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Prospective Comparison Of Clinical And Radiographic Outcomes Of The Treatment Of Thoracolumbar A3 And A4 (AO) Burst Fractures Without Neurology. Open Vs Percutaneous Pedicle Screw Instrumentation Vs Vertebral Augmentation With Expandable Implants

Trauma / Spine Trauma / Surgical Treatment

Marek Roclawski¹, Rafal Pankowski¹, Wojciech Kloc², Stanislaw Adamski³, Sergiusz Bielocerkowski¹, Adam Augustyniak¹, Marcin Ceynowa¹, Tomasz Mazurek¹

1. Medical University of Gdansk, Department of Orthopaedics, Copernicus PL, AO Spine Center, Gdansk, Poland
2. Department of Neurosurgery, Copernicus PL, AO Spine Center Department of Neurology and Neurosurgery, Faculty of Medical Sciences, University of Warmia and Mazury, Gdansk, Poland
3. Department of Neurosurgery, Copernicus PL, AO Spine Center, Gdansk, Poland

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Background

Around 70–90% of spinal fractures are located in thoracolumbar region, with ThoracoLumbar A3 and A4 (AO) Burst Fractures (TLBF), accounting for about 20% of all thoracolumbar fractures. TLBF usually caused by high-energy trauma, including vehicle accidents and fall, occur due to an axial loading force that results in failure to support the anterior and middle column and generate great overall negative impact on patients' quality of life. Most authors believe that these fractures require surgical intervention, however, there is still some controversy regarding treatment of TLBF with the number of techniques and advances in spinal instrumentation.

Objectives

The objective of this study was to compare clinical and radiographic outcomes of three different methods of operative treatment of TLBF: Open Pedicle Screw Instrumentation (OPSI) - the most common and conventional treatment option, and two minimally invasive therapeutic methods to reduce approach-related morbidity associated with conventional procedures: Percutaneous Pedicle Screw Instrumentation (PPSI) and Percutaneous Inter-Vertebral Augmentation with Cranio-Caudal Expandable Implant (PVAEI)

Study Design & Methods

After exclusion of patients who did not match the inclusion criteria a total of 154 patients who underwent: OPSI (n=51), PPSI (n = 59) or PVAEI (n = 44) for the treatment of TLBF (between 2014 and 2017 in two Departments: Orthopaedics and Neurosurgery of Copernicus PL left for further analysis. Evaluations were performed before the surgery, after surgery during discharge, 6 weeks post op, 1 year post-op and at the final follow-up (minimum 2 years post op). For clinical evaluation, the intraoperative blood loss, operation time,

radiation dose, postoperative hospital stays, the length of postoperative scar and perioperative complications were analyzed. For the patient's pain and functional evaluation: VAS and ODI scores were evaluated. For radiologic parameters: regional kyphosis, vertebral wedge angle, and vertebral body height of anterior, middle and posterior wall on the lateral radiograph were evaluated.

Results

Demographic and clinical features including age, body mass index, gender ratio, fracture level, fracture classification (AO Spine, McCormac Severity Score and cross-sectional area (CSA) of the spinal canal at the fracture level), and neurological status in all groups were not significantly different. There were significant differences between OPSI and both PPSI and PVAEI in perioperative outcomes (less intraoperative blood loss, shorter recovery and surgical time) and complications (surgical site infection, implant failure) in favour of PPSI and PVAEI and with the best results for the last group. Postoperative VAS and ODI outcomes improved in all groups and there was a significant difference in favour of PPSI and PVAEI groups after the surgery and at the time of final follow-up. The radiographic outcome significantly improved in each group immediately after the surgery (highest improvement for OPSI) and decreased at the final follow-up without differences between OPSI and PPSI but in favour for PVAEI

Conclusions

Although all three groups showed favourable clinical and radiographic outcomes at the final follow-up, both minimal invasive and especially PVAEI provided earlier and better pain relief, better functional improvement and less perioperative complications. PVAEI provided better maintenance of radiographic parameters than both pedicle screw instrumentations during last follow up control.