Neurosurgical Forum

LETTERS TO THE EDITOR

Safety in the use of a high-speed burr for total uncinectomy during ACDF

TO THE EDITOR: We read with great interest the recently published article by Segar et al.⁵ (Segar AH, Riccio A, Smith M, et al: Total uncinectomy of the cervical spine with an osteotome: technical note and intraoperative video. *J Neurosurg Spine* 31:831–834, December 2019). In this article, the authors describe a novel approach that involved using an osteotome to resect the uncinete process during anterior cervical discectomy and fusion (ACDF) for cervical radiculopathy.

We concur that total uncinectomy is an important technique to have in the surgical armamentarium, as limited foraminotomies from within the disc space and reliance on indirect decompression through restoration of disc space height have restricted the ability to completely decompress the foramen, especially in cases of severe uncinete hypertrophy.^{3,4} We have recently published our favored technique for total uncinectomy during ACDF using an injected cadaveric specimen to highlight essential neurovascular and bony relationships.¹

At our institution, we regularly perform a total uncinectomy during ACDF for cervical radiculopathy. We agree with the authors that protection of the vertebral artery is imperative. This can be accomplished through several methods.^{6,7} In our experience, we perform lateral subperiosteal dissection of the uncinete process using a Freer dissector, similar to the authors' utilization of a Penfield no. 4 dissector.

Although the authors discuss potential safety issues regarding the use of a high-speed burr to remove the offending uncinete, we have had success both in safety and in pain-free outcomes using a burr, with protection of the vertebral artery using a Freer dissector, and then fracturing of the residual uncinete medially using gentle pressure. Often, this remaining piece will be attached to the uncinete fibroligamentous complex, which can be connected to the adventitia of the vertebral artery.^{2,8} Anatomically, this technique provides considerable safety in allowing identification of the uncinete fibroligamentous band attachment with controlled removal. We have not had any neurovascular injuries when using this technique, and the safe usage of a high-speed burr has been established by other authors, as well.^{6,7} A thorough knowledge of the anatomy and care-

ful review of preoperative images, as the authors mention, allow for maximization of both surgical safety and relief of cervical nerve compression when performing this technique.

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Disclosures

The authors report no conflicts of interest.

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Response

We thank Drs. Clifton and Pichelmann for their interest and comments regarding our article. Utilization of a high-speed burr is certainly a valid option for total uncinete resection. Our paper highlighted a novel technique, which in our hands has proven safe and effective. Similarly, utilization of the high-speed burr can be safe, as the letter writers have described. However, this technique can also generate excessive heat, leading to neural or vascular injury,¹ and any misjudgement of lateral position can lead to entrapment of the artery.² Consideration of these potential complications is important prior to embarking on uncinete resection with a burr. The use of an osteotome obviates these problems.

Furthermore, the authors describe passing a Freer elevator around the uncus, as we do, to protect the vertebral artery. Usually when the osteophyte is in a very posterior position, the elevator can be passed medial to the vertebral artery without issue. However, in some cases, the uncinete hypertrophy extends anteriorly, enveloping the vertebral artery. In these situations, burring the anterior osteophyte at the level of or more anterior to the artery is dangerous. Here, we advocate using the osteotome technique to remove overgrown anterior osteophytes and to safely identify the vertebral artery. Once clearly identified, the uncinectomy can be completed with either an osteotome or the burr or both.

This letter highlights that a burr can be safely used to achieve neural decompression. Our preference is using an osteotome, for the benefits described in our paper. As surgeons, we must utilize techniques that are safe, effective, and allow us to achieve a reliable clinical outcome for our patients.

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Lumbar fusion

TO THE EDITOR: I read with interest the article by

Reid et al.⁸ (Reid PC, Morr S, Kaiser MG: State of the union: a review of lumbar fusion indications and techniques for degenerative spine disease. *JNSPG 75th Anniversary Invited Review Article. J Neurosurg Spine* 31:1–14, July 2019).

The authors correctly state that the justification for spinal stabilization has changed as our understanding of the intricacies of lumbar instability and spinal alignment has grown.⁸ Despite the fact that our understanding of spinal instability may not be consistent with existing world opinion, the authors should have referred to our work on the subject.^{1–7}

The study of the subject of spinal degeneration has been “disc-centric” for more than a century. Our analysis suggests that spinal instability related to weakness, disuse, or injury to the muscles that support lifelong standing human posture is probably the point of initiation of the entire cascade of spinal alterations that are grouped under the definition of “spinal degeneration.”² A lateral location away from neural structures and an oblique profile make identification of instability at the facets difficult or impossible using plain radiographs or even with modern computer-based imaging. Facetal telescoping or listhesis of facets of the rostral vertebrae over those of caudal vertebrae in one or more spinal segments is the primary effect of muscle weakness. The secondary effects of facetal listhesis include buckling of intervertebral ligaments that include the ligamentum flavum and posterior longitudinal ligament, osteophyte formation, and reduction of disc space height. The overall outcome is reduction of spinal and neural foraminal width. The secondary and so-called “pathological” effects that lead to neural deformation can be clearly visualized on imaging. In 2010, we proposed facetal distraction using a “Goel facet spacer” as a treatment for single- or multiple-level radiculopathy or myelopathy for both cervical and lumbar spinal degeneration.² We identified that a single act of facetal distraction resulted in reversal of all the known, recognized, and radiologically visible features of spinal degeneration.^{2,7} The aim of our operation was secondary decompression and spinal arthrodesis. Our remarkably satisfying clinical and radiological results validated our concepts.

As our experience in the field grew, we realized that it was not neural deformation or compression but subtle instability-related micro-injuries that are the cause of neurological symptoms and deficits. Accordingly, for single- or multiple-level spinal degeneration we resorted to “only fixation” as the treatment.^{1,3,4,6} Our articles on the subject are the first in the literature in which we did not recommend decompression of the neural structures by bone, ligaments, osteophytes, or disc resection.^{1–7} Transarticular facetal fixation using 1, 2 (double insurance), or 3 (triple insurance) screws provided remarkable stability to the spinal segments.⁵ Identification of the unstable spinal segments on the basis of clinical and radiological evaluation, and direct assessment of the status of the facets by manual palpation of the bones, was a critical issue that determined the levels of spinal segments that were stabilized.

Decompression of the compressed neural structures has been the basic tenet of spine surgery. However, our studies suggest the futility of both direct and indirect spi-

nal decompression. We have been so convinced of the validity of only fixation as a form of surgical treatment that our recent editorial on the subject discusses a possibility that bone decompressive surgery, including laminectomy and foraminotomy, can eventually become historical.¹

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Response

The authors appreciate Dr. Goel's insights on our review of lumbar fusion techniques and indications. A topic as broad and controversial as lumbar fusion for degenerative disease provides for myriad opinions, and a review article presents challenges with regard to not only space constraints but also clarity of presentation. Admittedly, and regrettably, we were unable to cover everything.

But as much as the volume and diversity of literature on the topic is a burden for reviewers, it is (obviously) a strength and a boon to our field. The studies cited in our review are the most rigorous available, with long follow-up, high enrollment, and randomized controls in many studies. They represent, in our opinion, the best available evidence.

Recently, Goel et al. (2019) have published data on 70 patients who have undergone transarticular fusion without decompression for lumbar stenosis. In their data they report, ultimately, 100% success, a difficult outcome to achieve with any intervention. It is also, as Goel et al. note, not consistent with existing world opinion, nor is their characterization of decompression for spinal stenosis as “futile.”

The heterogeneity of both our patients and their pathology allows for different treatment approaches, and there are undoubtedly improvements to be made in both operative technique and patient selection. There may well be a role for fusion (transarticular or otherwise) without decompression in well-selected patients, but stronger evidence will be needed to change current practices.

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