To determine the value of motor cortex stimulation in patients with CRPS.

**Design:** Retrospective case study.

**Participants/Methods:** 5 CRPS patients suffering from pain and skin anomalies in 1 limb and adjacent trunk were trialed with epidural motor cortex stimulation. The etiology of CRPS was a brachial plexus injury in 3 patients, Parkes-Weber syndrome in 1, and sclerodermic neuropathy in the other. A 20-contact grid was placed on the dura overlying the motor cortex through craniotomy. Trial stimulation was done for about 2 weeks using various electrode combinations. When a successful trial was achieved, the grid was replaced with a 4-contact paddle electrode over the cortical area where stimulation evoked the best analgesia. Over the next 2.5 to 6.0 years, patients were evaluated using 3 pain scales. The efficacy of stimulation at day 60 or 90 was verified by randomly activating the current generator for 30 days in a double-blind fashion.

**Results:** 4 patients obtained analgesia. The fifth (brachial plexus injury) underwent successful DREZ lesion. Over time, implanted patients had sustained analgesia and regression of autonomic features. During the double-blind on/off stimulation trial, pain returned in all patients when current generators were off. Two and a half years after implantation, 1 patient with brachial plexus injury had breakage of his leads. He opted for DREZ lesions, providing sustained analgesia without improving autonomic signs. Five years after implantation, another patient had an electrode migration, which was repositioned after cortical mapping. In a third patient, the electrode stopped functioning 14 months after implantation because of epidural fibrosis. Revision of the electrode restored the analgesic effect of stimulation.

**Conclusions:** Motor cortex stimulation affords sustained relief to patients with CRPS and does not appear to be a placebo. Concurrent reduction of autonomic symptoms could serve as an objective measure of efficacy.

**Reviewer's Comments:** The results of this study, despite the small number of subjects, are very encouraging. There are a few issues with the design. For instance, the motor cortex was not properly identified. This could have been done with the phase reversal technique. It seems that the intent of the authors was to identify the cortical area that responded best to stimulation. Also, it is not mentioned whether the ipsi- or contralateral cortex was stimulated. As acknowledged by the authors, the measures of analgesia and autonomic changes were subjective. Finally, since the DREZ lesions are very efficacious in relieving the brachial plexus pain, it should be offered as an alternative when proposing motor cortex stimulation. (Reviewer-Luc Jasmin, MD).

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Keywords: Neurostimulation, Cerebral Cortex, Complex Regional Pain Syndrome (CRPS), Brachial Plexus

Print Tag: Refer to original journal article
Neurocognitive Decline More Severe With WBRT Plus SRS vs SRS Alone

Neurocognition in Patients With Brain Metastases Treated With Radiosurgery or Radiosurgery Plus Whole-Brain Irradiation: A Randomised Controlled Trial.

Chang EL, Wefel JS, et al:

Lancet Oncol 2009; 10 (November): 1037-1044

Neurocognition is more severely affected in patients who receive WBRT in addition to SRS than in patients who receive SRS alone for metastatic carcinoma to the brain.

**Background:** Surgery or stereotactic radiosurgery (SRS) combined with whole brain radiotherapy (WBRT) has a survival benefit over WBRT alone. Reduction of neurocognitive decline after WBRT is desirable.

**Objective:** To clarify whether elective WBRT should be given with SRS or deferred because of increased neurocognitive decline.

**Design:** Single institution randomized controlled trial.

**Participants/Methods:** Patients with Karnofsky Performance Status score ≥70 with 1 to 3 brain metastases were randomized to receive SRS alone (dosed by Radiation Therapy Oncology Group 90-05 guidelines) or SRS followed within 3 weeks by WBRT (3000 cGy in 12 fractions). Neurocognition was assessed at baseline and at each follow-up visit by a battery of tests, including the Hopkins Verbal Learning Test-Revised (HVLT-R), a standardized neuropsychological instrument with sensitivity to neurotoxic effects of cancer treatments. Significant deterioration in neurocognition was defined as a drop in HVLT-R score of 5 points at 4 months. Local treatment failure was defined as an increase in lesion size of 25% on contrast-enhanced MRI. Distant control was defined as absence of new lesions on contrast-enhanced MRI.

**Results:** 30 patients receiving SRS alone and 28 with SRS plus WBRT were followed for a median of 9.5 months. Median tumor margin dose was 1900 cGy for SRS alone and 2000 cGy for SRS plus WBRT. The trial was halted by the institutional data monitoring committee when the HVLT-R total recall component at 4 months deteriorated in 7 of 11 SRS plus WBRT patients (64%) compared to 4 of 20 SRS alone patients (20%). Delayed recall and delayed recognition were also worse after SRS plus WBRT. Median and 1-year survival was higher for SRS alone (15.2 months and 63%) compared to SRS plus WBRT (5.7 months and 21%). One-year local tumor control was better in SRS plus WBRT (100% vs 67%), as was 1-year distant tumor control (73% vs 45%). In total, 33% of SRS alone patients required salvage craniotomy for local failure, 20% required salvage SRS for distant failure, and 33% required salvage WBRT. Two patients treated with SRS plus WBRT (7%) required salvage SRS for distant failure.

**Conclusions:** SRS with close clinical monitoring should be the treatment of choice for 1 to 3 cerebral metastases. Surgical salvage for local failure and SRS or WBRT for distant failure should follow.

**Reviewer's Comments:** This study provides convincing evidence that deferring WBRT in favor of SRS alone reduces neurocognitive decline in patients with cerebral metastases. Interestingly, in this study, survival was better for SRS alone patients, but local and distant control were not as good if WBRT was deferred. Therefore, the role of salvage therapies, such as surgical resection of local failure and WBRT and SRS for distant failure, should not be understated. I agree fully with the authors’ conclusions, and I look forward to instituting them into our clinical pathways. (Reviewer-N. Scott Litofsky, MD).

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Keywords: Neurocognition, Radiosurgery, Radiation Therapy, Cerebral Metastases

Print Tag: Refer to original journal article
Ethanol May Provide Protection After Head Injury

Serum Ethanol Levels: Predictor of Survival After Severe Traumatic Brain Injury.

Salim A, Teixeira P, et al:

J Trauma 2009; 67 (October): 697-703

Alcohol ingested prior to severe TBI may have a protective effect as such patients have improved survival.

Background: Animal studies suggest that alcohol at low or moderate levels before traumatic brain injury (TBI) may have a neuroprotective effect. Clinical studies have had mixed results.

Objective: To study the hypothesis that ethanol use is associated with improved survival after severe TBI and that serum ethanol levels on admission correlate with survival.

Design: Retrospective single institution database study.

Participants/Methods: Patients with severe TBI, defined as head abbreviated injury score (AIS) ≥3, admitted to the Surgical Intensive Care Unit (ICU) at Los Angeles County and the University of Southern California Medical Center from 2000 to 2005, who had serum ethanol levels assessed were divided into ethanol positive (>0.08 g/dL) and ethanol negative. Logistic regression was performed to investigate the association between ethanol and mortality and to adjust for confounding variables, including ethanol positivity, age >55 years, gender, mechanism of injury, Glasgow Coma Scale (GCS) <8, SBP <90 mm Hg, Injury Severity Score (ISS) >25, and AIS >4. Probability of mortality was calculated and plotted on a receiver-operating characteristic curve using predicted and true outcome. Ventilator days and ICU and hospital length of stay (LOS) were compared as outcomes.

Results: 482 (47%) of 1025 patients with severe TBI were tested for ethanol consumption. Tested patients were more often male, blunt trauma victims, GCS <8, and head AIS >4. In total, 179 (37%) were ethanol positive and 303 (63%) were negative. Ethanol-positive patients were more likely male and involved in blunt trauma, and had lower ISS, with more tracheostomies. Ethanol-positive patients had lower hospital mortality (27% vs 40%), even after adjusting for relevant confounding variables. Ethanol-positive patients had higher rates of sepsis (7% vs 2%). Hospital LOS was higher for ethanol positives, but not when adjusted for confounding variables. Serum ethanol level was higher for survivors (0.11 g/dL) than non-survivors (0.05 g/dL).

Conclusions: Elevated ethanol levels are associated with improved survival in severe TBI. Additional research is required to establish a mechanism as well as potential therapeutic implications.

Reviewer's Comments: This study's authors purport a possible survival advantage of ingested ethanol in TBI. Several shortcomings of the study should be considered before accepting these assertions. The authors define severe TBI by AIS, not GCS; approximately 40% of studied patients had GCS >9—not the standard definition of severe TBI. Studied patients did not include those admitted to the Neurosurgery ICU, which may create significant bias in the types of patients studied. Lastly, only 47% of this potentially biased group had ethanol levels, creating further bias. If these results hold true in a study without such bias, the possibility that ethanol may provide some brain protection would certainly warrant investigation of any therapeutic properties ethanol may have. (Reviewer-N. Scott Litofsky, MD).

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Keywords: Alcohol, Traumatic Brain Injury, Outcome, Intoxication

Print Tag: Refer to original journal article
Practice management recommendations for hyponatremia rely on expert opinion rather than guidelines because evidence literature is scarce.

**Background:** Hyponatremia is commonly encountered in critically ill neurosurgery patients.

**Objective:** To critically evaluate the existing literature to develop evidence-based guidelines regarding management of hyponatremia.

**Methods:** The authors convened a multidisciplinary panel across medical and surgical subspecialties that evaluated scientific literature published from 1950 to 2008. This panel then developed a set of recommendations used to create an evaluation and treatment protocol in the treatment of hyponatremic neurosurgical patients at the author's institution.

**Results:** According to the panel recommendations, hyponatremia should be evaluated and treated for serum sodium <131 mmol/L. The evaluation should include invasive monitoring where available, in addition to physical exam findings and basic laboratory values. There was little support in the literature for measuring levels of hormones such as natriuretic peptides or antidiuretic hormone. Symptom severity was important in determining the level of correction necessary, which should be performed no faster than 10 mmol/L/d. The syndrome of cerebral salt wasting should be treated with serum sodium replacement and fluid resuscitation. In patients at risk of vasospasm in the setting of subarachnoid hemorrhage, fludrocortisones may be considered while fluid restriction should be avoided. A combination of urea, diuretics, lithium, demeclocycline, and/or fluid restriction should be the treatment for the syndrome of inappropriate antidiuretic hormone.

**Conclusions:** Because class I evidence literature on hyponatremia management is scarce, practice management guidelines have relied heavily on expert opinion, an important note to be remembered when applying them.

**Reviewer's Comments:** Hyponatremia is a common complication occurring in critically ill neurosurgical patients. This article is an important summary of the literature regarding recommendations for diagnosis and management. Key points made by the authors include the critical threshold of hyponatremia, defined as 131 mmol/L. The authors also point out that critical levels below 120 mmol/L result in significant increases in mortality rate and the onset of major complications, such as seizures. The differentiation between the syndrome of inappropriate antidiuretic hormone secretion and cerebral salt wasting is critical, as a misdiagnosis could result in incorrect treatment and potential life-threatening complications. In such cases, the authors note that invasive monitoring to assess fluid status is critical, and in my practice I have found that analysis of urine sodium levels is invaluable as well. A recommendation for slow sodium replacement of <10 mmol/L/d to avoid neurological complications, such as central pontine myelinosis, is well known but bears reinforcing. Controversial recommendations, such as the use of corticosteroids and hypertonic saline, remain and must be balanced by the fact that, as with many clinical guidelines, the ones described here are derived from literature recommendations that fall short of class I evidence. (Reviewer-Nicholas C. Bambakidis, MD).

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Keywords: Hyponatremia, Cerebral Salt Wasting, Syndrome of Inappropriate Antidiuretic Hormone

Print Tag: Refer to original journal article
Physicians should consider the anatomy (ventral or dorsal) of a spinal epidural abscess when determining a patient's treatment plan.

Objective: The management of spinal epidural abscess (SEA) has typically consisted of open surgical drainage, often emergently. Antibiotic therapy alone has been advocated by some in select patients, though the indications for such management are unclear in the literature.

Participants/Methods: The authors reviewed a series of 104 patients with a diagnosis of SEA over 10 years. Most patients (61.5%) were managed with CT-guided aspiration or antibiotics alone based on blood cultures, while the remainder (38.5%) underwent surgical decompression. Most of the patients in this series presented without focal neurological deficit.

Results: There was no significant difference in terms of outcome between patients treated surgically or conservatively. This lack of difference held true even between subgroups based on whether the abscess was located dorsally (34.6%) or ventrally (65.4%), though patients presenting with paraplegia or quadriplegia were much more likely to possess a dorsal SEA than ventral SEA (30.6% vs 7.3%), and this was a significant outcome ($P=0.003$).

Conclusions: The data in this review do not support the view that SEA in all cases is a surgical emergency necessitating early decompression to avoid a poor outcome. The data do seem to indicate that the location of the SEA, either dorsally or ventrally, is important.

Reviewer's Comments: This important paper provides good evidence in support of conservative management for certain patients presenting with SEA. Specifically, patients without neurological deficit presenting with ventral SEA may be adequately managed with CT-guided aspiration followed by targeted antibiotic therapy. It can also be argued that, in patients with dorsal SEA, CT-guided aspiration may be considered with placement of a persistent drainage catheter and subsequent antibiotic therapy as noted above. In my view, the anatomic localization noted in the study is an artificial product of the etiologies of SEA in different cases. Ventral SEA tends to arise via seeding from the disc space or vertebral bodies and is much more likely to occur in the lumbar spine, as was the case in the present series. In these cases, patients often do very well with conservative management because the SEA is rarely compressive due to the localized anatomy of the nerve roots and thecal sac. In the thoracic and cervical spine, a dorsal SEA arises through seeding of the dorsal epidural fat and is much more likely to cause spinal cord compression, thereby requiring surgical decompression. In any event, it should be remembered that patients can suddenly deteriorate neurologically, probably as a result of venous infarction and thrombosis, and surgical decompression in the face of spinal cord compression on imaging should strongly be considered. It remains to be seen whether use of CT-guided aspiration in such cases is completely adequate in ensuring a good outcome. (Reviewer-Nicholas C. Bambakidis, MD).
Excellent outcomes without significant cosmetic deformity are possible with a modified orbitozygomatic approach for pediatric craniopharyngioma.

**Background:** Craniopharyngiomas are benign, nonglial tumors that form from remnants of Rathke's pouch. Complete surgical resection remains the mainstay of treatment. The orbitozygomatic approach offers several advantages for surgery, but the results of this approach have not been well documented in children.

**Objective:** To review the authors' experience with a modified orbitozygomatic approach in the surgical management of children with craniopharyngioma.

**Design:** Retrospective chart review.

**Participants:** All children who underwent resection of a craniopharyngioma at the authors' institution from 2000 to 2006 via a modified orbitozygomatic approach.

**Methods:** The patients were identified by a standard imaging work-up including CT and MRI. They all underwent preoperative visual assessment and endocrine work-up. The modified orbitozygomatic approach is described as a supine approach with head turned approximately 30° to the contralateral side. A coronal scalp incision is made and the scalp is elevated along with the superficial temporal fat pad. The ipsilateral orbital rim and part of the orbital roof is removed in one piece along with a frontotemporal craniotomy. The rest of the microsurgical approach is standard, including opening of the lamina terminalis. Removal of the orbital rim and roof provides greater access to the sellar region and the lamina terminalis.

**Results:** 10 patients were identified: 6 boys and 4 girls. Nine of 10 had preoperative visual deficits. Endocrine abnormalities were present in all patients preoperatively. The mean diameter of the tumors was 2.9 cm, with 3 tumors exceeding 3.5 cm in diameter. A radiographic and intraoperative gross total resection was achieved in all patients. Eight of 9 patients had visual improvement postoperatively. No patients required shunting. All patients had postoperative endocrine dysfunction requiring supplementation with medication. Two patients developed hyperphagia and obesity, presumably from hypothalamic damage.

**Conclusions:** The modified orbitozygomatic approach yields results as good as the best series in children. There were no cosmetic deformities reported by the authors. This approach should be considered for resection of craniopharyngioma in children.

**Reviewer's Comments:** This is a small series documenting the utility of the modified orbitozygomatic approach for the resection of craniopharyngiomas in children. This approach is a hybrid of a unilateral subfrontal approach and a pterional approach. As such, it is very versatile. Because the series is so small, I think it is impossible to say whether this approach is better than any of the others. The cosmetic problems associated with this approach in children are small, and it can be considered a safe and effective approach. However, the other approaches such as the bifrontal interhemispheric, the transsphenoidal, the transcallosal, and petrosal, all have their place and need to be considered for certain craniopharyngiomas. (Reviewer-Ethan A. Benardete, MD, PhD).

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Keywords: Craniopharyngioma, Pediatric Neurosurgery, Orbitozygomatic Craniotomy, Skull Base

Print Tag: Refer to original journal article
The use of subdural drains after burr-hole evacuation of chronic SDH is safe and reduces recurrence rate as well as mortality.

**Background:** Chronic subdural hematoma (SDH) is essentially seen in the elderly and is correlated with sizeable morbidity and mortality. Its incidence approximates 5/100000/year and is expected to increase in the near future. Chronic SDH is treated with surgical drainage and recurrence rates after the initial procedure range from 5% to 30%. Nonetheless, controversy remains as to whether or not postsurgical drainage decreases recurrence rates. In fact, recent work shows that it does; however, no randomized controlled trial (RCT) exists to further prove this concept.

**Objective:** To evaluate the impact of subdural drainage after burr-hole evacuation of chronic SDH.

**Design/Participants:** Single-center RCT that was conducted over 3 years and included patients aged ≥18 years presenting to the author's institution with symptomatic chronic SDH demonstrated by CT for burr-hole evacuation.

**Methods:** Upon admission, information regarding presenting symptoms, presence/absence of fall, baseline mobility, assistance in daily living, medical history, Glasgow Coma Scale (GCS) score, modified Rankin Scale (mRS) score, extremity weakness, and dysphasia were gathered. Following burr-hole evacuation, patients were randomized to subdural drainage versus no drainage if deemed safe by the neurosurgeon. Bilateral SDH was considered as one case and were similarly treated. Drains were kept for 48 hours and then removed. At discharge, data regarding surgical and medical complications, mobility, GCS, speech deficit, and extremity motor strength were recorded. At 6 months, information about accommodation, degree of independence, degree of mobility, mRS, and living/dead status was obtained. The primary study outcome was recurrence rate defined as rate of reoperation for recurring chronic SDH following initial evacuation with/without drain. Recurrence was defined as presence of signs/symptoms due to an ipsilateral SDH identified on CT within 6 months of initial surgical evacuation. Secondary study outcomes were clinical outcome at discharge and at 6 months, as well as length of hospital stay.

**Results:** When compared to no drain, recurrence rate was significantly lower in the drain cohort. The latter remained true after controlling for variables with logistic regression analysis. It took a significantly longer time for the drain group to recur when compared to no drain, 15.5 versus 8.0 days, respectively. At 6 months, a significantly larger number of patients were alive in the drain versus non-drain group and this remained valid with logistic regression analysis. After controlling for variables, admission mRS was a significant predictor of mortality at 6 months. More patients with drains had GCS 15 at discharge when compared to no-drain patients. Limb weakness or dysphasia at discharge was significantly less frequent in drain patients. Good mRS 0-3 at discharge and 6 months was significantly more common in drain patients. Complications included 3 subdural empyemas, 1 intracerebral hemorrhage, and 1 acute SDH.

**Conclusions:** Use of subdural drains after burr-hole evacuation of chronic SDH is safe and reduces recurrence rate as well as mortality.

**Reviewer's Comments:** The significant results reported in this study emphasize the beneficial role and safety of subdural drain placement after chronic SDH evacuation and may encourage neurosurgeons previously unconvinced of such practice. Drain placement in this setting is routinely performed at our institution with good results. (Reviewer-Ziad A. Hage, MD).

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Keywords: Subdural Hematoma, Drain, Burr-Hole, Randomized Controlled Trial

Print Tag: Refer to original journal article
**Is the Exophthalmos Index Objective?**

**Long-Term Results With Exophthalmos in a Surgical Series of 30 Sphenoorbital Meningiomas. Clinical Article.**

Scarone P, Leclerq D, et al:

J Neurosurg 2009; 111 (November): 1069-1077

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The exophthalmos index is a useful, but as of yet, not validated measure of proptosis.

**Background:** Almost universally, patients with sphenoorbital meningiomas present with ocular symptoms, such as loss of visual acuity, pain, or exophthalmos. The exophthalmos is not always clinically appreciated or cosmetically significant, but present in the majority of patients at presentation.

**Objective:** To provide an objective measure of exophthalmos (the exophthalmos index) and track the result over a long-term follow-up period.

**Design/Participants:** Retrospective report of the results of 30 patients who underwent surgery for a sphenoorbital meningioma with a median follow-up of 61 months.

**Methods:** The medical and radiographic records of the study cohort were analyzed retrospectively. The exophthalmos index was calculated on radiographs.

**Interventions:** All patients underwent surgical intervention for the treatment of the sphenoorbital meningioma.

**Results:** All patients were women with a median age of 51 years. Median symptom duration before surgery was 10 months; 93% presented with exophthalmos; decreased visual acuity was seen in 23%; and 17% had pain associated with proptosis. Based on radiographic measurements, each patient's exophthalmos index was measured from the preoperative, early follow-up, and late follow-up scans. Although not the focus of the report, the surgical extent of resection was Simpson Grade II in 90% and Grade III in 10%. Recurrence was seen in 10% of patients, while the rest had stable radiographic images during the follow-up period. All patients had an exophthalmos index between 1.2 and 2.75 preoperatively. The severity of the exophthalmos index was not associated with preoperative symptom type or duration. At first postsurgical follow-up, clinical exophthalmos was improved in 86% of patients, while the exophthalmos index was improved in 90% of patients, and in 93% of patients at last follow-up. However, improvement was not sustained between the first and last follow-up scans, with only 20% of patients continuing to have improvement, 50% had worsening, and 30% had a stable index. Compared to the preoperative exophthalmos index, 87% had improved index at last follow-up, unchanged in 10%, and worse in 3%. Residual exophthalmos was related to residual or recurrent disease.

**Conclusions:** The authors’ exophthalmos index is a useful, but as of yet, not validated measure of proptosis. Worsening exophthalmos is often an indicator of residual or recurrent disease.

**Reviewer’s Comments:** Sphenoorbital meningiomas are often slowly progressive and surgical intervention is technically difficult due to anatomic constraints. Most patients present with proptosis and this report proposes an objective measure for the determination of exophthalmos. The authors are to be commended for their proposal and this exophthalmos index needs validation in other series. The challenge remains whether this index is both radiographically and clinically relevant. (Reviewer-Kenji Muro, MD).

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Keywords: Exophthalmos, Orbit, Proptosis, Sphenoorbital Meningioma

Print Tag: Refer to original journal article