Neurostimulation of GPi in Dystonia-Choreoathetosis—New Trial Is Encouraging

Bilateral Pallidal Deep Brain Stimulation for the Treatment of Patients With Dystonia-Choreoathetosis Cerebral Palsy: A Prospective Pilot Study.

Vidalhité M, Yelnik J, et al:

Lancet Neurol 2009; 8 (August): 709-717

Significant improvement of dystonia-choreoathetosis is highly dependent on the accuracy of placement of the DBS electrodes in the posterolateroventral globus pallidus internus.

Background/Objective: Dystonia-choreoathetosis is highly resistant to medical treatment and is associated with major disability in patients with normal intelligence. Since deep brain simulation (DBS) has been shown to improve movement disorder in patients with dystonia, will it be equally useful in dystonia-choreoathetosis?

Design: Prospective, multicenter, open-label study.

Participants/Methods: 13 adults with established dystonia combined with chorea and/or athetosis were recruited. None of the patients had any cognitive impairment (as determined by the mini-mental state examination) or psychiatric disorders (according to the Beck inventory scale). The etiology of the movement disorder was neonatal, hypoxic, or ischemic encephalopathy. Stereotaxic placement of electrodes, one in each posterolateroventral globus pallidus internus (GPI), was based on MRI and, in some centers, was combined with perioperative recordings.

Results: On average, 24% improvement was reported with large interpatient variability. The greatest improvement was an increase in well-being; there was also a decrease in body pain and an increase in quality of life. Four patients had an improvement of their disability score of ≥40%. One patient had fewer benefits from stimulation 1 year after implantation for no clear reasons. In 4 patients, either no improvement from the stimulation was seen or the dystonia worsened.

Conclusions: Significant improvement can be expected in >50% of DBS-treated dystonia-choreoathetosis patients. This improvement was more obvious on the self-rating of the effect of stimulation than on objective measures.

Reviewer's Comments: Given the severity and the intractability of the motor disorder afflicting these patients, the results of this preliminary study are encouraging. In view of the fact that DBS for dystonia has shown consistent results, a larger trial is warranted for dystonia-choreoathetosis. The sample of patients in the present study is too small to conclude that DBS is a useful procedure for these patients. The degree of improvement between individuals varied so much that one could ask whether, in some cases, the poor outcome could have been predicted. Hopefully, the parameters associated with a positive or negative outcome will be clarified after a larger study is performed. (Reviewer-Luc Jasmin, MD).

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Keywords: Movement Disorder, Dystonia, Chorea, Cerebral Palsy, Globus Pallidus, Deep Brain Stimulation

Print Tag: Refer to original journal article
The leisure use of glue may increase the risk of malignant primary brain tumor development.

**Background:** Environmental and occupational factors (such as exposures to pesticides, metals, polycyclic aromatic hydrocarbons, solvents, ionizing radiation, and electromagnetic fields) may play a role in the increasing incidence of malignant primary brain tumors.

**Objective:** To evaluate correlations between the occurrence of malignant primary brain tumors and carcinogenic chemical exposures.

**Design:** Prospective single-institution case-control study.

**Participants/Methods:** Case patients aged >18 years with previously untreated World Health Organization Grade II to IV glioma diagnosed during 2005 were matched to a control group of non-cancer neurosurgery patients for age (within 5 years) and gender. Both groups of patients were interviewed by an occupational physician with the same questionnaire. Occupational and leisure exposures to chemicals and radiation (cell phones, computers, ionizing medical radiation, and electromagnetic fields) were quantified into low, moderate, and high exposures. Residential setting was also assessed. Exposure odds ratios and 95% confidence intervals were used to determine risk factors associated with the development of malignant primary brain tumor.

**Results:** Data on 122 (116 complete, 6 incomplete) of 162 eligible glioma patients were compared to that of 122 controls. Mean age was 57 years (range, 20.4 to 86.3 years). Occupation categories were not associated with an increased risk of tumor. Moderate occupational chemical exposure was associated with lower tumor development risk. A significant risk of developing malignant primary brain tumor was associated with leisure glue exposure, and a decreased risk was associated with natural fertilizer. No radiation source was associated with increased risk; cell phone tower exposure was associated with a decreased risk.

**Conclusions:** Occupational chemical and environmental exposures do not appear to be related to increased risk of developing malignant primary brain tumors. Glue use during leisure activities was linked to tumor development. Further studies will be required to evaluate exposure risks more completely.

**Reviewer's Comments:** We are frequently asked questions by patients and/or families related to why the patient developed a brain tumor. They want to know if an exposure at work or some habit may have contributed to the development of the glioma. In this relatively small epidemiological study, no occupational, leisure, or environmental factor was significantly associated with development of malignant primary brain tumor other than leisure glue exposure. The study does not indicate whether glue exposure was as recreational drug use or in concert with model-building, woodworking, or other more socially acceptable glue utilizations. The study does suggest the importance of appropriate ventilation and other occupational safeguards, even during leisure activities. One weakness of this paper is that, although patient enrollment was prospective, risk assessment was retrospectively based on patient memory—patients, particularly those with brain tumors, could have forgotten their previous exposures. Another weakness is that quantification of exposure was based on patient estimation. The bottom line is that we still do not have a good answer to our patients' questions about the etiology of their tumors. (Reviewer-N. Scott Litofsky, MD).
DVT Common After Head Injury

Incidence and Risk Factors for Deep Venous Thrombosis After Moderate and Severe Brain Injury.
Ekeh AP, Dominguez KM, et al:

J Trauma 2009; December 4 (): epub ahead of print

Deep venous thrombosis occurs in one third of patients with TBI with a hospital stay of ≥7 days.

**Background:** Patients with head injury after trauma who are at risk for deep venous thrombosis (DVT) present unique challenges because of the hesitancy to use anticoagulant prophylaxis due to the risk of intracranial hemorrhage.

**Objective:** To determine the incidence of DVT in patients with head injury and to identify unique risk factors for the development of DVT in this population.

**Design:** Single-institution retrospective chart review.

**Methods:** Charts of patients aged ≥18 years with head injuries requiring hospitalization for ≥7 days from 2000 to 2006 were reviewed. Sequential compression devices were used for DVT prophylaxis. Venous duplex ultrasound for DVT screening was performed weekly, beginning at day 7 to 10, or when clinical evidence for DVT was present. Patients with isolated head injury were compared to those with extracranial injuries in addition to head injury.

**Results:** 677 of 939 brain-injured patients (72%) had duplex DVT screening and were subsequently evaluated. Of the 262 patients excluded, 85% were discharged within 14 days; Of the patients included in the analysis, 31.6% developed DVT. DVT was associated with increased intensive care unit stay (18.1 days vs 10.2 days without DVT). Independent predictors of DVT were male gender, age >55 years, Injury Severity Score (ISS) ≥15, subarachnoid hemorrhage on head CT, and lower extremity injury; 84.2% of DVT cases occurred in the lower extremity. Proximal progression of DVT occurred in 18.4% of patients. Of 217 patients with isolated head injuries (32.1% of total), only 25.8% developed DVT compared to 34.3% of the 460 patients with combined head/extracranial injuries. Pulmonary embolism was more likely in combined head/extracranial injuries (3.69%) than in isolated head injuries (0.92%).

**Conclusions:** DVT occurs in one third of patients with brain injuries with a hospital stay ≥7 days. It is less common in patients with isolated head injury than in those with concomitant extracranial injury. Inferior vena cava filters (IVCF) should be considered in those with high-risk factors.

**Reviewer's Comments:** This paper confirms the perception that DVT is very common in head-injured patients despite mechanical prophylaxis with sequential leg compression devices. The use of screening helps establish the high incidence of DVT. Unfortunately, the authors do not indicate what percentage of patients had clinical evidence of DVT compared to those diagnosed on screening; this information would be helpful for centers that do not routinely screen patients. Identification of high-risk patients can help direct resource utilization with regard to screening. The authors provide no support for their conclusion that IVCF should be used in high-risk patients. An alternative being used in some centers is chemoprophylaxis with low-molecular-weight heparin in patients with stable head CT under strict monitoring protocols. With additional study, perhaps we will derive reasonable solutions for the vexing problem of DVT after traumatic brain injury. (Reviewer-N. Scott Litofsky, MD).

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Keywords: Brain Injury, Deep Venous Thrombosis, Incidence, Risk Factors, Prophylaxis

Print Tag: Refer to original journal article
Despite extensive research, there remains no completely reliable way to distinguish radiation necrosis from recurrent tumor by imaging alone.

**Background/Objective:** The problem of differentiating radiation necrosis from recurrent primary tumor is a difficult one, and this is crucial to the practice of neuro-oncology. The authors present a literature review of this topic, focusing on imaging techniques.

**Methods:** The authors reviewed the literature on imaging modalities and classified the evidence as ranging from level I (a blind cohort study) to level V (expert opinion).

**Results:** Standard MRI, diffusion-weighted imaging (DWI), and diffusion tensor imaging were considered. A handful of studies seemed to suggest that radiation necrosis has more heterogeneity on DWI, larger maximum apparent diffusion coefficient (ADC) values, and higher ADC ratios. Standard MRI may have sensitivity and specificity of only about 70%. MR perfusion imaging studies show that cerebral blood volume is greater with tumor, but there is a significant area of overlapping values with radiation necrosis. MR spectroscopy studies generally show a higher choline-to-creatine ratio corresponding with recurrence, but some studies suffered from a lack of pathological verification. The choline-to-N-acetyl aspartate ratio is higher with recurrent tumor. Single photon emission computed tomography is a measure of metabolic activity. Various radiotracers have achieved a sensitivity of 90% and a specificity approaching 100%. PET with F18 fluorodeoxyglucose seems to have low sensitivity and specificity, but thallium 201 is associated with a sensitivity of 92%.

**Conclusions:** A completely reliable imaging distinction between post-treatment radiation necrosis and recurrent tumor remains elusive. Current studies suffer from lack of histopathology or description of methodology. Multivoxel MR spectroscopy and PET with newer radiotracers show promise.

**Reviewer's Comments:** This paper summarizes the difficulty in using imaging alone to distinguish radiation necrosis from recurrent tumor. Unfortunately, a realistic view of the data leaves us with the conclusion that there is still no completely reliable way to make this distinction a part of standard practice. The point about histological verification is crucial. Of course, on a biopsy of such a lesion, the histopathology may contain a majority of radiation necrosis but still contain some islands of tumor cells, confounding the diagnosis. Perhaps some of the uncertain conclusions of these imaging studies are due to variability in the nature of these lesions. (Reviewer-Paul L. Penar, MD).

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Keywords: Glioma, Radiation Necrosis, MRI, Diffusion, Perfusion, Spectroscopy, SPECT, PET

Print Tag: Refer to original journal article
Neurosurgical Treatment of Pregnant Women--Is It Safe?


Cohen-Gadol AA, Friedman JA, et al:

J Neurosurg 2009; 111 (December): 1150-1157

Surgery for intracranial lesions in pregnant women is well tolerated by mother and fetus.

Objective: This article is an attempt to add to the scant literature available regarding the neurosurgical treatment of pregnant women. Optimal management strategies for these patients are not well defined. Methods: The authors reviewed the records of 34 patients presenting over a 36-year period with a variety of pathological disorders at multiple institutions. Of these patients, 14 presented with neoplasms and 12 presented with vascular lesions. Hemorrhages were seen in 6 patients, while 2 patients had hydrocephalus. Records were reviewed to reflect patient and fetus outcomes.

Results: >50% of the patients in this series underwent surgical intervention. Of these, 74% underwent craniotomies for primary treatment of the underlying lesion, 10% underwent biopsy, and 16% were treated with cerebrospinal fluid shunting. Delivery was induced via cesarean section before neurosurgical treatment in 9%. Because of a need for radiation therapy, 5 patients underwent therapeutic abortion preoperatively. Three patients received neurosurgical treatment after delivery. There were no cases of maternal or fetal permanent morbidity, and there were no reported complications for the fetus related to the neurosurgical procedure.

Conclusions: Surgery for intracranial lesions in pregnant women is usually safe. If preoperative delivery is desired, cesarean section is a good option.

Reviewer's Comments: This article adds to the paucity of literature regarding the management of pregnant patients with neurosurgical lesions. Although relatively rare, when such cases arise, they commonly produce an inordinate amount of anxiety by members of the treatment team on both the obstetrical and neurosurgical sides. In practice, some of the most controversial elements of these cases remain so, particularly in the management of patients with vascular lesions, such as aneurysms or arteriovenous malformations (AVM). This article adds to the evidence that neurosurgical treatment of pregnant patients is usually very safe and well tolerated. It reinforces my belief that management should be based on neurosurgical principles. Aneurysms or AVMs should be treated in pregnancy if they rupture or are otherwise symptomatic (ie, with seizures or having documented growth). In asymptomatic cases, observation is reasonable, and it is my opinion that the method of delivery should be based on obstetrical principles and not dictated by the neurosurgeon as there is no solid evidence that method of delivery affects morbidity or the rate of hemorrhagic complications. As in all cases, such considerations must also be guided by the practitioner's experience and the comfort level of the treatment team at the practitioner's institution. (Reviewer-Nicholas Bambakidis, MD).

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Keywords: Pregnancy, Neurosurgery, Fetus, Tumor, Arteriovenous Malformation, Aneurysm

Print Tag: Refer to original journal article
Angioplasty Alone vs Angioplasty With Stent Placement

Comparison Between Primary Angioplasty and Stent Placement for Symptomatic Intracranial Atherosclerotic Disease: Meta-Analysis of Case Series.

Siddiq F, Memon MZ, et al:

Neurosurgery 2009; 65 (December): 1024-1033

A review of the available literature suggests that treating atherosclerotic disease with intracranial stenting in addition to angioplasty may have promising results.

Background/Objective: As potential treatment modalities for symptomatic intracranial atherosclerotic disease, angioplasty alone and angioplasty with stent placement have been advocated. This article is an attempt to analyze the available literature in evaluating these treatment strategies.

Methods: The authors performed a meta-analysis by collecting published studies between 1980 and 2008. End points utilized were the incidence of death and/or stroke at 2 different time points (1 month and 1 year) after treatment. Statistical models were used to determine the results of the study.

Results: 105 studies were included in the analysis, which included data on 2318 patients. In patients treated with angioplasty alone, the estimated stroke and/or death rate was calculated at 8.9%, which dropped to 8.1% in patients treated with stent placement. Restenosis was observed in 14.2% of patients treated with angioplasty alone, while this rate was reduced to 11.1% for patients who received a stent. No correlation was found between the year of publication of the studies and the results.

Conclusions: Inclusion of intracranial stenting in addition to angioplasty in the treatment of atherosclerotic disease may result in a lower rate of recurrent stroke or death, as well as a lower rate of restenosis.

Reviewer's Comments: This is an important and timely article analyzing the available data in the literature regarding emerging techniques of treating intracranial stenosis. It is important to first remember that the indications for the use of such modalities over medical management have not yet been clearly defined, although studies are ongoing (some of which are randomized). This study includes the results of several trials that date back to a period in which development of endovascular treatments for stroke were in their infancy. As such, they may not be representative of current results, which often change rather quickly as they mirror the development of advanced technological innovations. This may be particularly true in the development of new stent technology such as the Wingspan stent (or in the treatment of aneurysms with covered stents, such as the Pipeline device). Nevertheless, the review provided by the authors is an important contribution that mirrors a current trend among practitioners to include stent placement in the treatment of intracranial atherosclerotic stenosis. (Reviewer-Nicholas C. Bambakidis, MD).

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Keywords: Intracranial Atherosclerotic Disease, Angioplasty, Stent Placement

Print Tag: Refer to original journal article
Spasmodic torticollis can be greatly improved by microvascular decompression of the accessory nerve.

**Background:** Spasmodic torticollis (ST) is a disorder characterized by involuntary clonic and tonic spasms of the neck muscles often associated with an abnormal posture of the head. Various hypotheses have been proposed to explain this disease, including a disorder of the reflex arcs sustaining cervical muscle tone, a dysfunction of basal ganglia, and mechanical factors such as vascular compression. Various surgical approaches have been tried: myotomy, neurectomy or rhizotomy of the motor nerves, spinal cord stimulation, botulinum toxin injection, and microvascular decompression (MVD).

**Objective:** To test the effect of MVD in 12 patients suffering from ST.

**Design:** Single-institution, retrospective study with a follow-up period of 2 to 36 months.

**Participants/Methods:** 12 patients were treated from December 2005 to November 2008. The median age was 43 years (range, 13 to 64 years). Seven patients presented with rotation only, and 5 had both rotation and extension components. Some patients had previously been treated with various unspecified therapies. In all candidates, ST was present for at least 6 months, and spasms were confined to the cervical muscles. There were no associated neurologic disorders. A retrosigmoid craniectomy was performed, and the compressing blood vessels on the accessory nerve were mobilized and padded with Teflon. The compressing veins were coagulated and divided. All nerves were left intact.

**Results:** 10 of 12 patients were cured. The 2 others were improved with moderate residual spasms. Improvement of the patients was noticeable as early as 1 week after surgery. This represents a very good outcome according to the criteria of Jho and Jannetta (1995). No operative complications were observed. The most commonly involved vessels were the posterior inferior cerebellar artery and the vertebral artery. The electrophysiological recording after MVD showed significant decreased amplitude of the sternocleidomastoid potentials but not of the trapezius muscle potentials.

**Conclusions:** Ectopic discharges resulting from the vascular compression of the accessory and upper cervical nerves are a potential mechanism in the genesis of ST.

**Reviewer’s Comments:** In adults, ST usually involves muscles on both sides of the neck. So it is unexpected that unilateral vascular decompression of one nerve would be curative. Also, as pointed out by Dr. Sindou in his comments, ST is generally understood as a dystonia. Therefore, the underlying mechanism is more likely to involve the basal ganglia than a single cranial nerve. Regardless, the results presented here are convincing. Longer follow-ups and a greater number of patients as well as independent studies will be required to better document the usefulness of vascular decompression for this complex disorder. (Reviewer-Luc Jasmin, MD).

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**Keywords:** Torticollis, Movement Disorder, Dystonia, Vascular Decompression, EMG

**Print Tag:** Refer to original journal article
Two thirds of patients with obsessive-compulsive disorder are significantly improved by deep brain stimulation.

**Background:** In the past, patients with severe obsessive-compulsive disorder (OCD) were treated by anterior capsulotomy, the target site being the junction of the ventral internal capsule with the ventral striatum, 1 cm above the anterior commissure. Over time, it has been suggested that more ventral and especially more posterior lesions might be more successful because they target an area where the striato-thalamo-cortical fibers are very compact.

**Objective:** To review the data from 4 institutions, including outcomes, adverse events, and effect of various targets.

**Design:** Multicenter retrospective study.

**Participants/Methods:** 26 adults diagnosed with severe OCD, according to the DSM 4, were implanted. Onset of OCD occurred between the ages of 7 and 34 years. The illness duration ranged from 8 to 41 years. Past or present depression was the most common associated diagnosis. Treatment with antidepressants and other drugs given at the recommended doses and for at least 3 months had failed. Behavioral therapy had also failed. An independent committee made the decision for final eligibility after reviewing all the records. Deep brain stimulation (DBS) leads were placed symmetrically, first on the same target as the one for capsulotomy and then more posteriorly. The same type electrodes were used for surgeries. MRI and CT were used to locate the targets. All patients continued their medical treatment after surgery, but behavioral therapy was withheld for 6 months. Follow-up lasted 3 to 36 months.

**Results:** Based on the Yale-Brown Obsessive-Compulsive Scale, patients were divided into 3 groups: <25% improvement; 25% to 35% improvement; and >35% improvement. Overall, improvement occurred in 60% of patients. The procedure was well tolerated, and only transient adverse effects were noted. A significant improvement in the daily life activities occurred for 16 patients. Also, in 20 patients, an increased independence and an improved occupational or school performance were recorded. Better results were obtained by moving the target posteriorly and medially. Increased perfusion of the orbito-frontal cortex, anterior cingulate cortex, striatum, pallidum, and thalamus was seen on PET scan, especially for stimulation at higher frequency.

**Conclusions:** DBS significantly improved OCD with only minor adverse effects. Up to 3 years after surgery, the functional improvement remained. The possibility of a placebo effect is discredited given that individuals with OCD are particularly resistant to this effect.

**Reviewer’s Comments:** This set of data is impressive. A more precise mapping of the target site, however, is needed, especially since the FDA’s recent approval of DBS for intractable OCD is based on the results obtained in these 26 patients. Finally, while DBS shows promising results, gamma knife lesions might be as good of a procedure. In the future, a close comparison of the results obtained with the 2 techniques should be considered. (Reviewer-Luc Jasmin, MD).

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Keywords: OCD, Stereotaxic Surgery, Neurostimulation, Psychosurgery, Depression

Print Tag: Refer to original journal article
Early enteral nutrition may protect against pneumonia after head trauma

Retrospective Analysis of the Risk Factors and Pathogens Associated With Early-Onset Ventilator-Associated Pneumonia in Surgical-ICU Head-Trauma Patients.

Lepelletier D, Roquilly A, et al:

J Neurosurg Anesthesiol 2010; 22 (January): 32-37

Early enteral nutrition may provide protective effects against early onset ventilator-associated pneumonia, while barbiturate coma contributes to its development.

**Background:** Early onset ventilator-associated pneumonia (EOVAP) occurs commonly in severe traumatic brain injury (TBI), worsening the outcome of these patients.

**Objective:** To determine the specific risk factors and to describe the bacteriology of EOVAP.

**Design:** Retrospective single-institution observational cohort study.

**Methods:** From 2000 to 2002, patients aged >18 years with a Glasgow Coma Scale score <8 requiring mechanical ventilation by oral intubation for >48 hours who survived >2 days were treated in the surgical intensive care unit. Intracranial pressure (ICP) was monitored with an intraparenchymal probe. Patients were sedated with fentanyl and midazolam, and cerebral perfusion pressure (CPP) was maintained above 70 mm Hg with norepinephrine and osmotherapy. Patients with ICP >25 mm Hg refractory to temperature control to <38°C and osmotherapy were treated with thiopental barbiturate. Enteral nutrition by nasogastric tube with a goal of 2000 kcal/day was provided. EOVAP was defined by new or progressive pulmonary infiltrate on chest x-ray within 4 days of injury and 2 of the following: temperature ≥38°C or ≤36°C; serum white blood cell count ≥12,000/mL or ≤4000/mL; or purulent pulmonary secretions. Immunosuppression was defined by a cancer diagnosis within 5 years or treatment with immunosuppressive drugs.

**Results:** 161 patients (mean age, 39.8 years; 63% male) experienced 34 (21.1%) cases of EOVAP. An additional 31 patients (19.3%) had late-onset pneumonia. Thiopental use and immunosuppression were independently associated with EOVAP. Early enteral feeding and neurosurgical procedures within 24 hours of admission were independently protective from EOVAP. EOVAP was associated with longer durations of sedation, mechanical ventilation, and ICU stay. Mortality rate was unrelated to EOVAP. Twenty-three cases of EOVAP were single-organism infections; 11 were multi-bacterial. Bacteria cultured included methicillin-susceptible Staphylococcus aureus (46%), Enterobacteriaceae (20%), Streptococcus pneumoniae (9%), Pseudomonas aeruginosa (9%), and Haemophilus influenzae (7%).

**Conclusions:** Barbiturate use to control ICP is associated with EOVAP; early enteral nutrition provides protective effects. S. aureus is the most common microbe encountered.

**Reviewer's Comments:** In this study, only about 40% of patients developed pneumonia after severe TBI; EOVAP accounts for about half of these cases. S. aureus was the most common pathogen, as expected. The mechanism by which early enteral nutrition is associated with protection from EOVAP is not determined. The negative impact of barbiturate use may represent the impact of increased neurological illness by its relatively early implementation. Alternatively, some consideration of other means of controlling ICP may be warranted, particularly with early neurosurgical intervention having a beneficial protective effect. Because CPP >70 mm Hg is no longer a guideline for TBI management in the United States and decompressive craniectomy is being used more frequently for refractory ICP, I wonder if these results are generalizable at present. (Reviewer-N. Scott Litofsky, MD).

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Keywords: Pneumonia, Head Trauma, Risk Factors

Print Tag: Refer to original journal article
ARD Can Be Used for IA Mechanical Thrombectomy in Select Cases

Mechanical Thrombectomy for Acute Stroke With the Alligator Retrieval Device.

Hussain MS, Kelly ME, et al:

Stroke 2009; 40 (December): 3784-3788

The Alligator retrieval device appears to be most efficacious in proximal occlusions in rather straight segments.

**Background:** Prompt cerebrovascular recanalization following acute ischemic stroke (AIS) significantly improves outcomes. Therefore, endovascular devices that can be used intra-arterially to achieve rapid and safe vascular recanalization are of great importance. The Alligator retrieval device (ARD), which was initially developed for retrieval of foreign material during endovascular procedures, has been recently used for mechanical thrombectomy.

**Objective:** In this article, the authors report their early experience with the ARD used for intra-arterial (IA) mechanical thrombectomy to treat AIS.

**Methods:** The ARD has 4 claws at the end of a flexible wire. It is advanced through a microcatheter from one end until the claws protrude and are deployed from the other end, proximal to the occluding thrombus. The claws are then moved forward toward the thrombus and the microcatheter is advanced around the claws forcing them to close around the thrombus. Both ARD and microcatheter are then pulled back simultaneously with the thrombus trapped between the claws. Over a 3-month period, the device was used according to physician preference for the treatment of AIS at the authors’ institution. No inclusion or exclusion criteria were predetermined. A total of 7 patients were included in this study and their demographics, imaging results, treatments, and outcomes were retrospectively recorded and analyzed.

**Results:** The mean patient age was 58.7 years. The average National Institutes of Health Stroke Scale (NIHSS) score on presentation was 19.7. Four patients had middle cerebral artery (MCA) occlusions and 3 had distal basilar occlusion. Six patients received IA tissue plasminogen activator plus abciximab at the start of the case. ARD was utilized as the first treatment modality in 5 patients and was successful in 4 patients (80%). Of the latter, 2 were basilar-occlusions and 2 were MCA-occlusions. In total, ARD successfully retrieved the occluding thrombus in 5 of 7 cases (71%). Complete arterial recanalization was achieved in 1 case and near-complete in 4. Three patients had good outcomes at 3 months and 3 died within 30 days of the procedure. For those who died, the NIHSS score at presentation was 20, 24, and 24, and all 3 presented with complete vessel occlusion. Near-complete or complete recanalization was achieved in these 3 patients who died. One asymptomatic hemorrhage was noted.

**Conclusions:** In select cases, ARD can be utilized for IA mechanical thrombectomy and may be a useful adjunct to the endovascular armamentarium used to treat AIS. This device appears to be most efficacious in proximal occlusions in rather straight segments.

**Reviewer’s Comments:** Prompt treatment of AIS in progress is a key to better outcomes. Both the degree and timing of recanalization affect these outcomes, and certain therapeutic modalities aimed at achieving such goals are now well established. However, when these conventional methods fail or are contraindicated, innovative and versatile approaches, such as ARD, for AIS treatment are always welcome, but subject to specific patient selection. (Reviewer-Ziad A. Hage, MD).

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Keywords: Acute Stroke, Mechanical Thrombectomy, Retrieval

Print Tag: Refer to original journal article
In children with mild head injury, a CT is not warranted in the absence of severe injury mechanism, altered mental status, loss of consciousness, vomiting, scalp hematoma, signs of palpable or basilar skull fracture, and severe headache.

Background: Traumatic brain injury (TBI) is a leading cause of death and disability in children. In the United States, head trauma (HT) in children younger than 19 years of age results in about 600,000 emergency department (ED) visits, 60,000 hospital admissions, and 7400 deaths per year. A CT scan is performed in about 50% of these children and is the standard test performed to identify brain injury and the need for neurosurgical intervention.

Objective: To identify children with HT who are at very low risk for clinically important TBI (ci-TBI) for whom head CT is not indicated.

Methods: A prospective study at 25 EDs in North America enrolled children <18 years of age who presented within 24 hours of HT with a Glasgow Coma Scale (GCS) score of 14 to 15. CT scans were obtained at the discretion of the ED physician. Determination of ci-TBI was based on hospitalization for >1 night, intubation for >24 hours, neurosurgery, or death from TBI. Age-specific prediction rules for ci-TBI were derived and validated.

Results: >43,000 enrolled children with HT were evaluable. Only about 1% had ci-TBI, and 0.1% underwent neurosurgery. Approximately 2% presented with GCS of 3 to 13. More than 42,000 children had mild HT with a presenting GCS of 14 to 15 and constituted the target group. The mean age was 7 years, and 25% were younger than 2 years of age. The GCS was 15 in 97%. A head CT was obtained in 35%, and TBI was identified with CT in 5% of those studied. In children under age 2 years, a prediction rule that had a negative predictive value and sensitivity of 100% for ci-TBI included these factors: normal mental status, no scalp hematoma (except frontal), no loss of consciousness or loss of consciousness for <5 seconds, nonsevere injury mechanism, no palpable skull fracture, and acting normally according to parents. For children older than age 2 years, the prediction rule that had a negative predictive value of 99.95% and a sensitivity of 96.8% for ci-TBI included these factors: normal mental status, no loss of consciousness, no vomiting, nonsevere injury mechanism, no signs of basilar skull fracture, and no severe headache.

Reviewer’s Comments: The decision to obtain a head CT in children with mild HT is commonly driven by medicolegal concerns. In addition to attention to cost-effectiveness, it is prudent to also avoid radiation exposure from unnecessary CT scans. (Reviewer-Gregory B. Sharp, MD).