Endovascular Tx Is Safe Alternative When IV tPA Is Contraindicated

Safety, Effectiveness, and Practicality of Endovascular Therapy Within the First 3 Hours of Acute Ischemic Stroke Onset.

Mathews MS, Sharma J, et al:

Neurosurgery 2009; 65 (November): 860-865

Endovascular treatment of ischemic stroke within 3 hours of stroke onset in patients in whom IV tissue plasminogen activator is contraindicated or fails is safe, effective, and practical.

Background: Of 795,000 annual strokes in the United States, 85% are ischemic. The Food and Drug Administration approved the use of an IV tissue plasminogen activator (tPA) within 3 hours of stroke onset, and recanalization rates vary between 20% for internal carotid artery (ICA) occlusions and 50% for distal middle cerebral artery (MCA) occlusions. Large-vessel occlusions are associated with high morbidity and mortality rates, and evidence suggests that large proximal clots respond poorly to IV tPA treatment. Nonetheless, endovascular approaches may be used to overcome these constraints. In fact, it is reported that intraarterial chemical thrombolysis achieves higher recanalization rates for large-diameter artery occlusion when compared to IV thrombolysis. However, most endovascular interventions are done after the 3-hour window, and little literature exists regarding endovascular management of acute ischemic stroke (AIS) within 3 hours.
Objective: To assess the safety and efficacy of several endovascular techniques in the management of AIS within the 3-hour window.
Methods: Using a prospectively maintained database, the authors retrospectively reviewed all consecutive patients who underwent endovascular treatment for AIS within 3 hours of stroke onset over an 8-year period at their institution. The decision of whether to initially treat endovascularly or with IV tPA was taken by a multidisciplinary team consisting of endovascular neurosurgeons and stroke neurologists. IV tPA was initiated after a CT was obtained if no contraindications existed. Endovascular approaches were reserved for patients who had failed IV tPA or who had contraindications and were more likely to occur with large-vessel occlusions and/or severe symptoms. Study outcomes were recanalization rate using the TIMI scale score, intracranial hemorrhage (ICH) rate, procedural complications, modified Rankin Scale (mRS) and NIHSS scores at last follow-up, and mortality rate.
Results: The study included 94 patients with a mean age of 68 years and median admission NIHSS score of 15. Mean follow-up period was 10.6 months. Occlusion sites included proximal ICA in 17.0%, ICA terminus in 14.0%, MCA M1 in 39.0%, and vertebrobasilar junction/basilar in 8.5%. Of patients, 95% had near complete to complete vascular occlusion at presentation. Endovascular interventions included intraarterial chemical thrombolysis alone in 15 patients, combined chemical/mechanical thrombolysis in 29, angioplasty in 32, and mechanical thrombectomy with the Merci Retrieval System in 49, with stenting in 36 and with microwire in 31. Mean interval between stroke onset and angiogram catheterization was 72 minutes. Procedural complications included vessel perforation in 3 patients, groin complications in 7, and lower-extremity ischemia in 2. Of patients, 35% had post-procedural ICH. Overall mortality rate was 26.6%. Mean NIHSS at discharge was 6.5, which had improved by 8.0 points. Mean mRS at death or last follow-up was 3.5.
Conclusions: This study demonstrates the safety, effectiveness, and practicality of endovascular treatment of AIS within the 3-hour window in patients in whom IV tPA fails or is contraindicated.
Reviewer's Comments: These results show good outcomes with endovascular treatment of AIS within 3 hours of symptom onset at this high-volume teaching center. Aggressive revascularization is key in light of the high morbidity/mortality rates associated with this disease. Nonetheless, these outcomes may not be reproducible in institutions where resources and technical expertise are lacking. (Reviewer-Ziad A. Hage, MD).

Keywords: Acute Ischemic Stroke, Endovascular Therapy, Recanalization, Revascularization

Print Tag: Refer to original journal article

Canadian C-Spine Rule Safely Reduces Spinal Imaging After Trauma

Implementation of the Canadian C-Spine Rule: Prospective 12 Centre Cluster Randomised Trial.

Stiell IG, Clement CM, et al:

BMJ 2009; 339 (October 29): b4146

Implementation of the Canadian C-Spine Rule can safely reduce diagnostic cervical spine imaging after trauma using relatively simple educational initiatives.

Background: Cervical spine imaging after blunt trauma often shows no injury. The Canadian C-Spine Rule (CCSR) was developed to help clinicians make bedside diagnostic and therapeutic decisions.
Objective: To evaluate the effectiveness of an active strategy to implement the CCSR.
Design: Multicenter, matched pair, cluster randomized trial.
Methods: 6 centers imaged cervical spines after injury by physician choice and 6 centers implemented CCSR, using educational initiatives of pre-study discussion, pocket cards, posters, teaching sessions, distribution of published manuscripts, and mandatory checklist of criteria at time of ordering diagnostic studies. CCSR uses absence of high-risk factors (age ≥65 years, dangerous mechanism of injury, extremity paresthesias), presence of low-risk factors that allow safe assessment of range of motion (simple rear end motor vehicle collision, sitting position in emergency department [ED], patient walking, delayed onset of neck pain, or absence of midline posterior neck tenderness), and ability to rotate neck 45° to defer imaging in patients with a Glasgow Coma Scale score of 15, injured within 48 hours, and not previously evaluated. Outcome measures included proportion or patients receiving diagnostic imaging, number of patients with missed injuries (defined by return ED visits within 30 days and evaluations at tertiary neurosurgical centers), and degree of CCSR implementation. Outcome measures from the consecutive 12 months before implementation were compared to the consecutive 12 months after. Follow-up sustainability of CCSR was assessed for 12 additional months following the study without educational initiatives.
Results: 11,824 patients were evaluated at 12 centers. Imaging decreased over time at implementation centers (61.7% to 53.3%) but increased at control centers (52.8% to 58.9%). There were 236 physicians at implementation centers who complied with CCSR in 85.7% of 1950 patients referred for imaging. No fractures were missed nor did serious adverse outcomes occur. Imaging during the follow-up period was sustained at 53.1% at implementation centers and increased to 61.7% at control centers.
Conclusions: An active strategy to implement CCSR led to a significant decrease in imaging without missed injuries or patient morbidity.
Reviewer's Comments: The CCSR appears to be a reasonable approach to determining which patients require diagnostic imaging of the cervical spine. This study shows that implementation can be accomplished with straightforward, simple educational initiatives. Use of diagnostic imaging was less in both implementation and control centers than the authors had expected (76% in the validation study), likely because 7 (3 implementation and 4 control) of 12 centers participated in a previous validation study of the CCSR. This weakness of the paper supports sustainability of implementation, but this study would have been better if only new centers were included. The results reported here should permit hospitals in the U.S. to consider implementing similar algorithms for cervical spine diagnostic imaging after trauma without fear of patient harm or medicolegal consequences. (Reviewer-N. Scott Litofsky, MD).

Keywords: Cervical Spine Injury, Imaging, Resource Utilization

Print Tag: Refer to original journal article

SRS After Surgery Controls Local Recurrence of Brain Metastases

Adjuvant Gamma Knife Radiosurgery Following Surgical Resection of Brain Metastases: A 9-Year Retrospective Cohort Study.

Hwang SW, Abozed MM, et al:

J Neurooncol 2009; November 12 (): epub ahead of print

Stereotactic radiosurgery can reduce local recurrence after surgical resection of brain metastases.

Background: Survival of patients with brain metastases has been improved with treatment with whole-brain radiation therapy (WBRT) and stereotactic radiosurgery (SRS). Even though WBRT has been standard treatment, recent trends have included local therapies of surgical resection and SRS.
Objective: To determine if survival of patients with brain metastases is adversely affected by deferring WBRT.
Design: Single-institution, retrospective cohort study.
Participants/Methods: Patients received surgical resection of at least 1 brain metastasis between 1999 and 2008. Those with 1 to 3 metastases were treated with gamma knife radiosurgery (GKS) to resection cavity and any residual enhancement using RTOG 90-05 recommendations (15 to 20 Gy at margin) or WBRT. Patients with >3 lesions received WBRT. Recurrence was defined as none, local, or regional (presumably elsewhere in the brain). Number of metastases, age, type of cancer (non–small-cell lung cancer vs others), gender, recurrence status, resection, and treatment were analyzed to identify factors associated with worse prognosis.
Results: 43 patients had surgical resection of brain metastases, 25 followed by GKS (72% women) and 18 by WBRT (28% women). Median survival for the GKS group (15.0 months) was greater than for the WBRT group (6.8 months), although this result did not reach statistical significance. Recurrence rates after GKS were none (14), regional (7), and unknown (4); there were no local recurrences. Recurrence rates after WBRT were none (6), local (3), regional (3), and unknown (6). Number of metastases and presence of regional failure were significantly associated with worse prognosis. Mean number of metastases was similar between GKS and WBRT groups.
Conclusions: Regional recurrence was associated with worse survival. A trend toward longer survival was seen after GKS compared to WBRT.
Reviewer's Comments: The authors were attempting to show that SRS (delivered by GKS) could reasonably control brain metastases if WBRT was deferred until salvage and would not adversely affect survival. Although survival was better in the SRS group, the gender disparity indicates a greater percentage of breast cancer patients (who generally have longer survival than do other cancer groups) in the SRS group. Also, how decisions to use SRS versus WBRT were reached is unclear. Considering the small number of patients and lack of follow-up on some, as well, this study does not add to a discussion of survival effects. Of major importance, however, is that the study indicates that SRS can reduce local recurrence. How to control regional recurrence, shown here to adversely affect survival, is not discussed. Concerns regarding neurological consequences after WBRT beg the question of optimizing adjuvant therapies to control brain disease and minimize adverse side effects. Further study will hopefully support treatment plans that include SRS after surgery and defer WBRT for regional recurrence or other salvage therapy. (Reviewer-N. Scott Litofsky, MD).

Keywords: Gamma Knife, Radiosurgery, Brain Metastases, Brain Neoplasms, Craniotomy

Print Tag: Refer to original journal article

Quality of Spine Literature -- Has It Improved?

The Quality of Quality of Life Publications in the Spinal Literature: Are We Getting Any Better?

Street J, Lenehan B, Fisher C:

J Neurosurg: Spine 2009; 11 (November): 512-517

The quality of published papers in the spine literature addressing quality-of-life outcomes has improved from 2000 to 2004.

Objective: To determine if the quality of spinal literature dealing with quality-of-life (QOL) outcomes has improved.
Design: Systematic retrospective review of the literature.
Methods: All abstracts from published manuscripts reporting QOL outcomes in 5 leading spinal journals from 2000-2004 were examined. Each paper was scored according to the criteria of Velanovich and Gill and Feinstein. Changes in the quality of manuscripts over time were assessed.
Results: During the study period, 2544 abstracts were identified and reviewed. Of these, 599 were deemed suitable for analysis because they reported QOL outcomes from spinal conditions or interventions. During the study period, the number of articles increased by 36%, and the number of QOL articles increased by 102%. There was a statistically significant improvement in the quality of QOL papers according to the criteria of Velanovich. There was no improvement in quality over the study period using the criteria of Gill and Feinstein. Disease-specific outcomes measures were used in 27% of papers in 2000, and this percentage increased to 43% by 2004. Only 53% of studies used appropriate statistical analysis in 2000, while nearly 100% of published manuscripts included an appropriate analysis by 2004.
Conclusions: The quality of published papers in the spine literature addressing QOL outcomes has improved from 2000 to 2004.
Reviewer's Comments: The authors should be congratulated for performing a systematic review of the literature to address the issue of the quality of clinical studies that report QOL outcomes. They demonstrate, using rigorous criteria, that more papers are using statistical analysis and more papers are using disease-specific measures. Using 2 different sets of criteria, one demonstrated improvement in quality while the other did not. As with any good study, this one raises far more questions than it answers. The real question is whether better clinical research results in improvement of clinical outcomes. Estimating the impact of clinical literature that addresses QOL outcomes is difficult. Issues surrounding cost, reimbursement, and patient preference are all significant variables in clinical decision-making. Another question important for those interested in comparative outcomes research is whether standardization of clinical outcomes measures is necessary before we can perform meaningful comparisons between studies. These types of issues were not addressed in the current study. The Gill and Feinstein criteria place emphasis on a patient's global rating for their QOL and whether patient-specific factors were incorporated into the final analysis. This approach aims to make the results of QOL studies more meaningful clinically. Establishing minimally important differences for disease-specific measures, as well as health-related QOL measures, will ultimately guide the design of future studies and augment the impact of the results. (Reviewer-Zoher Ghogawala, MD).

Keywords: Quality-of-Life Publications, Spinal Literature, Quality

Print Tag: Refer to original journal article

Spectral Analysis of BP, ICP Curves Can Predict Outcome

A New Index Derived From the Cerebrovascular Pressure Transmission and Correlated With Consciousness Recovery in Severely Head-Injured Intensive Care Patients.

Roustan JP, Neveu D, et al:

Anesth Analg 2009; 109 (December): 1883-1891

Spectral analysis of blood pressure and intracranial pressure relationships may help modulate therapeutic decision making for patients with severe traumatic brain injury in the future.

Background: Therapeutic decisions for moderate elevations of intracranial pressure (ICP) are uncertain. Relationships between spectral analysis of cerebrovascular transmission applied to ICP curves and outcome have not been determined.
Objective: To determine new parameters with physiological meaning derived from spectral analysis and transfer function of blood pressure (BP) and ICP signals, and to relate these to consciousness recovery.
Design: Single-institution prospective cohort study.
Methods: ICP was monitored on all trauma patients with a Glasgow Coma Scale (GCS) score of ≤8 by parenchymal transducer. BP was monitored by radial artery catheter. Patient treatment included sedation and mechanical ventilation (pCO_2 35 to 40 mm Hg) in which inspiratory and expiratory phases were equal. Cerebral perfusion pressure (CPP) was maintained at ≥70 mm Hg, and ICP was ≤25 mm Hg with increased sedation (thiopental, mannitol, and norepinephrine). Spectral analysis was performed on BP-ICP harmonics by calculating amplitude gain and phase, differences in cardiac distortion, and function of coherence (measuring the linearity of the relationship). Cardiac gain (Gc) and respiratory gain (Gr) were expressed as the ratio of Gr/Gc. Data were correlated with the Glasgow Outcome Scale (GOS), in which scores of 3, 4, and 5 were grouped as consciousness recovery (+), and scores of 1 and 2 were grouped as consciousness non-recovery (–).
Results: 20 consciousness (+) patients and 9 consciousness (–) patients (8 of whom died) had statistically similar characteristics except for increased cerebral swelling on CT scan and hypernatremia in consciousness (–) patients. Of consciousness (+) patients, 75% had a GCS >5, and 25% had focal injuries compared to 44% of consciousness (–) patients with a GCS >5 and 0% with focal injuries (differences not statistically significant). A total of 9393 spectral waveforms for BP and ICP were analyzed. Consciousness (+) patients had lower ICP, higher CPP, a higher mean Gr/Gc ratio, and a lower mean Gc. No patients with a Gr/Gc ratio ≥4 failed to regain consciousness.
Conclusions: Severe traumatic brain injury (TBI) patients with a Gr/Gc ratio ≥4 regain consciousness. A reduction in Gr/Gc ratio may signify worsening intracranial hemodynamic conditions before sustained ICP occurs.
Reviewer's Comments: Optimizing the care of patients with severe TBI is important and necessary. Spectral analysis of BP and ICP may eventually be helpful in making therapeutic decisions. This paper has some difficulties that limit its usefulness. The group of patients analyzed may not have been statistically different because of small numbers, but differences in presenting GCS and a focal nature of injuries suggest some potentially important differences. The majority of patients who did not regain consciousness died; the authors did not indicate if the cause of death was herniation or other causes. Maintaining a CPP ≥70 mm Hg is no longer standard of care based on the American Association of Neurological Surgeons and the Congress of Neurological Surgeons guidelines. Lastly, determining the Gr/Gc ratio is not easily accomplished at the bedside, limiting implementation of the index in a widespread manner. (Reviewer-N. Scott Litofsky, MD).

Keywords: Severe Traumatic Brain Injury, Cerebrovascular Pressure Transmission, Index, Consciousness, Elevated Intracranial Pressure, Spectral Analysis

Print Tag: Refer to original journal article

SRS Valuable in Managing Pilocytic Astrocytoma

Stereotactic Radiosurgery for Pilocytic Astrocytomas Part 1: Outcomes in Adult Patients.

Kano H, Kondziolka D, et al:

J Neurooncol 2009; 95 (November): 211-218

Stereotactic radiosurgery for pilocytic astrocytomas in adults is best after maximal resection.

Background: Pilocytic astrocytomas, although benign and World Health Organization grade 1, represent treatment challenges. Curative resection cannot always be accomplished, partly because of the location of the astrocytoma in surgically sensitive areas.
Objective: To assess the role of gamma knife stereotactic radiosurgery (SRS) in the management of pilocytic tumors in adults.
Participants/Methods: 14 adults undergoing radiosurgery at the University of Pittsburgh between 1994 and 2006 were evaluated. Median patient age was 32.3 years. Median tumor volume was 4.7 cc with a median prescription dose of 13.3 Gy to the 50% isodose. Median imaging time in follow-up was 36.3 months with a minimum of 6 months.
Results: 11 patients were alive at the median follow-up. Seven of 14 patients developed some form of tumor progression at a median of 18.6 months after SRS. The best response to SRS (>50% reduction in volume) occurred in 1 solid tumor and 3 cystic tumors, with overall survival rates at 5, 10, and 15 years of 100%, 62.3%, and 41.6%, respectively. The progression-free survival rates after SRS for the entire series at 1, 3, and 5 years were 83.9%, 31.5%, and 31.5%, respectively. Total survival rates after SRS at 1, 3, and 5 years were 100%, 88.9%, and 88.9%, respectively. Patients with prior surgical resection had 1- and 3-year progression-free survival rates of 90% and 38.6%, respectively. In univariate analysis, patients with previous surgical resection had significantly better progression-free survival, which was true for no other variables. No patient developed an adverse effect to radiation.
Conclusions: This radiosurgery series is weighted toward inaccessible tumors such as those in the brainstem. Prior surgical resection followed by radiotherapy was significantly associated with a longer interval for tumor recurrence. The best candidates for SRS are those with progression of circumscribed tumor in deep areas of the brain. Delayed cyst progression reduced the long-term tumor control in patients receiving SRS.
Reviewer's Comments: This paper presents valuable information for decision-making, although the total patient numbers are not large. These tumors often require multi-modality treatments, and radiosurgery seems to be quite justified and useful as part of those treatments. (Reviewer-Paul L. Penar, MD).

Keywords: Stereotactic Radiosurgery, Pilocytic Astrocytoma, Brain Tumor, Gamma Knife

Print Tag: Refer to original journal article

Is SRS Effective for Children With Pilocytic Astrocytoma?

Stereotactic Radiosurgery for Pilocytic Astrocytomas Part 2: Outcomes in Pediatric Patients.

Kano H, Niranjan A, et al:

J Neurooncol 2009; 95 (November): 219-229

Radiosurgery should be considered when resection is not feasible in children, especially for solid pilocytic astrocytomas or for early recurrence.

Background: Juvenile pilocytic astrocytomas are low-grade tumors that can be life-threatening. Surgical resection represents the optimal treatment, as fractionated radiosurgery and chemotherapy are not curative. Radiosurgery has the potential to minimize side effects of radiation on the developing brain.
Objective: To evaluate the role of stereotactic radiosurgery (SRS) in the treatment of pilocytic astrocytomas in children.
Methods: A total of 50 pediatric cases were described. The median age was 10.5 years, and patients were treated at the University of Pittsburgh by gamma knife radiosurgery between 1987 and 2006. Tumor locations were most commonly in the cerebellum and brainstem. Eleven patients were newly diagnosed, with the other patients having had prior treatment. Median tumor volume was 2.1 cc, and patients were treated with a median dose of 14.5 Gy prescribed to the 50% isodose. Follow-up was a median of 55.5 months with a minimum of 6 months.
Results: Complete resolution after radiosurgery was seen in 5 of 31 solid tumors (16%), and a >50% reduction in volume was seen in 14 of 31 solid tumors (45%) and 7 cystic tumors (37%). Ten of 31 solid tumors and 2 of 19 cystic tumors were unchanged after radiosurgery. Median survival rates after radiosurgery for the entire series at 1, 5, and 10 years were 100%, 97.4%, and 97.4%, respectively. Progression-free survival (PFS) rates at 1, 3, and 5 years were 91.7%, 82.8%, and 70.8%, respectively. Tumor control in this series was achieved in 76% of patients. Delayed SRS for recurrent tumor after initial or subtotal resection was significantly associated with poorer PFS, as was brainstem involvement. Patients with solid tumors also had better PFS, as did those with a target volume of <8 cc. In those who had solid tumors and had recurrence after total surgical removal or residual tumor after incomplete removal, the 10-year PFS rate was 100%.
Conclusions: Late juvenile pilocytic astrocytoma recurrence should be considered for resection if possible, and SRS is best used when re-resection is not feasible or for an early recurrence. It is less effective with cystic than with tumor growth. Early SRS is associated with better PFS and may avoid the effects of radiation on cognition and higher cortical function.
Reviewer's Comments: This work adds significantly to our knowledge of the role of radiosurgery in the treatment of pilocytic astrocytoma. Although the issue of cognitive-sparing radiation is not specifically addressed, there is a clear recommendation for early SRS for incompletely or unresected lesions and good definition of factors associated with better outcomes. (Reviewer-Paul L. Penar, MD).

Keywords: Stereotactic Radiosurgery, Pilocytic Astrocytoma, Brain Tumor, Gamma Knife, Pediatrics

Print Tag: Refer to original journal article

AED Use After ICH -- Is It Safe?

Anticonvulsant Use and Outcomes After Intracerebral Hemorrhage.

Naidech AM, Garg RK, et al:

Stroke 2009; 40 (December): 3810-3815

Phenytoin is associated with more fever and worse outcomes following intracerebral hemorrhage.

Background: Intracerebral hemorrhage (ICH) is associated with high morbidity and mortality. One aspect is antiepileptic drug (AED) use for seizure prophylaxis. However, data on AED use after ICH are lacking. Factors favoring seizure prophylaxis after ICH include a high risk of early seizures, a bad impact of seizures on blood pressure and intracranial pressure, and proven benefit of phenytoin in early seizure prevention after traumatic brain injury. However, longer duration of phenytoin prophylaxis is correlated with worse cognitive and functional outcomes and more side effects after subarachnoid hemorrhage. Seizure prevention does not necessarily result in improved outcomes, as the association between seizure and poor outcomes may not be true. Moreover, AED use, particularly phenytoin, might be correlated with fever, which, in turn, is associated with worse outcomes after ICH.
Objective: To evaluate the hypothesis that AED use is correlated with more fever and worse functional outcomes after ICH.
Participants/Methods: Consecutive patients with ICH were prospectively enrolled. Excluded were ICHs from trauma, ruptured aneurysms, ruptured arteriovenous malformations, vasculitis, and other lesions. Information about baseline status, demographics, hospital course, and follow-up was prospectively recorded. The National Institutes of Health Stroke Scale (NIHSS) and Glasgow Coma Scale scores were recorded on admission. Outcomes were measured at 14 days or discharge (whichever occurred first) and at 28 days and 3 months of follow-up. Poor outcome was defined as an mRS of 4 to 6. Core temperature ≥100.4°F was prospectively recorded from day 0 to day 13 and was considered a "febrile day." Ventilator-free days were prospectively recorded from day 0 to day 13. The occurrence of pneumonia, bacteremia, ventriculitis, deep venous thrombosis, pulmonary embolus, or external ventricular drain insertion was documented. Therapeutic/prophylactic AED use, dose, and length of treatment were recorded, as were phenytoin levels, occurrence dates of clinical seizures, and EEG data.
Results: 98 patients were included; 22% received phenytoin prophylaxis, 12% received levetiracetam prophylaxis, 6% received both, and 59% received neither drug. Other AEDs were rarely used. Seizures were significantly correlated with greater total phenytoin administration, longer phenytoin use, and higher mean free phenytoin level. This was not the case for levetiracetam. Of patients, 43% underwent EEG monitoring. Clinical seizures occurred in 7 patients, 5 of which happened on the day of ICH. Phenytoin and levetiracetam did not reduce the seizure risk. The number of febrile days was significantly correlated with longer phenytoin use and total dose, and with worse NIHSS at 14 days. A trend toward fewer ventilator-free days was noted with prophylactic phenytoin. Three phenytoin-related complications were noted: rash, hypotension, and fever. Phenytoin prophylaxis was significantly correlated with worse NIHSS at 14 days after discharge. No association was noted between seizures and outcomes. Levetiracetam was unrelated to outcomes.
Conclusions: Phenytoin is correlated with more fever and worse outcomes following ICH.
Reviewer's Comments: There is a need to identify patient populations that would benefit the most from AED therapy in the setting of ICH, minimizing unnecessary AED use. Further research is needed to determine ICH patient groups at high risk for seizures and to develop group-specific AED treatment paradigms. (Reviewer-Ziad A. Hage, MD).

Keywords: Anticonvulsants, Intracerebral Hemorrhage, Outcomes; Seizures, Neurocritical Care

Print Tag: Refer to original journal article

Free-Hand EVD Placement Is Inaccurate Procedure

External Ventricular Drain Insertion Accuracy: Is There a Need for Change in Practice?

Toma AK, Camp S, et al:

Neurosurgery 2009; 65 (December): 1197-1201

Free-hand external ventricular drain (EVD) placement is inaccurate, and further research is warranted to evaluate the impact of image guidance on EVD insertion.

Background: External ventricular drain (EVD) placement is a commonly used emergency lifesaving procedure to measure and alleviate high intracranial pressure. EVD insertion is usually performed using a free-hand technique that uses surface landmarks to direct the ventricular catheter as close to the ipsilateral foramen of Monro as possible, through a burr hole. In the published literature, most studies report on EVD-related complications.
Objective: To assess the accuracy of EVD insertion.
Methods: Over a 2-year period, all EVD placement procedures performed at the authors' institution were assessed, and data about patient age, diagnosis, surgeon seniority, number of EVDs, and mortality were recorded. Head CTs were reviewed by the first author and the preoperative Evan's index, calculated by dividing the maximal frontal horn ventricular width over the transverse inner diameter of the skull at the same scan image, was determined. Catheter tip location was stratified into the following categories: (1) ipsilateral frontal horn; (2) other cerebrospinal fluid (CSF) spaces, namely, third ventricle/body of lateral ventricle/contralateral frontal horn/subarachnoid cisterns; and (3) intraparenchymal. EVD length was estimated on scout CT images and measured from catheter tip to inner bone table at the burr hole. EVD insertions were all performed in the operating room under general anesthesia. Postoperative CT was performed on a clinical need basis. Functioning EVDs in an unwanted location were left in place as long as they were draining.
Results: 234 EVD insertions were included. Mean patient age was 52.9 years. Of 161patients, 69.5% had a single procedure and 30.5% had ≥1 revision/reinsertion. Overall, 61.0% of procedures were on the right, 21.8% on the left, and 6.0% were bilateral; 11.0% were performed by senior surgeons and 89.0% by trainees. Mean preoperative Evan's index was 0.32. Post-EVD CT scan was available in 76% of procedures. Of the latter, 39.9% of catheter tips were in the ipsilateral frontal horn, 19.1% in the third ventricle, 18.0% in the body of the lateral ventricle, 10.4% in the subarachnoid space, 2.7% in the contralateral frontal horn, and 9.8% were intraparenchymal. Mean estimated EVD length was 66 mm. Mean length of EVDs with tip in the ipsilateral frontal horn was 59.2 mm. For catheter tips in other CSF spaces, mean EVD length was 70.2 mm and for intraparenchymal tip, 75.4 mm. With a preoperative Evan's index <0.3, 34.1% of catheter tips were in the ipsilateral frontal horn as compared to 66.7% when Evan's index >0.4. This difference was statistically significant. In total, 25% of patients with catheter tips in the correct location needed EVD revision/reinsertion versus 40% with catheter tips in undesired locations.
Conclusions: Free-hand EVD placement is inaccurate and further research is warranted to evaluate the impact of image guidance on EVD insertion.
Reviewer's Comments: As noted herein, EVD insertion using surface landmarks is of limited accuracy and can be affected by several confounding variables, including ventricle shape and size as well as operator experience. Image guidance may improve EVD insertion accuracy. Other ways of improving accuracy might be through the use of computer simulators to enhance operator learning curve. Studies to assess the impact of these methods are warranted. (Reviewer-Ziad A. Hage, MD).

Keywords: Acute Hydrocephalus, External Ventricular Drain, Ventriculostomy

Print Tag: Refer to original journal article

Adult Pilocytic Astrocytomas May Be More Aggressive Than Pediatric Tumors

Rapid Recurrence and Malignant Transformation of Pilocytic Astrocytoma in Adult Patients.

Ellis JA, Waziri A, et al:

J Neurooncol 2009; 95 (December): 377-382

Radiation therapy has been linked to malignant transformation in pilocytic astrocytoma.

Background: Pilocytic astrocytomas are classified by the World Health Organization (WHO) as grade I tumors and are considered benign. In a number of clinical series, the recurrence rate is <10% following surgery and malignant transformation occurs in 0%. Most of these series include a majority of pediatric patients.
Objective: To clarify the clinical presentation and prognosis of adult patients with pilocytic astrocytomas.
Design: Retrospective chart review.
Participants: Adult patients who presented for initial treatment of their pilocytic astrocytomas at the Department of Neurological Surgery at the Columbia University Medical Center in New York.
Methods: 20 patients were identified who were treated from 1995 to 2005. Diagnosis was established after surgical resection of the tumor based on histology using WHO criteria. Radiographic imaging was reviewed as well as inpatient and outpatient charts. Symptomatic recurrences were treated with surgery. Radiographic recurrences that were not symptomatic were treated with radiation. If they then became symptomatic, re-resection was performed.
Interventions: Gross total resection was performed in 15 of 20 patients. The other 5 patients had subtotal resections limited because of proximity to brainstem or hypothalamus. Six patients had recurrences or tumor progression during the study period. Five were given local radiation therapy, either Gamma knife or fractionated radiotherapy.
Results: 6 patients had recurrence or tumor progression. One patient was symptomatic at time of recurrence and underwent surgery; the other 5 had radiation therapy. Three of these patients progressed despite radiation and underwent surgery. The pathology of these recurrent tumors was found to be anaplastic astrocytoma using standard criteria.
Conclusions: Adult pilocytic astrocytomas may behave more aggressively than pediatric tumors. Radiation therapy may be associated with a higher risk of malignant progression.
Reviewer's Comments: This is an interesting study. Although there is a higher risk of malignant progression in adult pilocytic astrocytomas as opposed to pediatric tumors, the majority of patients still did well. The data suggest an association between radiation therapy and malignant transformation of these tumors. It is clear that there are not enough patients in this study to draw any firm conclusions. A larger, multicenter study would be very helpful. In addition, radiation therapy should be used reluctantly for pilocytic astrocytomas. Surgery should be the treatment of choice. (Reviewer-Ethan A. Benardete, MD, PhD).

Keywords: Pilocytic Astrocytoma, Glioma, Benign, Malignant, Brain Tumor, WHO Grade I

Print Tag: Refer to original journal article

Swiss Recommendations on Hemicraniectomy for Stroke

Decompressive Craniectomy for Space Occupying Hemispheric and Cerebellar Ischemic Strokes: Swiss Recommendations.

Michel P, Arnold M, et al:

Int J Stroke 2009; 4 (June): 218-223

These recommendations were approved by the Swiss Neurological Society, the Swiss Society of Neurosurgery, and the Swiss Society of Intensive Care Medicine.

Background: Space-occupying ischemic strokes in the middle cerebral artery (MCA) territory have a high case fatality. Results of several observational studies show a beneficial effect of craniectomy in a selected group of patients. The same applies to space-occupying ischemic strokes in the posterior fossa.
Objective: The authors published these recommendations with the goal of unifying the acute management of patients with space-occupying ischemic stroke. They set out to avoid performing craniectomy in patients with poor prognosis or if the risk of worsening and herniation is small; to decide on craniectomy at an early stage; to improve communication between doctors, patients, and relatives; and to use adequate neurosurgical techniques and perioperative management. **Methodology:** A work group of stroke neurologists and neurosurgeons reviewed the current published literature and guidelines, then drafted these recommendations, which were approved by the 'Guidelines Commission' of the Swiss Society of Intensive Care Medicine.
General Recommendations: The patient's will should be documented and taken into account. Close neurological and cardiovascular monitoring should occur in an intermediate or intensive care stroke unit for up to 5 days. The following actions should be taken: ensure sufficient cerebral oxygenation, treat hyperthermia, correct hypovolemia with isotonic fluids, avoid oral intake of food and fluids, elevate the upper part of the body between 0 and 30°, and treat hyperglycemia. Antiplatelet therapy should be avoided if craniectomy is likely, though it is not an absolute contraindication. Headache, nausea, and vomiting should be addressed and mechanical and pharmacological thromboembolic prophylaxis should be initiated. **Nonindicated Measures:** Administration of corticosteroids, hypotonic fluids, or sedatives is not indicated. Controlled hyperventilation and/or administration of osmotic therapy are of little value if a decision against a craniectomy has already been made. Preoperative invasive intracranial pressure (ICP) monitoring is also not routinely recommended. The authors specified the indications and contraindications for decompressive craniectomy in the setting of an MCA versus a cerebellar infarction. They also specified the surgical technique that should be adopted. In case of decompressive craniectomy, the decision and surgery should be carried out as soon as possible. In the meantime, placement of a central venous catheter and an arterial catheter, profound sedation, analgesia, intubation, and controlled mechanical ventilation with a target $PaCO_2$ of 35 mm Hg, and osmotherapy with mannitol or hypertonic saline should be initiated. In case of decision against decompressive craniectomy, apply general measures but abstain from sedation, intubation, and controlled ventilation.
Reviewer's Comments: For postoperative management at the ICU, general intensive care concepts for treatment of acute ischemic stroke in collaboration with a stroke specialist should be applied as well as monitoring and treatment of ICP and cerebral perfusion pressure. Pharmacologic thromboembolic prophylaxis should be restarted on the second postoperative day. After the critical period, focus should be on waking up the patient, extubation, and mobilization. Early rehabilitation should be initiated as soon as possible in the ICU. (Reviewer-Joseph Adel, MD).

Keywords: Decompressive Craniectomy, Stroke, Guidelines

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