Blood blister-like aneurysms are highly prone to intraoperative rupture. Better options for endovascular treatment of these lesions are needed.

**Background:** A very high rate of morbidity and mortality is associated with the occurrence of blood blister-like aneurysms (BBAs). These lesions are difficult to address in a definitive fashion and have a propensity to rebleed with devastating results. Endovascular experience in treating these lesions is ongoing.

**Objective:** To add to existing data on the subject.

**Participants/Methods:** The authors review a consecutive series of 9 patients with BBAs in a retrospective fashion. Their cohort included 2 men and 7 women with a mean age of 50 years (range, 42 to 57 years). All aneurysms were ruptured. Follow-up data included an analysis of treatment methods as well as angiographic and clinical outcomes.

**Results:** Initial treatment consisted of stent-assisted coiling (SAC) in all patients. In 3 patients, additional treatment with insertion of an additional stent was required (the "stent-within-stent" [SWS] technique). A covered stent was placed in 3 patients in addition to SAC. Patients treated with SAC alone all experienced coil regrowth without rebleeding and required retreatment. One patient receiving a covered stent died from intraoperative rupture of the internal carotid artery. Patients treated with the SWS technique did well without evidence of recurrence or rebleeding at limits of follow-up (mean, 11 months; range, 4 to 26 months).

**Conclusions:** SWS and covered stenting may be effective treatment options in preventing rebleeding of BBAs. Stent-assisted coil embolization alone is an insufficient treatment method.

**Reviewer's Comments:** This study highlights the difficulties inherent in treating these lesions. They are thought to represent a subset of pseudoaneurysms and are often found to be very thin-walled during surgical exposure and highly prone to intraoperative rupture. I generally have found that primary clipping is impossible to achieve and usually resort to wrapping the carotid artery with a sling of Gore-Tex secured with an aneurysm clip to prevent rebleeding. Occasionally, carotid artery sacrifice is necessary with or without bypass grafting. Clearly, surgical reconstruction can be difficult, and the morbidity of treatment can be quite high. Endovascular treatment has been described in this report and prior reports. It is clear that primary coil embolization is usually followed by regrowth or rehemorrhage of the aneurysm and is generally not an acceptable initial therapy. Stent assistance has been proposed by some, but as is clear in this study, stent-assisted coiling alone is rarely curative. Newer technological devices including covered stents may provide an ideal answer, but it cannot be overlooked that the most devastating complication reported in the present series was associated with placement of such a device. As more options become available for endovascular treatment of these lesions, outcomes should be expected to improve. (Reviewer-Nicholas C. Bambakidis, MD).

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Keywords: Blood Blister-Like Aneurysm

Print Tag: Refer to original journal article
Patients tolerate gamma knife radiosurgery well and enjoy its minimally invasive benefits, but they express concerns regarding the pain and anxiety they experience during treatment.

**Background:** Gamma knife radiosurgery is an indispensable tool for treatment of benign and malignant tumors, vascular lesions, and functional disorders. While clinical results of treatment have been well described, patients' perspectives regarding treatment have not been.

**Objective:** To explore patients' experiences and perspectives during various stages of gamma knife radiosurgery process.

**Design:** Prospective, single-institution quality research study.

**Participants/Methods:** 25 to 30 patients proficient in English and treated with gamma knife radiosurgery from August 2007 to August 2008 were interviewed on 3 occasions: after consultation but prior to education, the day prior to treatment, and 3 months following treatment. Interviews were based on a guide, but open-ended discussion was encouraged. Tabulated data were analyzed by open coding (grouping by shared ideas) and axial coding (organizing data by themes) by each of the 5 authors.

**Results:** 29 of 242 patients (12%) were selected by convenience sampling and completed 28 first interviews, 21 second interviews, and 22 third interviews. Patients were treated for non-malignant tumors (38%), malignant tumors (28%), trigeminal neuralgia (21%), tremor (10%), and arteriovenous malformations (3%). Patients identified 7 overarching themes, including (1) satisfaction with the overall treatment experience, (2) satisfaction about patient knowledge of gamma knife radiosurgery, (3) satisfaction about the quality and amount of patient education, (4) realization of process expectations, (5) prioritization of outcome over process, (6) realistic expectations of outcome, and (7) prevalence of pain and anxiety. Of patients, 63% experienced pain during application and removal of the Halo ring, and 36% were not prepared for the pain. Of note, 59% complained of transient worsening of symptoms or mild posttreatment complications.

**Conclusions:** While the gamma knife radiosurgery process is overall a positive experience for patients, significant numbers of patients encounter pain and anxiety. Clinicians can improve patient treatments by specifically asking patients about their experience.

**Reviewer’s Comments:** This unique paper describes perspectives of patients in regard to their experiences with gamma knife radiosurgery. Although the authors explain that new information is not discovered by interviewing >25 patients in studies of this nature, perhaps a larger sample may have provided insights into differences between patients with different pathology groups. The frequent pain and anxiety experienced by patients may make frameless radiosurgery a more attractive option. Perhaps some of the postoperative symptomatic worsening may reflect a degree of patient anxiety. Certainly, when patients are treated with framed-based radiosurgery, attention to pain and anxiety is paramount. Patient education appears to be an important part of the radiosurgery process and can be a key source of addressing patient anxiety in advance. The overall positive patient experience is important to remember when guiding patients in choosing from available treatment options. (Reviewer-N. Scott Litofsky, MD).
Minor head impacts in soccer cause reduced short-term neuropsychological performance consistent with concussion, even though players are unaware that they suffered a concussion.

Background: Head injuries, resulting primarily from aerial ball challenges between unprotected heads, are common. Many resulting concussions are unrecognized, and their consequences are unknown.

Objective: To determine if minor head impacts cause brain functional impairments and if neuropsychological testing changed the next year as a result of those impacts.

Design: Prospective case-control study.

Participants/Methods: Participating Norwegian elite soccer league players had baseline reaction time neuropsychological testing. Players suffering head impact, defined as (1) apparent impact to head, face, or neck, (2) causing referee to interrupt match, and (3) causing the player to lie on pitch for >15 seconds, were evaluated. Next-day review of match videotapes identified impacted players who had follow-up symptom assessment and neuropsychological testing the day after impact. Non-impacted players served as controls and were tested the day after the match. Players with at least 1 impact were compared the next season to those without impact.

Results: 452 of 660 players had baseline neuropsychological testing; 144 of these had testing the next season. A total of 228 head impacts occurred in 352 matches; 44 impacts (19.3%) were followed by neuropsychological testing. Players removed from a match after impact were more likely to have follow-up testing. Reaction time performance significantly decreased from baseline values; 22 (50.0%) tested impacted players were symptomatic, most commonly with headache (38.6%), dizziness (27.3%), and diminished concentration (18.1%). Medical personnel diagnosed only 6 concussions. Next-season reaction times were increased for 37 (25.7%) players who suffered 1 impact compared to 107 (74.3%) non-impacted players, but these times were still within normal testing range. Impacted players headed the ball more often than did non-impacted players.

Conclusions: Minor head impacts in soccer are associated with reduced neuropsychological performance shortly after the impact, even in asymptomatic players. Reduction in performance is also noted the next season.

Reviewer’s Comments: As a neurosurgeon, as well as a soccer dad and adult onset-player, I am frequently asked about risks of heading the ball. This study assesses neuropsychological performance of elite players who suffered significant enough head impacts to force them to remain lying on the pitch >15 seconds and for referee play stoppage. These impacts frequently resulted from aerial ball challenges. Using reaction time parameters, this study shows significant reduction in performance after impacts, even if the player had no symptoms. One weakness is low compliance for follow-up testing; its effect on the results is uncertain. The asymptomatic nature of players impacted and impaired should concern those of us involved in sports as medical personnel, parents, and participants. Increased vigilance about assessing players and allowing them to return to play at an appropriate time is warranted. The value of protective headgear, particularly for those in high-risk positions, should also be considered. (Reviewer-N. Scott Litofsky, MD).

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Keywords: Concussive Injury

Print Tag: Refer to original journal article
In subarachnoid hemorrhage patients, fever control is correlated with lower cerebral metabolic distress, irrespective of intracranial pressure.

**Background:** Fever is known to promote brain damage and is correlated with poorer outcomes in patients with aneurysmal subarachnoid hemorrhage (SAH). Nonetheless, the pathogenesis underlying this process is unclear. Fever control has been advocated in patients with brain injury, but how such a practice can be clinically advantageous is not yet understood. On the other hand, it has been demonstrated that a high lactate/pyruvate ratio (LPR) in the interstitial space of the brain indicates brain metabolic distress and is correlated with poor outcome following SAH.

**Objective:** To assess how fever control affects LPR in SAH patients.

**Participants/Methods:** SAH patients consecutively admitted at the authors' institution who underwent cerebral microdialysis and intracranial pressure (ICP) monitoring, along with induced normothermia for refractory fever, were retrospectively studied. Refractory fever was defined as a persistent rectal temperature ≥38°C despite antipyretics that was treated with induced normothermia using icepacks and an external cooling device. ICP monitoring was performed using an ICP probe and a microdialysis catheter inserted bedside into white matter contralateral to the area of maximal injury. Sterile artificial cerebrospinal fluid was being circulated in the microdialysis catheter, and samples were tested hourly for glucose/lactate/pyruvate. Regarding brain metabolism, an LPR >40 indicates continuous brain cell energy dysfunction and cerebral metabolic crisis. Episodes of cerebral metabolic crisis are the percent-hourly measurements with LPR >40. Mean LPR and cerebral metabolic crisis episodes were recorded during fever and induced normothermia. Moreover, knowing that fever is a risk factor for high ICP, samples collected at normal (≤20 mm Hg) or high (>20 mm Hg) ICP were studied independently. At discharge, outcome was evaluated using the Glasgow Outcome Score (4 to 5, good outcome; 1 to 3, poor outcome).

**Results:** 1637 microdialysate samples obtained from 18 SAH patients were studied along with temperature and ICP data. In the setting of normal ICP, induced normothermia was correlated with a significantly lower LPR and fewer cerebral metabolic crisis episodes when compared to fever. In the setting of elevated ICP, when compared to fever, induced normothermia was correlated with lower LPR, ICP, and cerebral metabolic crisis rate. Patients with good outcomes had a lower mean LPR and ICP when compared to those with poor outcomes. When considering high LPR and cerebral metabolic crisis, a significant reduction by induced normothermia was observed in good and poor outcome patients; however, the reduction was larger in poor outcome patients.

**Conclusions:** In SAH patients, fever control is correlated with lower cerebral metabolic distress, irrespective of ICP.

**Reviewer's Comments:** In this interesting study, it is demonstrated that controlling fever is associated with reduced cerebral metabolic distress as noted from a significantly lower LPR with induced normothermia, regardless of ICP. Nonetheless, several questions remain to be resolved: How are fever control and outcome related? What is the clinical significance of a reduced LPR? Is this reflective of decreased brain injury? Further studies with larger patient samples are needed. (Reviewer-Ziad A. Hage, MD).

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Keywords: Fever

Print Tag: Refer to original journal article
Using the Enterprise stent in vessel diameters approaching manufacturer-indicated limits might lead to stent migration.

**Background:** The Enterprise stent was given humanitarian device exemption approval to treat wide-necked, intracranial, saccular, or fusiform aneurysms arising from a vessel 2.5 to 4.0 mm in diameter.

**Objective:** To report the case of a spontaneous proximal migration of an Enterprise stent without any endovascular manipulation during a staged stenting procedure for treatment of a basilar artery aneurysm (BAA). **Case Report:** A 48-year-old female presented with a medical history of horizontal diplopia and a family history of a sister with a BAA, which incited screening with MRI and magnetic resonance and diagnostic angiography. Three intracranial aneurysms were detected: an 11.5-mm irregular BAA with a 5.5-mm neck from which both posterior cerebral arteries originated; a 3.6-mm bilobed right superior cerebellar artery (SCA) aneurysm; and a 2.0-mm left A1-A2 junction aneurysm. After reviewing images, the senior author deemed microsurgical clipping of the BAA too risky and thus opted for an endovascular approach. Due to patient preference, a staged approach was used whereby the stent would be placed first, followed by coiling at a later date. Endovascular stenting was therefore performed, and a 4.5 x 22.0 mm Enterprise stent was deployed, with proximal tines in the mid-basilar and distal tines just distal to the posterior communicating artery origin. This position allowed for excellent neck coverage for both the BAAs and SCA aneurysms. The procedure was uncomplicated, and the patient was discharged the following day in the same neurological condition as at baseline. Nine weeks later, the patient came back for coiling of the BAA. Following angiogram and before any endovascular intervention was performed, it was noted that the stent had migrated 1 cm proximally, with all distal tines located within the aneurysm neck and proximal tines at the vertebral basilar junction. Despite stent migration, coiling was performed as the stent could still act as a buttress in a "waffle cone" configuration. Post coiling, delayed angiographic imaging showed flow reduction in P1 segments due to a small thrombus that was developing at the aneurysmal neck. Intra-arterial ReoPro was then infused with near-complete thrombus resolution. Follow-up angiogram showed distal branches patency; however, persistent filling of a portion of the dome was noted. The patient had no procedure-related neurological deficit.

**Conclusions:** This was the first report of spontaneous migration of an Enterprise stent prior to planned staged coil embolization. Using Enterprise in vessel diameters approaching the manufacturer-indicated limits might lead to stent migration.

**Reviewer's Comments:** The Enterprise has a closed-cell design that allows for re-sheathing after partial deployment. This design, however, has a low-friction surface that might decrease vessel wall adherence and therefore allow for stent migration. It is possible that using a longer stent or one with open-cell design might have precluded this event. (Reviewer-Ziad A. Hage, MD).

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Keywords: Wide-Necked Basilar Aneurysm

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Use of the Pipeline embolization device is associated with no major peri-procedural complications, and at 1-year follow-up, most all patients have complete cure of their aneurysms.

**Background:** While aneurysm embolization techniques have advanced, significant challenges remain with regard to incomplete treatment and recurrence, especially with large, fusiform, and wide-necked aneurysms. There has been a desire to move toward an endoluminal solution. The Pipeline embolization device (PED) is the first endovascular construct to function as a stand-alone device for endovascular treatment of intracranial aneurysms.

**Objective:** To report on peri-procedural outcomes and midterm angiographic follow-up results of 53 patients with 63 wide-necked aneurysms that were treated with the PED.

**Participants/Methods:** 53 patients with 63 wide-necked aneurysms were treated with PED after failing previous treatments. The PED is a flexible microcatheter-delivered self-expanding stent-like construct. Success was defined as complete coverage of the aneurysm neck, preserved patency of the parent artery, and no clinically adverse events. Clinical and angiographic follow-up was performed at 1, 3, 6, and 12 months after treatment.

**Results:** PED deployment was technically successful in 70 of 72 deployments. No major peri-procedural complications were encountered. Six of 53 patients had minor complications. At the conclusion of treatment, only 5 of 63 aneurysms showed complete angiographic occlusions (all of which were small aneurysms). The remaining aneurysms had residual filling. Transit time in and out of the aneurysm, however, was slowed and the inflow jet was disrupted. One-, 3-, 6-, and 12-month angiographic follow-up results were available for 51, 42, 28, and 18 aneurysms, respectively. At 6-month angiographic follow-up, 93% of aneurysms studied had progressed to complete occlusion. At 12 months, only a giant, circumferential, fusiform basilar aneurysm treated with 2 PEDs had residual filling. Of 38 vessels with 3-month angiographic follow-up, 3 showed mild in-stent stenosis, 2 showed moderate in-stent stenosis, and 2 showed severe in-stent stenosis. All cases of in-stent stenosis were asymptomatic and were not treated.

**Conclusions:** Endovascular reconstruction with the PED is a safe, durable, and curative treatment of selected wide-necked, large, and giant cerebral aneurysms. Although there are some limitations in regard to clinical situations and anatomic locations, for those that are amenable to treatment, PED appears to be an optimal treatment modality.

**Reviewer's Comments:** Conceptually, this paper represents the beginning of what may be a paradigm shift in the endovascular treatment of intracranial aneurysms. I disagree with the authors that durability and efficacy have been demonstrated in that 12-month angiographic follow-up is available in only 18 patients. Furthermore, many unanswered questions remain regarding use of these stents in perforator-rich zones. A major downside of this technology is that the sac of the aneurysm cannot be accessed endovascularly after stent placement. I am optimistic that flow diverters such as the one presented will play an increasingly important role in the management of intracranial aneurysms. (Reviewer-Bernard R. Bendok, MD).

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Keywords: Cerebral Aneurysms

Print Tag: Refer to original journal article
For small- and medium-sized vestibular schwannomas, gamma knife radiosurgery demonstrates better facial nerve and hearing outcomes compared to open microsurgery.

**Background:** Treatment of vestibular schwannomas is controversial. There have been only a few studies comparing gamma knife radiosurgery and microsurgery, with all showing that facial nerve and hearing outcomes are better after radiosurgery. In 2006, the first prospective study comparing treatment-associated morbidity found better outcomes in the radiosurgery group compared to open surgery.

**Objective:** To assess treatment-associated morbidity in patients undergoing microsurgery for vestibular schwannomas.

**Design/Setting:** Prospective, open non-randomized study at Bergen University Hospital in Finland.

**Participants/Methods:** 91 patients were enrolled. Three radiosurgery patients withdrew before the first follow-up examination. All patients had unilateral lesions of ≤25 mm in the cerebellopontine angle. Twenty-eight patients were enrolled in the microsurgery group, with the remaining 60 in the radiosurgery group. Primary end points were facial nerve function according to the House-Brackmann scale and hearing function according to the Gardner-Robertson scale at 2 years posttreatment. Secondary end points included retreatment, quality of life, symptom variables, and professional status at 2 years.

**Results** In 5 surgical cases, subtotal resection was performed due to a decrease or loss of electromyogram signals. The facial nerve was transsected in 1 case. Perioperative complications were noted in 4 cases. Clinical hydrocephalus was noted in 2 patients in the radiosurgery group, and they were treated with ventriculoperitoneal shunts. At 2 years, 13 of 28 surgery patients and 1 of 60 radiosurgery patients had reduced facial nerve function. Thirteen of 28 surgical patients had Gardner-Robertson grade A or B hearing preoperatively; however, none were preserved at 2 years' follow-up. Twenty-five of 60 radiosurgery patients had Gardner-Robertson grade A or B hearing pretreatment, with 17 maintaining their hearing at 2 years. Tinnitus, vertigo scale score, and balance platform tests did not differ significantly between groups. Quality of life was significantly better in the radiosurgery group compared to the surgery group.

**Conclusions:** The authors' data confirm the findings of the first prospective non-randomized study that there are better facial nerve and hearing outcomes from gamma knife radiosurgery compared to microsurgery for small and medium vestibular schwannomas.

**Reviewer's Comments:** Major weaknesses of this study include the following points: The study is not randomized. The microsurgical results of facial nerve and hearing function are not comparable to what has been published from high-volume surgical centers. Two years of follow-up may not be enough to rule out recurrences and delayed hearing loss after radiosurgery. It may be that the results of this study primarily apply to centers that lack significant microsurgical experience with vestibular schwannomas. (Reviewer-Bernard R. Bendok, MD).

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Keywords: Vestibular Schwannoma

Print Tag: Refer to original journal article
Resection and interposition grafting can be part of the surgical armamentarium to treat large distal anterior cerebral artery aneurysms.

**Background:** Distal anterior cerebral artery (DACA) aneurysms are rare lesions accounting for about 6% of all intracranial aneurysms. The majority are small in size, whereas large and giant lesions are seldom encountered. In fact, the reported literature documents only 26 giant pericallosal (PC) aneurysms. These lesions can be challenging to treat, and surgical techniques include direct neck clipping, trapping, hunterian ligation, coiling, or bypass procedure.

**Objective:** To report on a complex large DACA aneurysm treated by resection and interposition superficial temporal artery (STA) grafting. **Case Report:** A 69-year-old female presented to an outside hospital with acute onset headache. Her neurological exam was normal, but a head CT showed a 1.8- x 1.5-cm hyperdense lesion anterior to the genu of the corpus callosum with left frontal lobe edema. CTA demonstrated a DACA-A3 aneurysm. After transfer to the authors' institution, digital subtraction angiography (DSA) showed a partially thrombosed, complex wide-necked right A2-A3 junction aneurysm involving the origin of PC and callosomarginal (CM) arteries. The left PC was markedly narrowed due to pressure from the aneurysm. The complex lesion morphology combined with involvement of both PC/CM arteries precluded an endovascular approach and therefore a microsurgical approach with/without bypass was entertained. During surgery it was noted that the A2 entered the aneurysm, and 1 cm away from that entry point, both the right PC/CM arteries originated from the aneurysm. The intraoperative anatomy indicated the necessity for a bypass procedure and it was opted that the STA was of adequate diameter for an interposition graft and anastomosis with the A2. The aneurysm was excised and the STA graft interposed in place. Of note, clip reconstruction was not possible after opening of the aneurysm, as the arterial wall was abnormal. Intraoperative Doppler confirmed patency of the PC/CM arteries post-bypass. Postoperative angiogram demonstrated no aneurysmal remnant and patent bypass graft with good PC/CM flow. Patient was neurologically intact and was discharged at 7 days. At 6 weeks follow-up, patient had made a full recovery with a modified Rankin Scale score of 1, and CTA showed patent STA and good flow in bilateral ACA branches.

**Conclusions:** Resection and interposition grafting for large DACA aneurysms can be part of the surgical options for these patients.

**Reviewer's Comments:** This is an interesting case report reminding us of the importance of innovation and intraoperative versatility when encountering a challenging situation. Also of great importance is thorough preoperative planning. Nonetheless, the authors fail to address the relevance of preoperative balloon test occlusion, in this case to evaluate for collateral flow and adequate perfusion of the anterior cerebral territory in the event of proximal vessel occlusion. However, excision/interposition grafting should certainly be considered as part of the surgical options to treat these lesions. (Reviewer-Ziad A. Hage, MD).
The transglabellar/subcranial approach is effective for treating Kadish B esthesioneuroblastomas.

**Background:** Esthesioneuroblastomas, also known as olfactory neuroblastomas, are rare tumors of the nasal cavities, paranasal sinuses, and the skull base. The optimal management of these prototypical anterior skull base tumors is as yet undefined.

**Objective:** To review outcomes of a consecutive series of patients treated for esthesioneuroblastoma at a single institution.

**Design:** Retrospective chart review.

**Participants:** 15 patients with histologically proven esthesioneuroblastoma identified at the University of Michigan from 1994 to 2006.

**Methods:** All patients were staged using the Kadish grading systems (A = nasal cavity only, B = nasal cavity and paranasal sinus, and C = distant extension, ie, intracranial). Thirteen patients were stage B and 2 were stage C. All patients underwent surgery via the transglabellar/subcranial approach. In this approach, the frontal bone is removed along with the nasal root. Extension into the skull base and the orbital rims is made as necessary. The goal is to limit brain retraction while providing an excellent view of the tumor. Postoperatively, patients were evaluated for radiation therapy (RT). Nine patients were treated with surgery alone, while 5 received surgery and postoperative RT, and 1 received surgery, radiation, and chemotherapy.

**Results:** Mean follow-up was 75 months. All patients were alive at last follow-up. Eleven were known to be disease free, although 8 of these had repeat surgery followed by radiation. One patient was alive with disease and 3 had unknown disease status. Mean time to recurrence was 82 months and this was much more common in the population treated with surgery alone than in the group treated with surgery plus radiation. In the group that received surgery and radiation, the 5- and 15-year disease-free survival was 83%. Surgical complications included cerebrospinal fluid leak, pneumocephalus, and hydrocephalus, all of which were managed successfully.

**Conclusions:** Surgery and postoperative RT seem to offer optimal outcomes currently for esthesioneuroblastoma in which excellent quality of life and long-term survival can be achieved.

**Reviewer's Comments:** This is a useful article highlighting some of the issues with treatment of esthesioneuroblastoma. Esthesioneuroblastoma acts as a low-grade malignancy with recurrence frequently occurring far out from initial treatment. This patient population therefore requires careful follow-up by both neurosurgeon and oncologist. Improvements in adjuvant therapy (chemotherapy) may increase the disease-free survival rate in the future. Nevertheless, with careful surgery and postoperative radiation, the expectation should be for an excellent outcome. (Reviewer-Ethan A. Benardete, MD, PhD).

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Keywords: Esthesioneuroblastoma

Print Tag: Refer to original journal article
Levetiracetam monotherapy appears to be a viable and safe alternative to phenytoin following craniotomy for supratentorial glioma.

**Background:** Seizure is an often dramatic presenting sign leading to diagnosis of gliomas. Seizure treatment in the acute period is often with a parenteral antiepileptic drug (AED) such as phenytoin. However, many AEDs, including phenytoin, have side effects. In addition, due to the metabolism of many AEDs by the liver, there are postsurgical chemotherapy dosing considerations that must account for the presence of AEDs. In fact, several clinical trials have as a randomization risk factor the presence or absence of enzyme-inducing AEDs.

**Objective:** To study the safety and feasibility of switching patients with glioma-related seizures from phenytoin to levetiracetam in the postoperative period.

**Design:** Prospective randomized phase II study.

**Participants:** All participants had a diagnosis of supratentorial glioma with seizures and ≤1 previous resection.

**Methods:** After identifying patients for study, consent forms were obtained. Patients were then randomized to have phenytoin converted to levetiracetam monotherapy in the postoperative period or to remain on phenytoin monotherapy. Patients were followed for 6 months to assess seizure control and to evaluate for side effects.

**Results:** The study was designed to enroll 60 patients; 29 were enrolled over a 13-month period. The seizure-free rate at 6 months was 87% for the levetiracetam arm and 75% for the phenytoin arm. Subjects in the levetiracetam arm reported a lower incidence of side effects, including dizziness, difficulty with coordination, depression, lack of energy or strength, and insomnia. However, there was a higher incidence of mood instability.

**Conclusions:** Levetiracetam monotherapy appears to be safe following craniotomy for supratentorial glioma.

**Reviewer's Comments:** This pilot study addresses an important aspect of patient care--seizure control and the side effects of therapy. Although the study was closed due to patient accrual issues, the authors did an admirable job in the design and implementation of this study. At face value, it does appear that levetiracetam monotherapy may be as effective as phenytoin in the control of glioma-related seizures; however, due to the patient numbers, this conclusion cannot be drawn. The same is true in regard to side effects. The study could have been strengthened with the implementation of quality-of-life questionnaires, since side effects of therapy affect this outcome as well. In my experience, the switch from any enzyme-inducing AED to a non-enzyme-inducing AED such as levetiracetam has been very successful in the management of patients who undergo craniotomy for any intracranial malignancy. It also makes the dosing of adjuvant chemotherapeutic agents more straightforward for our neuro-oncology colleagues. (Reviewer-Kenji Muro, MD).

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Keywords: Anticonvulsants

Print Tag: Refer to original journal article
Use of angiotensin-converting enzyme inhibitors or angiotensin receptor blockers may be effective in preventing aspirin resistance.

Background: In the cardiac literature, the existence of aspirin-resistant nonresponders to therapy has been well documented.

Objective: To evaluate the prevalence and factors associated with aspirin nonresponders who have been premedicated with dual antiplatelet therapy for endovascular surgery.

Participants/Methods: Patients were pretreated with aspirin (325 mg) and clopidogrel (75 mg). A platelet function analyzer-100 test was used to assess aspirin resistance. An entire host of independent factors was analyzed for possible association with aspirin resistance, including age, sex, smoking history, and body mass index as well as other medical comorbidities and medication use. Analysis was carried out using a stepwise logistic model selection.

Results: 81 patients were included in the study. Pathological entities treated included aneurysm coiling (43%), aneurysm coiling with stent assistance (26%), carotid stent and angioplasties (16%), intracranial stent and angioplasties (9%), and extracranial vertebral artery stent and angioplasties (6%). A total of 17 patients (21%) were found to be unresponsive to aspirin therapy. Analysis of possible associated factors identified only the absence of an angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) in the patient's medication regimen to be significant ($P=0.0348$).

Conclusions: In this study, 21% of patients were found to be nonresponders to aspirin. Use of ACE inhibitors or ARBs may be effective in preventing aspirin resistance.

Reviewer's Comments: This study adds to the growing literature regarding the population of patients who are nonresponders to antiplatelet therapy. Such therapy is critically important in preventing complications during and following endovascular procedures. This is particularly true as technological advances continue to bring new products (such as new intracranial stents) into increasing use for intracranial application without adequate knowledge regarding long-term complication rates and the need for concomitant use of antiplatelet agents. Future work must be geared toward garnering a better understanding of which patients may be at increased risk of developing antiplatelet medication resistance. Questions remaining include the possible significance of ACE inhibitors in inducing antiplatelet resistance, as this study seems to imply. It is unclear whether the findings of this study imply that nonresponders are at a higher risk of complications post-procedurally. Still, the study is an important addition to the literature. (Reviewer-Nicholas C. Bambakidis, MD).

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Keywords: Endovascular Neurosurgery

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