becomes an integral part of the evaluation of acute cervical spine trauma.

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Reference


**To The Editor:** We agree with the assertions made by Doran and colleagues in their recent article stressing the importance of magnetic resonance (MR) imaging to manage patients with traumatic locked facets (Doran SE, Papadopoulos SM, Ducker TB, et al: Magnetic resonance imaging documentation of coexistent traumatic locked facets of the cervical spine and disc herniation. *J Neurosurg* 79:341–345, September, 1993). However, we cannot support their contention that obtaining MR images prior to attempts at closed reduction is essential in the management of these injuries. The primary goal of treatment for spinal cord injury is rapid anatomical realignment of the disrupted vertebral elements in an attempt to treat the primary injury and prevent secondary neuronal injury. The cascade of events that results in secondary neuronal injury begins almost immediately after trauma, and is exacerbated by persistent spinal cord compression. Because of this, we have several concerns regarding the authors’ interpretation of their data and the subsequent recommendations.

Obtaining an MR image prior to an attempt at closed reduction adds a significant time delay, even at the best of tertiary care centers. In their study, the authors did not report the time interval between diagnosis of facet lock and reduction by either skeletal traction or surgery. The immediate use of skeletal traction for closed reduction alleviates cord compression and allows for the best possible outcome following neuronal injury. In most cases, closed reduction of the 50% translation usually associated with bilateral locked facets will result in increased spinal canal patency by approximately 1 cm. Despite their statement that “... closed reduction of facet dislocation associated with disc rupture may cause increased spinal cord compression,...” they present no MR imaging evidence that demonstrates closed reduction inducing significant spinal cord compression from traumatic disc herniations.

Successful closed reduction was obtained in only three (33%) of nine patients, a figure that seems low in comparison with the results of other series. The complications reported by the authors leading to failed closed reduction occurred as a result of root compromise (Case 5), severe arm pain (Case 6), and compromise of a cervical level (Case 7). These complications were equally matched in number by improved neurological outcome in three patients who underwent successful closed reduction with cervical traction prior to MR imaging. All of these latter patients had a neurologically complete injury at the time of presentation and two had disc herniations (Cases 1 and 9). No statistical evidence was given to support the authors’ conclusion that MR imaging prior to reduction/decompression improved outcome in this retrospective series.

We agree with the authors on the surgical management of these lesions. Here MR imaging is useful in planning a surgical approach. For patients with traumatic facet lock, we pursue a trial of closed reduction as rapidly after diagnosis as possible. Whether traction is successful or aborted, all patients undergo MR imaging or myelography-computerized tomography prior to any surgical intervention. In our experience, if a disc herniation is present on preoperative imaging studies, an anterior approach can frequently be used for both discectomy and facet reduction, followed by fusion and plating. As the authors indicate, posterior fusion and stabilizing techniques alone will not adequately treat the patient with a herniated disc, and failure to diagnose a significant disc herniation can lead to continued cord compression.

Although we agree with several of the points raised in their paper, the authors have not demonstrated adequately the validity of their recommendation to obtain an MR image prior to any attempt at reduction for traumatic facet lock. We believe that the time required to obtain an MR image precludes early reduction in patients with facet lock and delays the ultimate goal of treatment: rapid decompression of the spinal cord to halt the cascade of secondary neuronal injury.

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References


**RESPONSE:** We appreciate the comments of Dr. Knightly and colleagues on our article. They also recognize the importance of acute magnetic resonance (MR) imaging of cervical spine trauma. However, they recommend that attempts at closed reduction be performed prior to MR imaging. While we recognize that treatment should not be unreasonably delayed in order to obtain an MR image, we believe that the risk of the short period of time necessary to obtain such a study in our institution is outweighed by the potential benefits of avoiding further injury to the spinal cord from a concurrent disc herniation. It seems intuitive that rapid reduction and decompression of compressed neural elements offer the best hope for neurological recovery; however, this has yet to be proven for spinal cord injury

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and the exact timing of this "window of opportunity" has not been determined. In addition, there are growing numbers of reports in the literature documenting cases of neurological deterioration associated with reduction of locked facets that is secondary to concurrent disc herniation, some of these with catastrophic results. Recently, other authors have also recommended that an MR image be obtained prior to attempts at reduction of locked facets.

Based on our experience and the reported experience of others, we continue to recommend that MR imaging be performed prior to attempts at closed reduction, provided the image is available in a reasonable period of time. If an MR image is not available in a timely fashion, compulsive evaluation and re-evaluation of the patient is mandated during attempts at reduction. Any signs of neurological deterioration, including increased radicular pain, dictate abandonment of the procedure in an effort to avoid further neurological injury that may occur secondary to concurrent disc herniation.

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References

Angiography After Aneurysm Surgery

To The Editor: I enjoyed the article by Macdonald, et al. (Macdonald RL, Wallace MC, Kestle JRW: Role of angiography following aneurysm surgery. J Neurosurg 79:826-832, December, 1993). I have the following comments to make.

Postoperative angiography is the gold standard for documenting the results of operative obliteration of intracranial aneurysms. Postoperative cerebral angiography, usually studying only one vessel, has a diminishing low risk in patients with intracranial aneurysms. Dogma dictates that all patients should have postoperative angiography to confirm that the aneurysm is completely excluded from the circulation and that there have been no inadvertent and silent major vessel occlusions. Postoperative angiography in patients with ruptured aneurysms is also of use in predicting which patients may have difficulty with vasospasm, although the role of angiography is being supplanted by transcranial Doppler ultrasound examination in this setting. The patient care and educational value of postoperative angiography is obvious.

Dogma must be tempered by judgment and practicality. The standard of practice we adhere to is as follows.

1. Postoperative angiography is performed as an emergency procedure in all patients with unexplained new postoperative neurological deficits.
2. Postoperative angiography is performed in all patients where difficulty is encountered at surgery, even if their neurological status remains unchanged from preoperatively.
3. Postoperative angiography is performed in most other patients with the exception of older patients with a high degree of atherosclerotic disease, patients with medical complications requiring anticoagulation, and patients whose aneurysms were unusually simple anatomically and where surgery was performed uneventfully with good visualization of the major and perforating vessels, the aneurysm was collapsed, and the integrity of the major vessels was confirmed with a microvascular Doppler ultrasound study.

This practice standard is certain to evolve with the more routine use of microvascular Doppler ultrasonography and as intraoperative angiography becomes more widespread. Furthermore, irremediably the neurosurgical community will be obliged to consider a new factor in practice standards — the cost-benefit ratio. Angiography costs nearly half as much as the surgery to correct the aneurysm. The benefit to the patient of postoperative angiography is not half that of surgery. As the authors suggest, an algorithm to determine which patients would be most likely to benefit from postoperative angiography is needed. If a robust algorithm can be developed, material savings in the cost of the care of patients with intracranial aneurysms could be achieved without materially compromising the quality of care.

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Response: We appreciate the remarks by Dr. Kassell regarding our article on the role of angiography in aneurysm surgery and his comments about the use of postoperative angiography in his practice. We agree strongly that angiography is indicated for the unexplained new postoperative neurological deficit and where surgery was challenging or difficult. We were surprised that unexpected angiographic findings occurred in patients who were operated on uneventfully, and caution against the abandonment of postoperative angiography unless intraoperative microvascular Doppler ultrasound studies or angiography are substituted. We are currently studying prospectively the use of intraoperative angiography.

Our study did not permit the development of an algorithm, and we agree with Dr. Kassell that savings