Clinical Article

Online ISSN : 2314-8969
Print ISSN: 2314-8950

Egy Spine J 24:6-13, 2017

www.esa.org.eg

Short Versus Long Segment Fixation for Thoracolumbar Burst Fractures: A Randomized Controlled Trial

Mohammad M El-Sharkawi, MD., Mohamed Abdel Gawad Mohamed, MD., Al Moataz A El Sabrout, MD., Mohamed G Hassan, MD.

Department of Orthopaedic and Trauma Surgery, Assiut University Medical School, Assiut, 71511 Egypt.

Abstract

Background Data: Selection of stabilization procedures for treating thoracolumbar burst fractures remains controversial. Both long-segment and short-segment pedicle screw fixation including the fractured vertebral body have been used widely with no consensus on the better method.

Purpose: To compare between the long segment and short-segment with intermediate screw (s) fixation of thoracolumbar junction burst fractures in terms of radiological and clinical outcomes.

Study Design: Prospective randomized controlled trial.

Patients and Methods: Fifty consecutive patients (32 males and 18 females, mean age 33.6±14.6 years) with thoracolumbar burst fractures presenting during the period between October 2015 and December 2016 to Assiut University hospital were randomized into one of two groups. Group A (25 patients) was treated by long segment pedicle screw fixation, i.e., fixation of 2 levels above and below the fractured vertebra. Group B (25 patients) was treated by short segment fixation, i.e., 1 level above and 1 level below the fractured vertebra, with one or 2 intermediate screws in the fractured vertebra itself. The study protocol was approved by our institution review board and all patients signed an informed consent. The inclusion criteria were single level Type A3 and A4 fracture at thoracolumbar junction, regardless of their neurological status. All patients were treated within 48 hours from the injury. Monoaxial screws were used in all patients. Assessment of kyphosis correction by using the Cobb method and restoration of the anterior vertebral body height was performed radiologically postoperatively and at 3 and 6 months follow up. The clinical outcomes were evaluated using the modified Macnab criteria in the last follow-up. Radiological and clinical assessment was made by an independent observer.

Results: Demographic data of both groups were quite comparable. The mean operative time in Group B was significantly shorter than in group A (85±28 min. and 110±0.59 min. respectively). The mean operative blood loss was also significantly lower in Group B than in Group A (476±133.2cc and 656±195.9cc respectively). There was no significant difference between both groups as regards the degree of local kyphosis angle correction and anterior vertebral body height restoration or the correction loss observed during the follow up. Neurological recovery was observed in all patients. Clinically, 14 (56%) patients

Received on:
April 4th, 2017
Accepted on:
June 24th, 2017

in Group A and 21 (84%) patients in group B were within the Excellent/Good categories according to Macnab Criteria, whereas 11 (44%) patients in group A and 4 (16%) patients in Group B (16%) were in Fair/poor Group (P=0.064). No perioperative complications were recorded in either group.

Conclusion: Short-segment fixation using monoaxial pedicle screws and including the fractured vertebral body is as effective as long-segment pedicle screw fixation for treating A3 and A4 thoracolumbar burst fractures. It preserves motion segments and reduces the costs of surgery and seems to result in a better clinical outcome. (2017ESJ131)

Keywords: Thoracolumbar Burst Fracture, Long-Segment Pedicle Screw Fixation, Short-Segment Pedicle Screw Fixation, Intermediate Screw, Loss of Kyphosis Correction, Cobb Angle.

Introduction

The majority of spine surgeons prefer surgical intervention in treating thoracolumbar burst fractures. Surgical intervention is intended to decompress the spinal canal to assist neurological recovery, achieve rigid spinal fixation, correction of local kyphosis at fractured level.[6,12]

There is controversy between the spine surgeons regarding length of fixation procedures for adequately stabilizing the thoracolumbar burst fractures. Long segment fixation lengthens the lever arm and permits effective correction of kyphosis.[2] However, this technique requires more extensive paraspinal muscle dissection, a larger amount of intraoperative blood loss, longer operation time, and loss of many spinal motion segments for fixation.[2,8]

Short-segment fixation, on the other hand, requires a smaller incision, causes less spinal muscle damage during the surgery, and most importantly saves motion segments,[20,23] but some studies reported higher incidence of implant failure and long term loss of correction.[10,18] Kaneda et al,[13] and Kim et al,[17] found that inserting intermediate screw(s) in the fractured vertebra in short segment fixation is very effective in correcting the local kyphosis and preventing the recurrence of the deformity during the follow up.[13,17]

In fact, very few studies have compared between the long and short segment fixation for treating thoracolumbar burst fractures. Most of them included heterogeneous group of patients mixing type A fractures with the more complex and unstable types B and C. The aim of this study was to compare between long segment and short segment pedicle screw fixation for treating two similar cohorts of patients with thoracolumbar burst fractures.

Patients and Methods

After obtaining the Institution Review Board approval, fifty consecutive patients with thoracolumbar burst fractures randomly allocated into one of 2 groups were treated by posterior pedicle screw fixation in Assiut University Hospital during the period between October 2015 and December 2016. The first group (Group A) included 25 patients who were treated by long segment pedicle screw fixation, i.e., fixation of 2 levels above and below the fractured vertebra. The second group (Group B) included 25 patients who were treated by short segment fixation, i.e., 1 level above and 1 level below the fractured vertebra, with one or 2 intermediate screws in the fractured vertebra itself. Allocation of patients among treatment groups strictly followed a computer-generated random list. All patients were operated within 48 hours from the injury after their condition has been stabilized. Monoaxial screws were used in all patients. All study participants provided informed consent.

The inclusion criteria were single level fracture at thoracolumbar junction, Type A3 and A4 fracture according to the AO classification,[16] regardless of their neurological status. The exclusion criteria were 2 levels or more fractures at thoracolumbar junction, burst fracture away from thoracolumbar junction and all Type B and Type C fractures.

Diagnosis and fracture classification relied on anteroposterior and Lateral plain X-rays and CT images. The local kyphosis was assessed using the Cobb angle method.[5,21] The anterior and the posterior vertebral heights of the fractured vertebra were also measured and recorded. All surgeries were performed by experienced spine surgeon. MRI was routinely done for all neurologically affected patients who were included in our study, and posterior

decompression was performed in all of them. Fusion of the stabilized segment was not performed in any of the patients, and screws removal was planned to be done later on at 9-12 months follow up. Perioperative data including operative time, amount of blood loss, need for decompression, incidence and type of complications were recorded. Most patients were discharged from the hospital within 2 days postoperatively except those with associated injuries that mandated further hospitalization. External support was not used in any of the patients. Follow up was carried out in the outpatient clinic at 6 weeks, 12 weeks, and 24 weeks. Clinical outcome was evaluated using the modified Macnab criteria[1,19] and neurological assessment was done according to Frankel grading system.[9] Radiological assessment during follow up included the Cobb angle, the anterior and the posterior vertebral heights as well as the incidence of loosening, pulling out, implant breakage or pseudarthrosis. Radiological measurements and clinical outcome assessments were made by an independent observer (MAG), not responsible for any decision making or surgery.

Statistical analysis of the data was performed using SPSS 17.0 software (SPSS Inc., Chicago, IL). Continuous variables (such as age, kyphosis angle, operative time, blood loss) were compared using a two-sample t-test. Probability values of less than 0.05 were considered to be significant. Grouped variables such as gender, Mechanism of injury, fracture level, fracture classification, and neurological status) were evaluated using a Pearson chi-square test; values of less than 0.05 were considered significant.

Results

This prospective randomized controlled trial included 50 patients (32 males and 18 females, mean age 33.6±14.6 years) with thoracolumbar junction burst fracture (Type A3 and A4) surgically treated during the period between October 2015 and December 2016 in our hospital by either long segment or short segment fixation with intermediate screw (s) and were followed for 6 months. None of the patients was lost to follow-up during the 6 months study period. Table 1 summarizes the demographic data of the patients and confirms both groups are quite comparable with no significant differences between them.

The mechanism of injury was falling from a height (FFH) in 26 patients (52%), motor vehicle accidents (MVA) in 16 patients (32%), falling downstairs (FDS) in 5 patients (10%), and falling of a heavy object on the back in 2 patients (FHO) (4%). Associated injuries included calcaneal fractures in 6 patients (12%), long bone fractures in 2 patients (4%), head injury in 5 patients (10%), pelvic fracture in 1 patient (2%), and clavicle fracture in 1 patient (2%). Thirty patients (60%) were classified as A4 fractures and twenty patients (40%) as A3 fractures (Table 1) with no significant difference between the treatment groups.

The mean operative time of 85±.28 min. (Range, 60-120 min.) in Group B was significantly shorter (P=0.003) than that of Group A, which was 110±0.59 min. (Range, 60-270 min.). Similarly, the mean operative blood loss of 476±133.2 cc in Group B (Range, 300-800 cc) was significantly lower (P=0.001) than that of Group A, which was 656±195.9 cc (Range, 300-1000 cc). Posterior decompression was performed in 5 patients (20%) in Group A and in 2 patients (8%) in Group B. Dural laceration was discovered intraoperatively in one patient in Group A and was successfully repaired.

The mean Cobb angle (Table 2) in Group A improved from 15.1±9.8 preoperatively to 7.2±1.5 in the postoperative x-rays (P=0.004). The mean Cobb angle in Group B improved from 14.7±10.1 preoperatively to 6.8±1.8 in the postoperative x-rays (P=0.001). During the follow up, few degrees of correction were lost in many patients in both groups (Table 2). However, the degree of initial kyphosis correction as well as the amount of correction loss did not differ significantly between the two groups (P=0.397 and P=0.551 respectively).

Other radiological measurements including the anterior vertebral body height and the posterior vertebral body height are presented in table 3. There was significant improvement of the anterior body heights in both groups at the postoperative and follow up X-rays. However, there was no significant difference between the two groups in any of these radiological parameters.

Neurological recovery was observed in all patients in this series. Clinically (Figure 1 and Table 4), 14 patients in Group A (56%) and 21 patients in group B (84%) were within the Excellent/Good categories according to Macnab Criteria, whereas 11 patients in group A (44%) and 4 patients in Group B (16%) were in Fair/poor Group. However, this difference in the clinical outcome was not statistically significant (P=0.064). No perioperative complications were recorded in either group. Figures 2 and 3 are case examples of long and short segment fixation patients.

Table 1. Patients' Demographic Data

Parameters	Group A	Group B	P value
Gender (Male/Female)	16/9	16/9	1.000
Mean age in years (range)	34.8±14.9 (16-66)	30.8±11.0 (15-57)	0.276
Mechanism of injury			
FFH	11 (44.0%)	15 (60%)	0.432
MVA	8 (32.0%)	8 (32.0%)	
FDS	4 (16.0%)	1 (4.0%)	
FHO	2 (8.0%)	1 (4.0%)	
Associated injuries			
Fracture calcaneus	2 (8%)	4 (16%)	0.306
Fracture femur	2 (8%)	0 (0%)	
Head injury	2 (8%)	3 (12%)	
Fracture pelvis	1 (4%)	0 (0%)	
Fracture clavicle	0 (0%)	1 (4%)	
Thoracolumbar fracture level			
D11	1 (4%)	6 (24%)	0.092
D12	6 (24%)	8 (32%)	
L1	13 (52%)	6 (24%)	
L2	5 (20%)	5 (20%)	
Fracture Classification			
A3 Fracture	9 (36%)	11 (44%)	0.563
A4 Fracture	16 (64%)	14 (56%)	
Preoperative neurological status			
Frankel C	5 (20%)	2 (8%)	0.221
Frankel E	20 (80%)	23 (92%)	
Mean preoperative radiological measurements (range)			
Cobb Angle	15.1±9.8 (8-25)	14.7±10.1 (5-22)	0.887
Anterior vertebral height	2.7±0.3 (2-3)	2.6±0.3 (2-3)	
Posterior vertebral height	3.1±0.6 (2-4)	3.2±0.5 (2-4)	

Table 2. Changes in kyphosis Angle (Cobb's method)

Cobb Method	Group A (Long Segment)		Group B (Short Segment)		P. value
	Mean±SD	Range	Mean±SD	Range	
Pre operatively	15.1±9.8	7.7-24.5	14.7±10.1	5.2-22	0.887
Post operatively	7.2±1.5	0.5-10	6.8±1.8	0.5-10	0.397
6 months follow up	9.7±2.2	2-11	10.1±2.5	2-12	0.551

Table 3. Changes in Anterior and Posterior Vertebral Body Heights

Parameters	Anterior VBH		Posterior VBH	
	Group A	Group B	Group A	Group B
PreOp	2.7±0.3	2.6±0.3	3.1±0.6	3.2±0.5
PostOp	2.9±0.1	2.9±0.1	3.3±0.4	3.2±0.3
Follow up	2.8±0.1	2.8+0.1	3.2±0.6	3.3±0.4
P value	0.001	0.003	0.672	0.439

Table 4. Clinical Outcome at 6 Months Follow Up (Modified Macnab's Criteria)

Macnab's Criteria	Group A		Group B		P. value	
	No.	%	No.	%		
Excellent and Good	14	56.0	21	84.0	0.310	0.064
Fair and Poor	11	44.0	4	16.0	0.121	

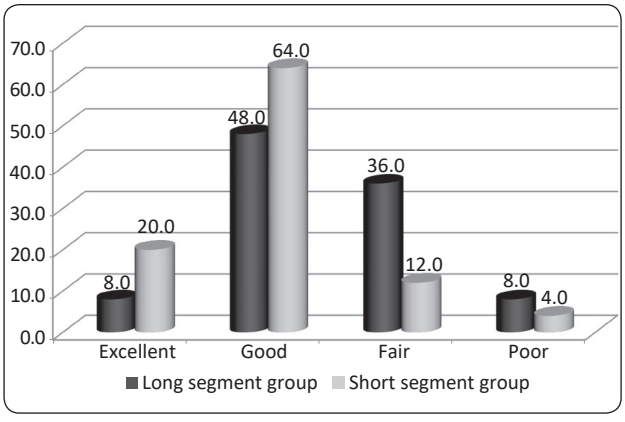

Figure 1. Clinical outcome at 6 months follow up according to the Macnab's criteria

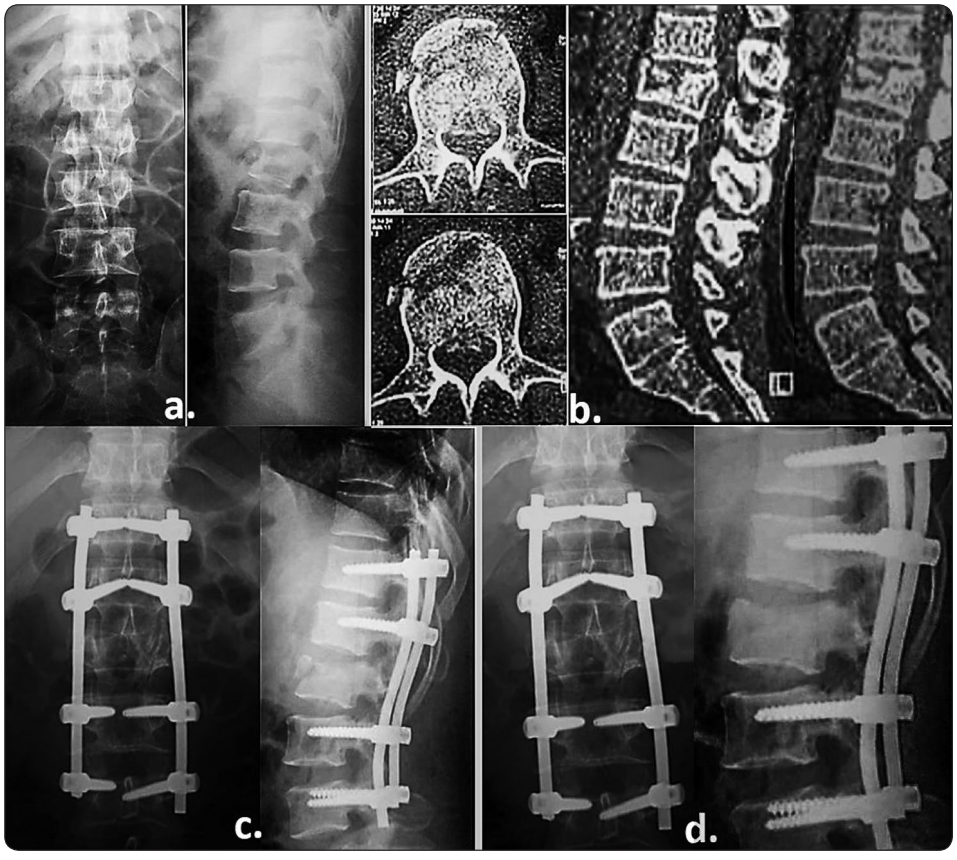

Figure 2. Male patient, 30 years old with A3 fracture of L2. He was neurologically intact and treated by long segment fixation from T12 to L4 with fair clinical outcome. (A) Preoperative plain X-rays (Cobb angle 8°, AVH 3.1 cm, PVH 2.9 cm) (B) Preoperative CT scan (C) Postoperative plain X-rays (Cobb angle 6°, AVH 3.7 cm, PVH 3 cm) (D) Six-month Plain X-rays (Cobb angle 7°, AVH 3.6 cm, PVH 3 cm).

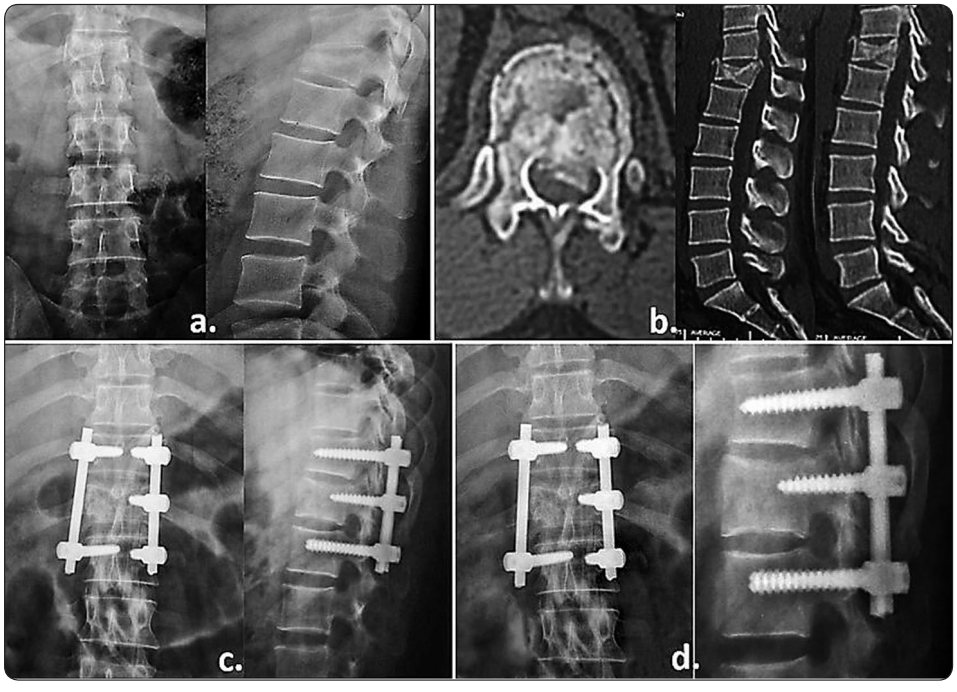

Figure 3. Male patient, 34 years old with A4 fracture of T12. He was neurologically intact and treated by short segment fixation from T11 to L1 with excellent clinical outcome. (A) Preoperative plain X-rays (Cobb angle 24°, AVH 2 cm, PVH 2.5 cm) (B) Preoperative CT scan (C) Postoperative plain X-rays (Cobb angle 8°, AVH 2.4 cm, PVH 2.5 cm) (D) Six-month Plain X-rays (Cobb angle 8°, AVH 2.4 cm, PVH 2.5 cm).

Discussion

Multiple variables have to be considered when treating thoracolumbar fractures such as the type and stability of the fracture, degree of comminution, and neurological status.[24] Very few studies have compared between long-segment and short-segment posterior fixation,[11,22] and all of them have mixed fracture severity ranging from type A to C according to the AO Classification of thoracolumbar fractures. This prospective randomized controlled trial included only patients with Type A3 and A4 burst fractures, and compared the clinical and radiological outcome between the long-segment fixation with that of short-segment fixation with one or two intermediate screws in the fractured vertebra. Both groups' demographic data were quite comparable. A significantly shorter operative time and less blood loss was observed in the short segment group. The degree of local kyphosis correction, anterior vertebral height correction, degree of correction lost during the follow up did not differ between the two groups. The clinical outcome was marginally better in the short segment group, but did not reach the level of statistical significance.

Our results confirm that of Butt et al,[4] Kanna et al,[14] and Katonis et al,[15] who reported satisfactory clinical and radiological results in their uncontrolled series with using short segment pedicle screw fixation in management of thoracolumbar burst fractures. Furthermore, Kim et al,[17] suggested that short-segment pedicle screw fixation with inserting one or two screws in the fractured level was enough in the management of selected young patients with unstable burst fracture. Hur et al,[11] who compared between long and short segment fixation, concluded that the loss of kyphosis correction, and the clinical outcome was not significantly different between the long-segment and short-segment group. In a recent meta-analysis comparing between long and short segment fixation, no significant difference was identified between the two groups regarding radiological outcome, functional outcome, neurologic improvement, and implant failure rate.[3]

Although Tezeren et al,[22] who studied the biomechanical difference between the two techniques found that long-segment fixation can lead to a better correction of the local kyphosis angle and restoration of the anterior vertebral body height, he failed to prove any clinical advantage of this long segment fixation.[22] Furthermore, he did not put screws in the fractured vertebra in his study, which certainly has weakened his construct. On the other hand, we believe that short-segment fixation with inserting one or two intermediate screws in the fractured vertebra allows for adequate spinal stabilization and leads to a better clinical outcome due to preserving many valuable motion segments. It should be noted here that only monoaxial screws should be used in this technique of short segment fixation to minimize loss of correction and recurrence of local kyphosis.

Our study has many limitations. First, it included relatively small number of patients, which failed to show a statistically significant better clinical outcome with short segment fixation despite the observation of a clear trend towards better clinical outcome with short segment fixation. This, however, is an ongoing study and a bigger series with long term follow up will be reported later. The second limitation of this study is the short follow up period. However, unlike spinal fusion, vertebral body fracture healing is known to occur within few months and construct failures due to inadequate stabilization usually occurs very early within the first 2-3 months, especially with short segment fixation. We have not observed any construct failures or pulling out in all our patients at 6 months follow up. The third limitation of the study is the heterogeneity of the patients in each group, having both A3 and A4 fractures. However, our primary goal was not to include any type B or C fractures in our series and because both fracture subtypes are represented in both treatment groups with no significant difference between them, we do not believe this heterogeneity has influenced the results. Finally, using one intermediate screw in some cases and two intermediate screws in other cases in Group B may have also confounded our results. We had planned to place two screws in each fractured vertebra in the short segment group. However, in many cases, one of the pedicles was broken and it was not possible to place the screw safely. Comparison between the two patient populations is not currently feasible because of the

small number in each group. Nevertheless, Kim et al,[17] did not find significant difference when placing one or two screws in fractured vertebra.

Conclusion

Short-segment fixation using monoaxial pedicle screws and including the fractured vertebral body is as effective as long-segment pedicle screw fixation for treating A3 and A4 thoracolumbar burst fractures. It preserves motion segments and reduces the costs of surgery and seems to result in a better clinical outcome.

References

1. Ahn Y, Lee SH, Chung SE, Shin S.W: Percutaneous endoscopic cervical discectomy for diagnostic cervical headache due to soft tissue disc herniation. Neuroradiology J 47:924-930, 2005
2. Alvine GF, Swain JM, Asher MA, Burton DC: Treatment of thoracolumbar burst fractures with variable screw placement or Isola instrumentation and arthrodesis: case series and literature review. J Spinal Disord Tech 17:251-264, 2004
3. Aly TA: Short Segment versus Long Segment Pedicle Screws Fixation in Management of Thoracolumbar Burst Fractures: Meta-Analysis. Asian Spine J 11:150-160, 2017
4. Butt MF, Farooq M, Mir B, Dhar AS, Hussain A, Mumtaz M: Management of unstable thoracolumbar spinal injuries by posterior short segment spinal fixation. Int Orthop 31:259-264, 2007
5. Cobb JR: Outline for the study of scoliosis. The American Academy of Orthopedic Surgeons Instructional Course Lectures. Vol. 5. Ann Arbor, MI: Edwards, 1948
6. Dai LY, Yao WF, Cui YM, Zhou Q: Thoracolumbar fractures in patients with multiple injuries: diagnosis and treatment-a review of 147 cases. J Trauma 56:348–355, 2004
7. El-Shehaby A, Saoud K, Elayouty A: Comparison of long segment fixation versus short segment fixation with pedicle screws at the level of the fracture in the management of Thoracolumbar fractures. Egyptian Spine Journal 5: 47-52, 2013
8. Esses SI, Botsford DJ, Wright T, Bednar D, Bailey S: Operative treatment of spinal fractures with the AO internal fixator. Spine 16 (suppl):S146–150, 1991
9. Frankel HL, Hancock DO, Hyslop G, Melzak J, Michaelis LS, Ungar GH, et al: The value of postural reduction in the initial management of closed injuries of the spine with paraplegia and tetraplegia. Paraplegia 7:179–192, 1969
10. Gurwitz GS, Dawson JM, McNamara MJ, Federspiel CS, Spengler DM: Biomechanical analysis of three surgical approaches for lumbar burst fractures using short segment instrumentation. Spine 18:977–982, 1993
11. Hur JW, Rhee JJ, Lee JW, Lee HK: A Comparative Analysis of the Efficacy of Short-Segment Pedicle Screw Fixation with that of Long-Segment Pedicle Screw Fixation for Unstable Thoracolumbar Spinal Burst Fractures. Clinical Medicine Research 4:1-5, 2015
12. Jacobs RR, Asher MA, Snider RK: Thoracolumbar spinal injuries. A comparative study of recumbent and operative treatment in 100 patients. Spine 5:463-477, 1980
13. Kaneda K, Abumi K, Fujiya M: Burst fractures with neurologic deficits of the thoracolumbar-lumbar spine: Results of anterior decompression and stabilization with anterior instrumentation. Spine 9:788–795, 1984
14. Kanna RM, Shetty AP, Rajasekaran S: Posterior fixation including the fractured vertebra for severe unstable thoracolumbar fractures. Spine 15:256-264, 2015
15. Katonis PG, Kontakis GM, Loupasis GA, Aligizakis AC, Christoforakis JI, Velivassakis EG: Treatment of unstable thoracolumbar and lumbar spine injuries using Cotrel-Dubousset instrumentation. Spine 24:2352-2357, 1999
16. Kepler CK, Vaccaro AR, Koerner JD, Dvorak MF, Kandziora F, Rajasekaran S, et al: Reliability analysis of the AO spine thoracolumbar spine injury classification system by a worldwide group of naive spinal surgeon. Eur Spine J 25:1082-1086, 2015
17. Kim GW, Jang JW, Hur H, Lee JK, Kim JH, Kim SH: Predictive factors for a kyphosis recurrence following short-segment pedicle screw fixation including fractured vertebral body in unstable

thoracolumbar burst fractures. J Korean Neurosurg. Soc. 56:230-236, 2015
18. Kramer DL, Rodgers WB, Mansfield FL: Transpedicular instrumentation and short-segment fusion of thoracolumbar fractures: a prospective study using a single instrumentation system. J Orthop Trauma 9:499–506, 1995
19. Macnab I: Negative disc exploration: an analysis of the cause of nerve root involvement in sixty-eight patients. J Bone Joint Surg (Am) 53:891-903, 1971
20. Mahar A, Kim C, Wedemeyer M, Mitsunaga L, Odell T, Johnson B, et al: Short-segment fixation of lumbar burst fractures using pedicle fixation at the level of the fracture. Spine 32:1503-1507, 2007
21. Sasso RC, Best NM, Reilly TM, McGuire RA Jr: Anterior-only stabilization of three-column thoracolumbar injuries. J Spinal Disord Tech 18:S7–14, 2005
22. Tezeren G, Kurul: Posterior fixation of thoracolumbar burst fracture: short-segment pedicle fixation versus long-segment instrumentation. J Spinal Disord Tech. 18:485-488, 2005
23. Wang ST, Ma HL, Liu CL, Yu WK, Chang MC, Chen TH: Is fusion necessary for surgically treated burst fractures of the thoracolumbar and lumbar spine? A prospective, randomized study. Spine 31: 2646-2652, 2006
24. Wood KB, Bohn D, Mehbod A: Anterior versus posterior treatment of stable thoracolumbar burst fractures without neurologic deficit: a prospective, randomized study. J Spinal Disord Tech. 18:15–23, 2005

Address reprint request to:

Mohammad El-Sharkawi, MD.
Department of Orthopaedic and Trauma Surgery, Assiut University Medical School, Assiut, 71511 Egypt - E-mail: sharkoran@aun.edu.eg

الملخص العربي

مقارنة ما بين التثبيت الطويل والتثبيت القصير لعلاج كسور الفقرات الظهرية القطنية المتفتتة

البيانات الخلفية: لا يزال اختيار طريقة التثبيت المناسبة لعلاج كسور الفقرات الظهرية القطنية مثار خلاف بين الجراحين. فكلا من التثبيت الطويل والتثبيت القصير قد تم استخدامهم بصورة واسعة دون تحديد أي طريقة أفضل في علاج هذه الكسور.

الغرض: مقارنة ما بين كفاءة التثبيت الطويل وكفاءة التثبيت القصير في علاج كسور الفقرات الظهرية القطنية المتفتتة.

تصميم الدراسة: هذه الدراسة هي دراسة مستقبلية مقارنة لعدد 50 مريض عانوا من كسور الفقرات الظهرية القطنية المتفتتة.

المرضى والطرق: تشمل هذه الدراسة 50 مريض عانوا من كسور الفقرات الظهرية القطنية المتفتتة الذين ترددوا على مستشفى أسيوط الجامعي في الفترة ما بين شهر أكتوبر 2015 إلى شهر ديسمبر 2016. تم تقسيم المرضي عشوائيا إلى مجموعتين: المجموعة أ (25 مريض) تم تثبيت الكسر بواسطة التثبيت الطويل (تثبيت فقرتان أعلى الفقرة المكسورة وفقرتان أسفلها). المجموعة ب (25 مريض) تم تثبيت الكسر بواسطة التثبيت القصير (تثبيت فقرة أعلى الفقرة المكسورة وفقرة أسفلها مع تثبيت الفقرة المكسورة أيضا بمسمار أو اثنين). تقييم المرضي تم بعد العملية مباشرة وفي زيارات منتظمة بعد 3 اشهر وبعد 6 اشهر من الجراحة. في كل حالة كان يتم تقييم درجة إصلاح التحدب باستخدام طريقة كوب (Cobb)واستعادة الفقرة المكسورة لارتفاعها عن طريق قياس ارتفاع الفقرة المكسورة الأمامي والخلفي باستخدام الأشعة السينية. وأيضا تم تقييم المرضى أكلينيكيا باستخدام معيار مكناب (Modified Mcnab criteria).

النتائج: أظهرت المؤشرات الإحصائية أنه تقريبا لا يوجد اختلاف ما بين المجموعتين في درجة إصلاح التحدب باستخدام طريقة كوب وأيضا في درجة استعادة الفقرة المكسورة لارتفاعها. كما أظهر التقييم الأكلينيكي باستخدام معاير مكناب أن هناك 14 مريضا في المجموعة أ و21 مريضا في المجموعة ب بين الفئات (ممتاز/جيد)، بينما 11 مريضا في المجموعة أ و4 مرضى في المجموعة ب بين الفئات (متوسط/ضعيف) وأيضا إحصائيا لا يوجد اختلاف بين المجموعتين.

الاستنتاج: النتائج بعد التقييم الأكلينيكي ومناظرة الأشعات تؤكد أن كفاءة التثبيت القصير تماثل كفاءة التثبيت الطويل فى علاج كسور الفقرات الظهرية القطنية المتفتتة.