

Commentary

## Commentary: “Minimally invasive corpectomy and posterior stabilization for lumbar burst fracture”

Eric Truumees, MD\*

Director of Spinal Research, Seton Spine & Scoliosis Center, A Program of the Seton Brain and Spine Institute, University Hospital at Brackenridge, Austin, TX 78731, USA

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**COMMENTARY ON:** Eck JC. Minimally invasive corpectomy and posterior stabilization for lumbar burst fracture. *Spine J* 2011;11:904–8 (*in this issue*).

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Eck and collaborators are to be congratulated for detailing an elegant treatment approach to thoracolumbar burst fractures in their “Minimally invasive corpectomy and posterior stabilization for lumbar burst fracture” case report [1]. Although satisfying, their report leaves us with questions that these authors (and the hundreds of contributors before them) have been unable to answer. Some of these questions include:

- What is an “unstable” burst fracture?
- What are the indications for surgery in this patient population?
- When is an anterior approach really necessary?
- What are the downsides of a trial of brace management in the neurologically intact or sensory impaired patient?

Optimal treatment for burst fractures has been controversial for decades [2–4]. A recent literature synthesis found, despite years of debate and hundreds of articles, “only very low to moderate quality studies could be identified to address clinical questions related to TL spine trauma” [5].

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\* Corresponding author. Seton Spine & Scoliosis Center, Seton Brain and Spine Institute, 1600 West 38th St, Suite 200, Austin, TX 78731, USA. Tel.: (512) 324-3580.

E-mail address: [etruumees@gmail.com](mailto:etruumees@gmail.com) (E. Truumees)

Of the major questions that remain, whether to operate and when to operate, are the most critical. For patients with major neurologic compromise, few would argue against surgical stabilization. In neurologically intact patients, Wood et al. [6] showed that surgery did not improve outcomes. The reported patient had lower extremity weakness on presentation. Rapid improvement was noted with only ongoing numbness. Does this suggest he is neurologically unstable? Does this type of deficit warrant surgical stabilization? [7]. Does it matter that this injury is below the conus? Unilateral radicular findings often resolve with brace management, especially in the absence of laminar fractures [8].

Eck and colleagues write that their decision for surgery was made based on radiographic evidence of instability. They admit “radiographic criteria... felt to indicate mechanical instability, but were retrospectively derived, highly variable among authors and are not definitively proven to define instability.” How unstable was the reported injury? Eck et al. do not comment on the status of the posterior ligamentous complex. Certainly the fracture is comminuted. Are the commonly quoted radiographic parameters (eg, 50% height loss) equally relevant at L3 as they are at T12?

Others have specifically examined individual fracture characteristics, such as canal compromise and height loss. No predictive statements about outcome could be made on the basis of these markers alone [2,5,9,10]. Still, most of us reasonably consider these characteristics as part of the “personality of the fracture” when making treatment recommendations.

Once the decision to operate has been made, the type of surgery to perform becomes relevant. There is some overlap between questions of surgical approach and timing. For those who advocate early surgery, improved indirect reduction with a posterior ligamentotactic approach is often cited [11]. If an anterior approach is selected, surgery could

conceivably be performed later or even after a trial of brace immobilization.

In the reported case, both anterior (or extreme lateral) and posterior approaches have been selected. Each has been executed through a less invasive corridor with appealing radiographic and clinical results [4]. In considering this approach in their own patients, the reader must ask a few questions.

Allowing that this injury is unstable and the patient requires surgical stabilization, is an anterior corpectomy necessary or would posterior stabilization with or without fusion suffice [12]? Several studies suggest that an anterior approach lowers construct failure rates and better maintains kyphosis correction at the expense of increased surgical morbidity [13–15]. Eck et al. [4] argue that the transposas approach “allows for an anterior approach... through a small lateral incision for placement of a large interbody cage on the apophyseal ring. Benefits of this approach include avoiding the need for retraction of the retroperitoneal vessels and sympathetic plexus, less muscle dissection, and less manipulation of the abdominal contents and subsequent ileus.” In this case, the titanium mesh cage was centrally placed and does not cross the physeal ring. In one series, more subsidence was noted with similar mesh cages.

If an anterior approach is selected, in the absence of major posterior disruption, could not an anterior plate or screw-rod construct obviate the posterior pedicle screw construct [16–19]?

Arguably, given that this patient’s strength has returned and his alignment is reasonable, could a posterior approach alone have sufficed? Eck et al. counter that the front-back approach saved fusion levels. Based on common North American practice, I would agree. In other parts of the world, a short-segment posterior construct would be commonly recommended for a posterior midlumbar burst fracture. In fact, in recent randomized trials, monosegmental (typically the fracture level and the level adjacent to the most disrupted end plate) fixation was found equivalent to short-segment fixation and both were “effective and reliable operative techniques” [20,21].

Still, there are many examples of failure of short-segment posterior fixation and both anterior and posterior techniques suggested decrease failure risk. For example, when a posterior approach is performed, some authors have advocated monoaxial rather than polyaxial screws, cross-links and short screws at the fracture level to improve construct stiffness [22–26].

For most of us, the most intriguing aspect to the report by Eck et al. is the utilization of the transposas approach to the L3 vertebral body. Although elegant, the safest interval for this approach lies in the anterior disc space [27]. A more posterior approach, required if the large bony fragment is to be retrieved, increases risk to the lumbar plexus. To what degree transposas corpectomy approaches affect the reported less than 25% incidence of transient left leg

dysfunction after transposas discectomy remains unknown [28–31].

In this case, the patient reported left-thigh pain and numbness for 6 months after the surgery. The authors are unsure if this was related to the transposas approach. Fair enough. However, what if further studies confirm a higher rate of postoperative leg pain after a transposas approach? At what point will smaller incisions with decreased muscle trauma justify an increased nerve injury risk? It should be noted that others have reported successful less invasive utilization of retroperitoneal approaches to lumbar burst fractures allowing posterior retraction of, rather than penetration of, the psoas [4,32].

Eck et al. offer an elegant approach to a midlumbar burst fracture. Efforts to decrease the morbidity required by the stabilization of spinal injuries will certainly continue. These efforts should be undertaken with close attention to postoperative changes in leg pain and function in an effort to determine the relative impact of less invasive surgery versus postoperative radiculitis. More importantly, efforts to establish which fractures “need” stabilization and when an anterior approach is required must continue as well.

My recommendations: transposas and other less invasive techniques should be limited to surgeons and centers with significant trauma experience. The surgeon treating only the occasional burst fracture should maximize his facility with common techniques that are more generalizable across the entire thoracolumbar spine. In the current environment, surgeons must offer not only the best care for their patients but also remain cognizant of the costs associated with that care. Certainly, all surgeons must be vigilant that the possibility of a “less invasive” approach does not liberalize their surgical indications. Someday, we may be able to offer a surgical stabilization modality less morbid than nonoperative management. We are not there yet [3,9,33].

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