Neurosurgical Forum LETTERS TO THE EDITOR

Limitation of the Orthopedic System Inc. Cervical Spine Base Unit

TO THE EDITOR: When performing posterior cervical instrumentation and fusion, it is particularly important to maintain cervical immobilization with the patient positioned prone. This is particularly the case in situations of instability and deformity when the canal is already compromised. In a cadaveric spine, Bearden et al. demonstrated the benefits of the Orthopedic System Inc. (OSI) table in turning a patient prone in the axial plane (Bearden BG, Conrad BP, Horodyski M, et al: Motion in the unstable cervical spine: comparison of manual turning and use of the Jackson table in prone positioning. *J Neurosurg Spine* 7:161–164, August 2007).¹ While the cadaver is turned from the supine to the prone position, the OSI table and cervical collar outperformed manual immobilization in reducing motion and thus protecting the cord. However, in spite of the results of Bearden et al., the benefits of the OSI table with the OSI Cervical Management Base Unit (CMBU) in maintaining head position in Trendelenburg and reverse Trendelenburg have not been consistently met.

When utilizing the OSI spinal table to perform posteri-

or cervical fusion, the patient is lying prone with the chest resting on a stationary pad; the pelvis is also supported on pads and both are affixed to the radiolucent rails. The head is held prone with a 3-point head holder, such as the Mayfield head holder (Integra). The head holder is in turn attached to the OSI table with the CMBU. The CMBU is secured to the mainframe of the OSI table but not to the radiolucent rails upon which the patient is resting.

The rails supporting the patient can be adjusted in 3 planes: elevation, right and left rotation, and in the sagittal plane (head down or Trendelenburg and head up or reverse Trendelenburg). Having the head affixed to the mainframe of the OSI with the patient lying on the radiolucent rails creates a potential problem.

With the patient lying prone, the head is affixed in position with the chin-brow plane parallel to the rails. In the setup shown with the mannequin in Fig. 1 left, the rails are horizontal, the head is below the rails, and the cervical spine is lordotic. While elevating the head of the bed or placing it in reverse Trendelenburg, the patient's head moves superiorly in relation to the rails and chest support, resulting in loss of cervical lordosis and straightening of the spine (Fig. 1 right). This change in alignment can be potentially hazardous in cases of instability and stenosis, where motion can result in spinal cord injury.

FIG. 1. Left: Photograph showing the OSI spinal frame with the CMBU and 3-point clamp affixed to the mannequin head. The rails are horizontal in this setup, with the brow-chin plane in line with the rails. **Right:** The rails are now rotated in reverse Trendelenburg, 10° from the horizontal. Note the dorsal or superior translation of the head above the rails, with loss of lordosis and straightening of the spine. During surgery, with the patient under the drapes, this motion can go undetected, with dire consequences. Figure is available in color online only.

We advise caution when using the OSI spinal table with this cervical adapter. Once the head is affixed, the table may be lowered, raised, and tilted, but not rotated in the sagittal plane, i.e., Trendelenburg or reverse Trendelenburg. Rotation in the sagittal plane can result in undesirable and dangerous motion of the neck relative to the torso, thus causing injury. In particular, this rotation should be avoided when the patient is under the drapes and the surgical team cannot assess motion. All who use the OSI table and CMBU advise that once the patient's head is fixed in the sagittal plane, it is to remain so. Surgeons should be alerted that when using the CMBU, the head and torso do not move in concert in sagittal rotation.

The manufacturer does provide a second type of head fixation that couples to the rails (Coupler II, OSI). This coupler affixes the head to the rails via the head clamp. Although this coupler is more cumbersome to use, the Coupler II does move in concert with the rails and torso, obviating the risk of the head moving independently. If the surgeon anticipates sagittal rotation of the patient while he/she is under anesthesia (Trendelenburg or reverse Trendelenburg), then side-rail fixation of the head with the Coupler II is recommended.

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Percutaneous posterior cervical transfacet fixation

TO THE EDITOR: We read with great interest the recent article by Husain et al.² on the comparison of open versus percutaneous transfacet fixation of the posterior cervical spine (Husain A, Akpolat YT, Palmer DK, et al: A comparison of open versus percutaneous cervical transfacet fixation. *J Neurosurg Spine* 25:430–435, October 2016). The authors found a higher incidence of screw misplacement in the percutaneous technique compared to the

open technique. The authors mention in their introduction that they were unable to find any descriptions of percutaneous cervical transfacet screw placement techniques in the literature.

We would like to point out our paper published in 2012 on exactly this topic that Husain et al. failed to notice: “Percutaneous trans-facet screws for supplemental posterior cervical fixation.”¹ In that report we described an initial clinical experience with cervical transfacet screws, which we found to be a technically feasible option in the subaxial cervical spine for truly percutaneous spinal fixation. Surgery was successfully performed in 3 cases by using small fragment screws that are commonly used in orthopedic trauma surgery. We also described our percutaneous surgical technique with illustrative pictures and radiographs.

Transfacet open screw placement is a good bailout option if lateral mass fixation fails. It also can be used as an intermediate fixation option in long cervical constructs. For percutaneous screws, the use is limited to supplemental fixation after an anterior fusion procedure, due to limitations of current percutaneous posterior fusion options.

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Disclosures

The authors report no conflict of interest.

Response

The letter to the editor that was submitted by Ahmad and Wang is greatly appreciated. In response to their statement, we were unable to find any technique descriptions of percutaneous cervical transfacet screw placement in the literature at the time our manuscript was submitted. However, the article by Ahmad et al. titled “Percutaneous trans-facet screws for supplemental posterior cervical fixation”¹ was published in *World Neurosurgery* in 2012—prior to the submission and publication of our manuscript. With apologies, we did not have knowledge of this paper and thus did not reference it in our manuscript.

We read the paper by Ahmad et al.¹ with great interest. It is well written and provides an introduction for percutaneous transfacet fixation of the posterior cervical spine. They include an informative description of their surgical technique of percutaneous transfacet screws for supplemental posterior cervical fixation and describe their initial clinical experience with this technique. The paper notes

that “future areas of development will include validation of the safety and efficacy of this technique.”¹

Our study is therefore an appropriate segue; it compares the percutaneous to the open technique of transfacet fixation of posterior cervical spine in regard to the accuracy of facet capture (efficacy) and the potential of placing neurovascular structures at risk (safety). We describe the use of percutaneous techniques as an alternative to open transfacet fixation. Despite the potential risk of a higher incidence of misplacement with the percutaneous technique compared with the open technique, our results show that the distances from the screw to the neurovascular structures were statistically similar and the accuracies of facet capture were not statistically different. It is with great pleasure and enthusiasm that we see that two separate surgical teams can independently design a novel technique with so many similarities. This shows promise for the idea,

the technique, and the potential for its use as a minimally invasive approach to treatment of the cervical spine.

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