THORACO-LUMBAR A0 A3-A4 SPINE FRACTURES WITHOUT NEUROLOGIC DEFICITS. CONSERVATIVE OR SURGICAL TREATMENT?

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THORACO-LUMBAR A3-A4 SPINE FRACTURES WITHOUT NEUROLOGIC DEFICITS. CONSERVATIVE OR SURGICAL TREATMENT? (Abstract) Aim: to compare radiological and functional results after conservative and surgical treatment in patients with spinal burst fractures. Material and methods: between 2012 and 2015, 112 patients with spinal burst fractures and no neurologic deficits were treated in the Neurosurgical Department of “Prof. N. Oblo” Hospital. They were assessed during 3, 6, and 12 months follow-ups regarding clinical, radiological, and functional results. Results: mean follow-up was 12 months for both groups. There were no statistical differences regarding residual pain between the two groups, but the local kyphosis angle and functional results were significant better in the operative group. Conclusions: conservative treatment seems to be safe and effective for selected patients with thoracolumbar burst fractures. Surgery have advantages in patients with severe burst fractures and in suspected ligamentous lesions. Key words: SPINE, BURST FRACTURES, CONSERVATIVE, SURGERY

INTRODUCTION

The management of burst thoracolumbar spine fractures with no neurologic deficit has moved, in last decades, from more conservative treatment towards more operative treatment. The decision is based on clinical and radiological examinations. The distinction between stability and instability and the presence of neurological deficits play an important role in the diagnostic process of spinal fractures. Instability can be defined as the loss of the ability of the spine under physiological loads to maintain relationships between vertebrae so that there is no initial or additional neurological deficit, no major deformity, and no incapacitating pain (1). In general, patients with stable fractures without gross deformity are treated conservatively and patients with spinal injury and progressive neurological deficits are treated operatively. The management of unstable fractures without neurological deficits, however, remains controversial, especially for burst type of fractures.

Burst fractures are characterized by anterior and posterior failure of the vertebral body, with the failure of both the anterior and middle columns (2). Although the anatomical reconstruction of the vertebral column by surgical means seems to be necessary to avoid neurological and functional complications, long-term results of conservative treatment methods have shown that most of the thoracolumbar burst fractures can be treated conservatively (3).

Thoracolumbar burst fractures are unstable, and they should be treated surgically because of neurologic complications (4). On the other hand, according to Krompinger et al., those thoracolumbar burst fractures of neurologically intact patients with canal encroachment under 50% and kyphosis angle under 30º are stable and can be treated conservatively (5).

The current goal in the treatment of traumatic thoracolumbar burst fractures is to stabilize the spine to prevent short- and long-term deformity and neurological decline while improving the clinical outcome of the patient.
Recent studies comparing operative to nonoperative treatment in burst fractures without a neurological deficit have found no differences in the functional outcome between these treatment modalities, and moreover, operative management has been correlated with increased costs and complications (6, 7, 8). While operative management was reported to be more effective in preventing the progression of sagittal deformity in stable burst fractures, it has been shown to have no correlation with the functional outcomes reported by patients (9).

**MATERIAL AND METHODS**

Between January 2012 and December 2015, 112 patients with thoracolumbar spine burst fractures and no neurological deficits were admitted in the Neurosurgical Department of Clinical Hospital “Prof. N. Oblu” Iasi. There were 61% men and 39% women, aged between 18 and 84 years old (mean, 46.5 years), who sustained falls from height (53%), traffic accidents (29%), other accidents (domestic, sports). Inclusion criteria: patients admitted with thoracolumbar burst fractures A3 (incomplete burst) and A4 (complete burst), according to the new AO Spine Thoracolumbar Classification System (10), no neurological involvement, local kyphosis < 30°. Exclusion criteria: pathologic fractures, initial neurologic deficit, posterior ligamentous lesions, polytrauma patients, local kyphosis > 30°.

The patients enrolled in the study were assigned to 2 study groups according to treatment.
method: the first group included patients conservatively treated, the second group included patients surgically treated.

78 patients from group 1 were treated initial rest in bed with or without postural reduction, followed by application of an extension cast or brace and early mobilisation. Mean recumbency period was 3 days (range 2–5 days). The neurologic status of the patients was monitored during the reduction. After kyphosis correction was confirmed by plain radiography, the patients were kept in bed until they could tolerate the pain and general status permitted. When the patients began ambulation, they were instructed to wear a hyperextension body cast or brace for at least 3 months. After removal of the cast or brace the patients were allowed to return to work. Mean hospital stay was 5 days. The brace was used part-time during daily activities for 3-4 months. Upright radiographs were repeated at 3 months, 6 months, and 1 year, at the final follow-up. On the lateral view of all radiographs, local kyphosis angle (LKA) was measured as the angle between the inferior endplate of the intact vertebra above and the superior endplate of the intact vertebra below by the Cobb method. Pain was evaluated using the VAS (Visual Analogue Scale), and functional status using ODI (Oswestry Disability Index).

Patients from group 2 were surgically treated either from doctor’s decision due to severe comminution according to the Load Sharing Classification (II), or due to patient option. There were 25 (74%) men and 9 (26%) women who sustained either A3 (25 patients) or A4 (9 patients) burst fractures in the T11-L2 region. We used different surgical techniques: short segmental posterior fixation (fig.1), long posterior fixation (fig.2), anterior reconstruction and fixation or combined anterior and posterior technique (fig.3). All patients were assessed during 3 months, 6 months and 12 months follow-up using conventional X-ray images or CT examination, functional status evaluation using VAS and ODI.

RESULTS

The local kyphosis angle (LKA) and anterior vertebral height (AVH) were assessed and compared initial, at 6 and at 12 months for all patients from groups.

For the patients from group 1, LKA was initial 13,80º, and increased to 16,53º at 6 months, respectively 17,42º at 12 months. AVH was 73,8% initial, and decreased to 65,4% at 6 months and to 63,7% at the final follow-up. For the patients from group 2 LKA was initial 14,22º, decreased to 11,2º at 6 months and to 13,8º at 12 months postoperative. AVH was initial 67,4%, decreased to 63,5% at 6 months and to 62,7% at 12 months. Statistically the increase of local kyphosis was significantly lower (p<0,01) in patients from group 2.

Regarding pain assessment on VAS scale, the final results can be observed in table 1. We can observe an important decrease of local pain at 3 months in both groups; however, at final follow-up, patients from group 2 were significantly (p<0,01) painless.

Disability index evaluation is presented in table 2.
At the final-up assessment there were no statistical significant differences between the two groups.

DISCUSSION
The choice of type of treatment for burst thoracolumbar fracture without neurologic deficits seems to be a confusing decision in recent decades. A systematic review (12) shows that there is no scientifically sound evidence from high quality randomised trials on the effectiveness of operative and conservative treatment of traumatic thoracolumbar fractures. The efficacy of conservative treatment for thoracolumbar burst fractures has been often documented, especially for the patients without neurologic deficit (13). Nonoperative management offers many benefits, including decreased costs and complications with improved functional outcomes (14). Many conservative techniques stabilize the spine by limiting motion. Stadhouder et al. demonstrated no difference in the use of a brace or a cast (15), the body cast can restrict movements in all directions, while a brace maintains more flexibility in all directions. Bailey et al. (16) demonstrated no difference in the use of a custom brace or no brace. The results question the need for a supportive orthotic device in isolated AO Type A3 fractures.

According to the TLICS algorithm recommendations a final score of 3 or less indicate non-operative treatment while a score of 5 or above indicates the necessity of surgical intervention. Patients with a score of 4 fall into an intermediate zone in which both surgical and non-surgical treatment may be appropriate, with recommendations of performing the final decision on the basis of the particularities of each case. In more than half of the cases of thoracolumbar burst fractures without neurological injury the surgeon felt uncomfortable managing the lesion conservatively, having decided for surgical intervention. Regarding the different available classification systems for thoracolumbar fractures, it must be emphasized that each scheme possesses its own unique strengths and inherent disadvantages. Because of its simplicity as well as its clear and practical therapeutic algorithm, the TLICS classification system has gained the preference of several spine surgeons worldwide. The specific subgroup of patients with comminuted burst fractures deserve a special consideration, as in such subpopulation, even if the TLICS score is less than 3, conservative management may result in poor long-term prognosis. Ultimately, it seems that approaches that incorporate an evaluation of the degree of fracture comminution (such as the German guidelines which are based on a combination of the AO/Magerl and the McCormack load-sharing classifications) (17) may provide interesting solutions to overcome the inherent deficiencies of the TLICS classification in the setting of comminuted burst fractures.

CONCLUSION
Bracing is a low-risk, cost-effective method to treat A3 and A4 thoracolumbar fractures, and it offers equivalent efficacy as surgical management in many cases. In neurologically intact patients, there is no superior conservative management technique over another as supported by a high level of evidence. The appropriate method can be based on patient preference, comfort, and access to resources. A high level of evidence demonstrates similar functional outcome with conservative management when compared with open surgical operative management in patients who are neurologically intact. The Load Sharing Classification could be used for guiding the treatment of thoracolumbar burst fractures not only in surgical approach choice but also in surgical decision making. More evidence is needed to further classify the appropriate burst fractures for conservative management to decrease variables that may impact the prognosis. If the decision of conservative management is taken, a close follow-up is mandatory due to the high likelihood of long-term kyphotic deformity requiring surgical intervention.

REFERENCES


