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Short Segment versus Long Segment Pedicle Screws Fixation in Management of Thoracolumbar Burst Fractures

Shehab El-khadarway
Professor of Neurosurgery Department, Faculty of Medicine– Al-Azhar University, Egypt

Adel Ragab
Professor of Neurosurgery Department, Faculty of Medicine– Al-Azhar University, Egypt

Massoud Mahmoud Mostafa
Professor of Neurosurgery Department, Faculty of Medicine– Al-Azhar University, Egypt, Massoudelkhiat@gmail.com

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ORIGINAL ARTICLE

fiShort Segment Versus Long Segment Pedicle Screws Fixation in Management of Thoracolumbar Burst Fractures

Shehab El-khadarway [a,*], Adel Ragab [a], Massoud Mahmoud Mostafa [b]

[a] Neurosurgery Department, Faculty of Medicine, Al-Azhar University, Egypt
[b] Neurosurgery, EL-Ahrar Teaching Hospitals, Egypt

Abstract

Background: **It is still debatable which stabilizing techniques should be used to treat thoracolumbar burst fractures.**

Aim of study: **To evaluate the results of thoracolumbar burst fracture therapy using long-segment and short segment posterior fixation.**

Patients and methods: **Between August 2019 and February 2022, 60 patients who met the inclusion criteria received posterior pedicle screw fixation for burst thoracolumbar spine fractures at the Neurosurgery Department of Al-Azhar University Hospitals and El-Ahrar General Hospital, Zagazig. One of two groups was randomly assigned to the patients. One level above and one level below the broken vertebra, or short segment fixation, was used to treat the short segment group of 30 patients.**

Results: **Both groups' demographic information was quite similar. The median operation time in short segment group (187.25 ± 20.25 min) was substantially shorter than long segment fixation group (212.22 ± 30.51 min). Blood loss was substantially less in short segment group (567 ± 87.8 ml) than long segment fixation group (870.3 ± 107.8 ml). Follow up Cobb's angle (12 week after surgery) was substantially lower in long segment fixation group than short segment fixation group (7.7 ± 2.03 vs. 9.03 ± 1.67, $P = 0.007$), Absolute decrease of angle of kyphosis in long segment fixation group was substantially greater in long segment fixation group than short segment group (16.55 ± 4.80 vs. 13.22 ± 2.35, $P = 0.001$).**

Conclusion: **For the treatment of thoracolumbar burst fractures, short segment fixation is just as successful as long-segment pedicle screw fixation. It retains mobility segments, lowers surgical expenses, and seems to provide a superior clinical outcome.**

Keywords: Long-segment pedicle screw fixation, Short segment pedicle screw fixation, Thoracolumbar burst fracture

1. Introduction

The most frequent traumatic injuries to the spinal column are called thoracolumbar (TL) fractures. About 15,000 TL injuries occur in the United States each year; the majority of these cases are brought on by high-energy trauma in younger individuals, often as a consequence of a car collision. Additionally, older people have almost 700,000 osteoporotic fractures each year.[1]

The T10 to L2 level is where TL injuries happen most often. Due to the transition between the rigid, kyphotic thoracic spine and the flexible, lordotic lumbar spine, the TL junction is more prone to injury. Neurological deficits are caused by TL fractures in around 25% of cases. Compression fractures, burst fractures, flexion-distraction injuries, and translational injuries are the four most common spinal injuries.[2]

According to Denis et al. 1983 3-column hypothesis, a burst fracture is a compression fracture of the anterior and middle vertebral columns that pushes a piece of the posterior vertebral body into the spinal canal.[3] Because the thoracolumbar area is in the

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* Corresponding author. Neurosurgery Department, Faculty of Medicine— Al-Azhar University, Egypt
E-mail address: Massoudelkhiat@gmail.com (S. El-khadarway).

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transitional zone between the hard thoracic kyphosis and more flexible lumbar lordosis, it has been documented to be the site of the most spinal fractures.[4]

If there is minimal kyphotic deformity, no neurological damage, or an unsteady posterior vertebral column, conservative therapy is often the approach of choice. Surgical stabilization is recommended in cases of unstable thoracolumbar burst fractures. Surgery's primary objectives are to restore spinal stability, repair deformities, and decompress the spinal canal while protecting neurological function.[5–11]

In order to address thoracolumbar burst fractures, this research compared the results of long segment versus short segment posterior fixation.

The goal of the study was to evaluate the results of thoracolumbar burst fracture therapy using long segment and short segment posterior fixation.

Fig. 1. Preoperative CT scan of Dorsolumbar spine sagittal view Showing D12 fracture including upper end and posterior wall (AOSpine A3; incomplete burst fracture) anterior and middle column with small retropulsed segment in spinal canal opposite fractured level.

2. Patients and methods

Between August 2019 and February 2022, 60 patients who met the inclusion criteria and had a posterior pedicle screw fixation for a burst thoracolumbar spine fracture at the Neurosurgery Department of Al-Azhar University Hospitals and El-Ahrar General Hospital, Zagazig, participated in this prospective comparative analysis.

Patients were randomized into one of two groups: One level above and one level below the broken vertebra, or short segment fixation, was used to treat the short segment group of 30 patients. Long segment pedicle screw fixation, or fixing the vertebra at two levels above and below the fracture, was used to treat the long segment group of (30 patients).

2.1. Inclusion criteria

Patients with traumatic thoracolumbar burst fractures who volunteered to participate in the research were 18–55 years old, had normal spinal conditions prior to the fracture, and suggested surgical intervention by short or long segment pedicle screws.

2.2. Exclusion criteria

Patients presented by non traumatic thoracolumbar fractures, patients with more than one-level fracture, patients with compromised spinal canal more than 50%, patients with marked kyphosis or scoliosis.

2.3. Ethical approval

The Institutional Review Board (IRB) Committee of Al-Azhar University Hospitals gave its clearance to the research. A signed informed permission was acquired from each individual partaking in the research at the time of registration.

2.4. Methodology

2.4.1. Pre-operative evaluation

History taking: full history taking including age and sex, general examination, local clinical evaluation: Type of trauma, full Neurological Examination by American Spinal Injury Association (ASIA) scale,

Fig. 2. Preoperative CT scan of Dorsolumbar spine sagittal view showing L1 fracture including upper end and posterior wall with monosegmental transosseous fracture (Aospine B1, chance fracture), it involves both anterior and middle column and also posterior column involvement with retropulsed segment in spinal canal opposite fractured level.

Fig. 3. Preoperative CT scan of Dorsolumbar spine sagittal view showing L1 fracture including upper endplate and lower endplate with posterior wall involvement (Aospine A4, Complete burst fracture), it involves both anterior and middle column with small retropulsed segment in spinal canal opposite fractured level.

level of fracture, and pain visual analogue score (VAS) and radiological Evaluation: X-ray, CT, and MRI of thoracolumbar area (Figs. 1−4).

2.4.2. Operative procedures

In order to reduce bleeding from the epidural venous plexus and achieve a large early decrease of the spinal fracture, patients were gently log-rolled into a hyperextended, prone posture with the abdomen hanging loose. Prepared and draped in part while taking the necessary aseptic measures. The region to be instrumented is cut from one or two spinous processes above and below. From the lamina to the tips of the transverse processes, there

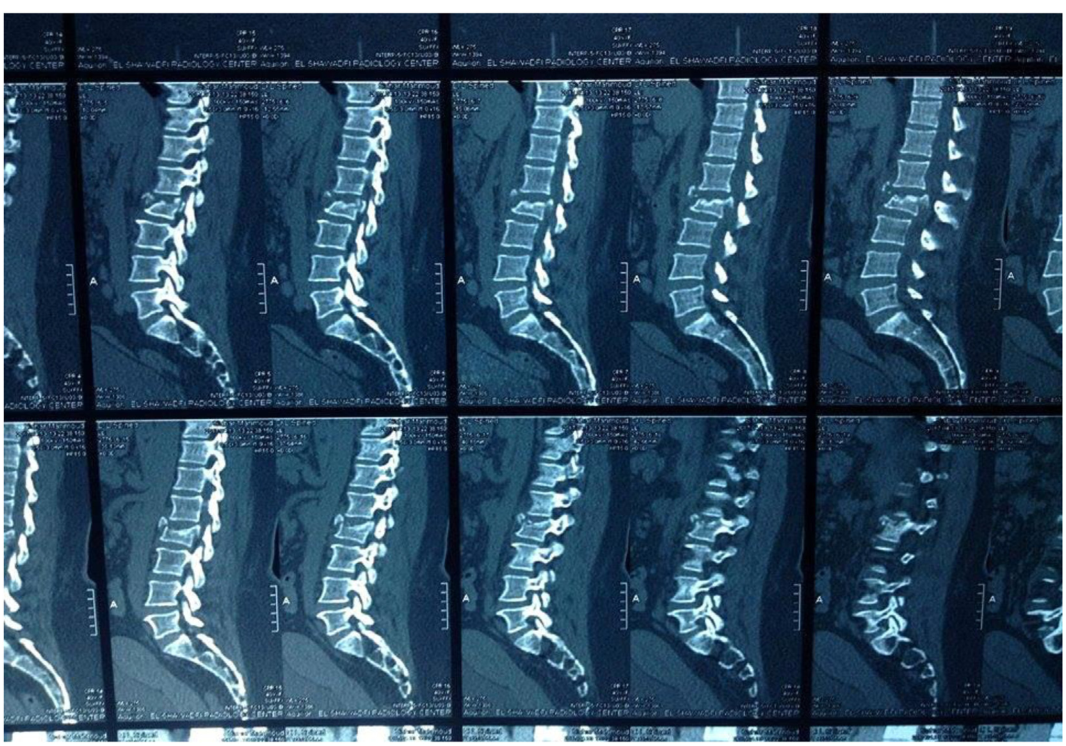

Fig. 4. Preoperative CT scan of Dorsolumbar spine sagittal view showing L2 fracture including upper end and posterior wall (AOSpine A3; incomplete burst fracture), it involves both anterior and middle column with small retropulsed segment in spinal canal opposite fractured level.

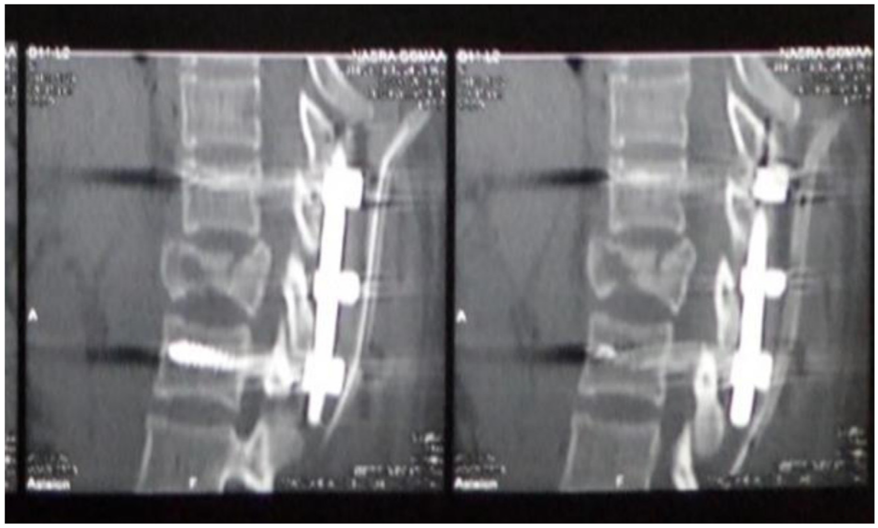

Fig. 5. Post-operative CT scan of Dorsolumbar spine sagittal view.

was an elevation of the fascia and the par spinal muscles. Short Segment Posterior Fixation (SSPF) (Short Segment Group) and Long-Segment Posterior Fixation (LSPF) (Long-Segment Group) pedicle screws were inserted one level above and below the fractured vertebra and two or more levels above and below, respectively, and fixed with the rod on one side provisionally. Posterior or Poster lateral decompression was then performed, and the anterior column was The 6 mm rods were shaped to mimic the typical sagittal curvature of the thoracolumbar spine after pedicle screw instrumentation (Figs. 5–8).

2.4.3. Postoperative evaluation

(1) Clinical and radiological evaluation. (2) Pain evaluation by VAS score. (3) Oswestry Disability Index (ODI) score.

2.4.4. Postoperative complications

(1) Wound infection. (2) CSF leakage. (3) New neurological deficit. (4) Vascular complications.

2.4.5. Follow-up imaging evaluation

(1) Implant system failure. (2) Caps loosening. (3) Rod slippage. (4) Screw breakage. (5) Screw pullout. (6) Cross-link slippage.

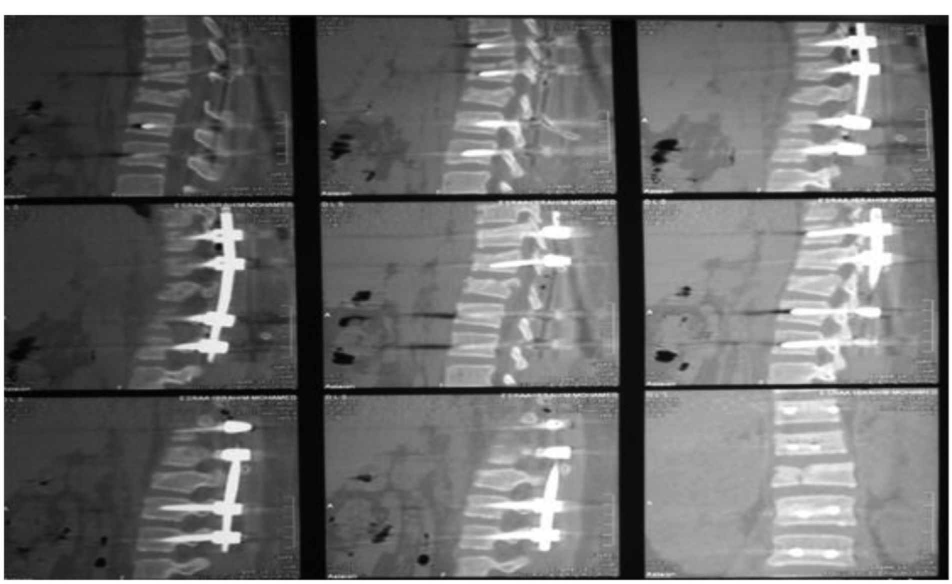

Fig. 6. Illustration of post-operative CT scan of Dorsolumbar spine sagittal view showing D12 fracture operated upon by long segment fixation with spinolaminer decompression opposite fractured level, well directed screws at level L1, L2 & D10, D11.

Fig. 7. Illustration of post-operative CT scan of Dorsolumbar spine sagittal view showing L1 fracture operated upon by Short segment fixation without decompression opposite fractured level, well directed screws at level D12, L2.

2.5. Statistical analysis

Utilizing statistical analysis, Data were analyzed utilizing MedCalc Statistical Software version 20 (MedCalc Software Ltd, Ostend, Belgium; https://www.medcalc.org; 2021) and IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY). The Pearson chi-square test or Fisher's exact test is employed to assess intergroup differences for categorical variables, which are reported as counts, percentages, or ratios. Intergroup differences are compared utilizing the independent-samples *t*-test, and continuous

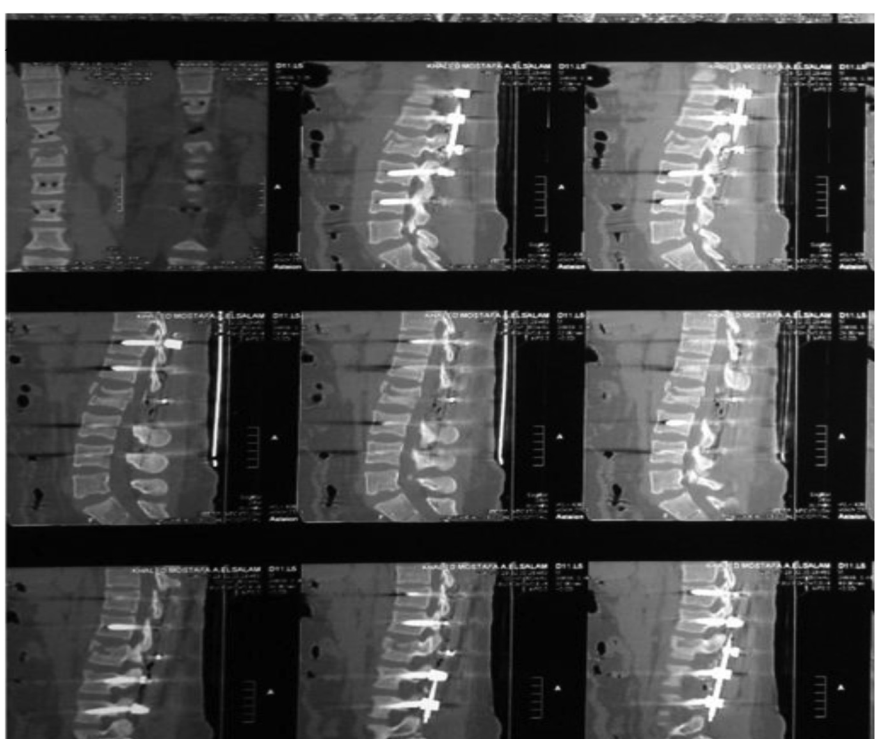

Fig. 8. Illustration of post-operative CT scan of Dorsolumbar spine sagittal reconstruction showing L2 fracture Operated upon by long segment fixation with spinolaminar decompression opposite fractured level, well directed screws.

numerical variables are reported as mean and standard deviation. Differentials are compared using the Mann-Whitney test for discrete numerical variables, which are reported as median and range. Statistical significance is defined as P values < 0.05.

3. Results

Male was the predominant sex in both short and long segment fixation groups. Mean age in short segment fixation group was 30.75 years (22–40 years) while in long segment fixation group median age was 29.25 (18–45 years) with no significant differences between them (Table 1).

The most prevalent pain visual analogue score (PVAS) in both groups was mild score where it constituted 60% of short segment fixation group versus 70% of long segment fixation group (Mean ± SD: 6.21 ± 1.5 vs. 5.66 ± 1.23) of insignificant variance between two researched groups ($P > 0.05$) (Table 2).

Table 1. The demographics of the examined groups.

Demographic data	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test	P value (Sig.)
Sex						
Male	17	57%	19	63%	0.069	0.792
Female	13	43%	11	37%		(NS)
Age (years)						
Mean ± SD	30.75 ± 5.95		29.25 ± 8.65		0.783	0.437
(Range)	(22–40)		(18–45)			(NS)

Table 2. Comparison between short segment fixation group and long segment fixation group as regard preoperative clinical evaluation.

Pre-operative PVAS	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test	P value (Sig.)
PVAS						
No pain	0	0%	0	0%	0.293	0.588
Mild	18	60%	21	70%		(NS)
Moderate	12	40%	9	30%		
Severe	0	0%	0	0%		
Mean ± SD	6.21 ± 1.5		5.66 ± 1.23			0.125
Median (range)	15 (4–9)		5.5 (4–8)		1.553	(NS)

The operative time in short segment group (187.25 ± 20.25 min) was significantly shorter than long segment fixation group (212.22 ± 30.51 min). Blood loss was substantially less in short segment group (567 ± 87.8 ml) than long segment fixation group (870.3 ± 107.8 ml) (Table 3).

Early postoperative clinical evaluation (0–3 days after surgery, during hospital stay): PVAS was insignificantly lower in short segment than long segment fixation group (Mean ± SD: 4.16 ± 1.61 vs. 4.91 ± 1.62, $P = 0.077$), 57% of short segment fixation group had mild VAS of pain compared 57% of long segment fixation group had moderate VAS of pain. Also ODI was insignificantly lower in short segment fixation compared to long segment fixation group (Mean ± SD: 28.44 ± 12.58 vs. 33.83 ± 11.58). 50% of short segment fixation group had minimal ODI compared to 50% of long segment fixation group had moderate ODI (Table 4).

There was significant shorter hospital stays in short segment (7.52 ± 2.85 days) compared to segment fixation group (9.22 ± 3.25 days) ($P = 0.035$). CSF leakage occurs in only one patient of short segment fixation group (3.3%) versus two patients of long segment fixation group (6.7%), also new neurological deficit occurs in only two patients of short segment fixation group (6.7%) versus three patients of long segment fixation group (10%) of insignificant difference between two studied groups ($P = 0.571$) (Table 5). No mortality rate recorded among studied cases.

Late postoperative clinical evaluation (after 12 weeks follow up): 67% of short segment had minimal ODI compared to 57% of long segment fixation group. 23% and 10% of short and long segment fixation groups respectively had no pain while 10% and 33% of short and long segment fixation groups respectively had moderate VAS for pain. Mean ± SD of PVAS was 3.85 ± 1.88 vs. 4.41 ± 1.78 with insignificant differences between them ($P = 0.241$). 60% and 67% of short and long segment fixation groups respectively had moderate ODI while 40% and 33% of short and long segment fixation groups respectively had minimal ODI. Mean ± SD of ODI was 22.62 ± 8.46 versus 24.33 ± 9.99 in short and long

Table 3. Operative time and blood loss of studied cases.

Early postoperative Clinical evaluation	Short segment fixation (SS) ($N = 30$)	Long segment fixation (LS) ($N = 30$)	Test	P value (Sig.)
Operative time (min)				
Mean ± SD	187.25 ± 20.25	212.22 ± 30.51	3.735	0.0004
(Range)	(150–230)	(180–270)		(HS)
Blood loss (ml)				
Mean ± SD	567 ± 87.8	870.3 ± 107.8	11.949	<0.0001
(Range)	(490–700)	(600–920)		(HS)

Table 4. *Early postoperative clinical evaluation.*

Early postoperative clinical evaluation	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test	P value (Sig.)
PVAS						
No pain	0	0%	0	0%	5.555	0.062
Mild	17	57%	8	27%		(NS)
Moderate	10	33%	17	57%		
Severe	3	10%	5	16%		
Mean ± SD	4.16 ± 1.61		4.91 ± 1.62		1.799	0 .077
(Range)	(2–7)		(3–8)			(NS)
ODI						
Minimal	15	50%	7	23%	4.858	0.088
Moderate	11	37%	15	50%		(NS)
Severe	4	13%	8	27%		
Very serious	0	0%	0	0%		
Exaggerated	0	0%	0	0%		
Mean ± SD	28.44 ± 12.58		33.83 ± 11.58		1.727	0.089
(Range)	(10–44)		(10–48)			(NS)

Table 5. *Primary outcome in studied groups.*

Primary outcome	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test	P value (Sig.)
Hospital stays (days)						
Mean ± SD	7.52 ± 2.85		9.22 ± 3.25		2.154	0.035
(Range)	(6–10)		(7–14)			(S)
Early Postop. complications						
Wound infection	0	0%	0	0%	0.320	0.571
CSF leakage	1	3.3%	2	6.7%		
New Neurological deficit	2	6.7%	3	10%		
Vascular complications	0	0%	0	0%		
Mortality rate	0	0%	0	0%		

segment fixation groups respectively with insignificant differences between them ($P = 0.477$) (Table 6).

Follow-up imaging evaluation (12 week after surgery): 12 week after surgery, 7 cases of short segment group presented with implant failure (5 cases with screw breakage and 2 cases with rod breakage) versus to 3 cases of long segment group presented with rod breakage with insignificant differences between them ($P = 0.167$) (Table 7).

Change in VAS of pain: There were insignificant improvements in PVAS in both groups. 7 cases (23%) and 3 cases (10%) of short and long segment

Table 6. *Late postoperative clinical evaluation.*

Follow up of clinical evaluation (12 week post-op)	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test	P value (Sig.)
PVAS						
No pain	7	23%	3	10%	5.612	0.0604
Mild	20	67%	17	57%		(NS)
Moderate	3	10%	10	33%		
Severe	0	0%	0	0%		
Mean ± SD	3.85 ± 1.88		4.41 ± 1.78		1.185	0.241
(Range)	(0–6)		(2–8)			(NS)
ODI						
Minimal	12	40%	10	33%	0.072	0.788
Moderate	18	60%	20	67%		(NS)
Severe	0	0%	0	0%		
Very serious	0	0%	0	0%		
Exaggerated	0	0%	0	0%		
Mean ± SD	22.62 ± 8.46		24.33 ± 9.99		0.715	0.477
(Range)	(10–34)		(10–38)			(NS)

Table 7. *Comparison between short segment fixation group and long segment fixation.*

Follow up Imaging evaluation (12 week Post-op)	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test	P value (Sig.)
Implant system failure						
Caps loosening	0	0%	0	0%		
Rod slippage	0	0%	0	0%		
Screw breakage	5	17%	0	0%	1.908	0.167 (NS)
Screw pullout	0	0%	0	0%		
Rod breakage	2	6%	3	10%		
Cross-link slippage	0	0%	0	0%		

Table 8. *Comparison between short segment fixation group and long segment fixation group as regard change in VAS of pain.*

Change in PVAS	Short segment fixation (SS) ($N = 30$)		Long segment fixation (LS) ($N = 30$)		Test ‡	P value (Sig.)
Change						
Mild to no pain	7	23%	3	10%		
Mild (no change)	11	37%	8	27%		
Moderate to no pain	0	0%	0	0%		
Moderate to mild	7	23%	7	23%		
Moderate (no change)	3	10%	7	23%	6.674	0.246 (NS)
Moderate to severe	0	0%	0	0%		
Severe to no pain	0	0%	0	0%		
Severe to mild	2	6%	2	6%		
Severe to moderate	0	0%	3	10%		
Severe (No change)	0	0%	0	0%		

group was improved from mild PVAS to no pain. 7 cases (23%) in both groups were improved from moderate to mild PVAS. 2 cases (6%) in both groups were improved from severe to mild PVAS. 3 cases (10%) of long segment group was improved from severe to moderate PVAS compared to no cases in short segment group ($P = 0.246$) (Table 8).

4. Discussion

The present research included 60 patients who met the inclusion criteria and had posterior pedicle screw treatment for a thoracolumbar spine burst fracture. Enrolled patients were split into two equal groups according to the kind of pedicle screw utilized: Short Segment Group For Short Segment Posterior Fixation (SSPF), pedicle screws were put one level above and below the damaged vertebra and Long-Segment Group where Long-Segment Posterior Fixation (LSPF) was performed, utilizing two or more levels above and below, and secured with the rod on one side temporarily. This was followed by posterior or posterior lateral decompression, and the anterior column was rebuilt using either a cage filled with graft or graft alone.

Our study revealed male predominance both short and long segment fixation groups. Mean age in short segment fixation group was 30.75 years (22−40 years) while in long segment fixation group median age was 29.25 (18−45 years) with no significant differences between them. In agreement with current study, Biakto et al.[12] study, found that the participants in their research varied in age from 18 to 55, with a mean age of 35 ± 13 years. Men (71.4%) outnumber women (28.6%) as the subjects in total.

Also Ye et al.[13] found The patients in group 1 ranged in age from 16 to 63 (average: 39.6), and the male to female ratio was 15 to 9. The male to female ratio in group 2 was 13: 7, and the age range was 14−60 (average: 38.7).

Regards to type of trauma, fall from height was the predominant type in long segment fixation group (40%) while MBA was the predominant type of trauma in short segment fixation group occurred in short segment group (43%).

Similar to current findings, El-Sharkawi et al.[14] revealed the mechanism of injury was falling from a height 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%).

Salama et al.[15] in their study, 11 patients were subjected to RTA and nine patients to falling from a height in the short segment group; in the long segment group, 13 patients were subjected to RTA and seven patients to falling from a height.

In current study, the most prevalent level of fracture in both groups at L1 where it constitutes 50% and 57% of short versus long segment fixation groups respectively with no statistical substantial differences between them ($P > 0.05$).

This is consistent with the findings made by Hur et al.[16] in 2015, Due to the transition from less mobile to more mobile locations, the L1 (71.4%), T12 (19.0%), and L2 (9.5%) had the greatest frequency of burst fractures.

Regards to neurological status, patients that are neurologically intact (ASIA E) constitute 67% of short segment fixation group versus 50% of long segment fixation group with no significant differences between them.

In Biakto et al.[12] study, Compared to the long type fixation group (18.8%), the short type fixation group included more patients (20%) with normal neurological state. Short fixation patients had 40% fewer patients with incomplete neurological impairments than long segment patients had (50%). Between the two methods of fixation, there was no discernible change on the ASIA impairment scale ($P > 0.05$).

Early postoperative clinical evaluation (0–3 days after surgery, during hospital stay): PVAS was insignificantly lower in short segment than long segment fixation group (Mean ± SD: 4.16 ± 1.61 vs. 4.91 ± 1.62, $P = 0.077$), 57% of short segment fixation group had mild VAS of pain compared 57% of long segment fixation group had moderate VAS of pain. In line with Necdet et al.[17] that In the early postoperative VAS score measurement, there is no substantial difference between the short and long segment pedicle screw fixation.

Against current study Biakto et al.[12] in their study revealed Patients receiving long segment fixation had higher levels of patient satisfaction (VAS: 75% vs. 20%) than those receiving short segment fixation. In the intermediate group, there was a substantial variation ($P = 0.047$). (VAS 3–7).

In Ye et al.[13] study, Groups 1 and 2 had preoperative VAS values of 7.7 ± 0.5 and 7.9 ± 0.5 points, respectively, and both groups' scores considerably decreased over the follow-up periods.

4.1. Postoperative complications

Regards to postoperative complications, CSF leakage occurs in only one patient of short segment fixation group (3.3%) versus two patients of long segment fixation group (6.7%), also new neurological deficit occurs in only two patients of short segment fixation group (6.7%) versus three patients of long segment fixation group (10%) of insignificant variation between two studied groups ($P = 0.571$).

Ten-year follow-up research by Toyone et al.[18] showed that Short segment fixation has the advantage of preserving thoracolumbar mobility without causing post-traumatic disc degeneration in burst fractures with neurological disability.

None of the patients had pulmonary embolism, deep vein thrombosis, or postoperative infections. In each group, the average time from surgery to ambulation was 3–5 days, depending on the individual circumstances of the patients. In Ye et al.[13] study, Due to fat liquefaction, wound healing was delayed in two patients with short segment fixation and one patient with long segment fixation. Furthermore, the 3 patients' wounds recovered fully following a dressing change, and neither group had any CSF leaking.

Late postoperative clinical evaluation (after 12 weeks follow up): 67% of short segment had minimal ODI compared to 57% of long segment fixation group. 23% and 10% of short and long segment fixation groups respectively had no pain while 10% and 33% of short and long segment fixation groups respectively had moderate VAS for pain. Mean ± SD of PVAS was 3.85 ± 1.88 vs. 4.41 ± 1.78 with insignificant differences between them ($P = 0.241$). 60% and 67% of short and long segment fixation groups respectively had moderate ODI while 40% and 33% of short and long segment fixation groups respectively had minimal ODI. Mean ± SD of ODI was 22.62 ± 8.46 vs. 24.33 ± 9.99 in short and long segment fixation groups respectively with insignificant differences between them ($P = 0.477$). These findings were closer to Steib et al.[19] and Aoui et al.[20] studies.

Follow-up imaging evaluation (12 week after surgery): 12 week after surgery, 7 cases of short segment group presented with implant failure (5 cases with screw breakage and 2 cases with rod breakage) versus to 3 cases of long segment group presented with rod breakage with insignificant differences between them ($P = 0.167$).

In agree with our study, Tezeren and Kuru,[21] Long segment instrumentation was shown to be a successful method of treating thoracolumbar burst fractures in their research comparing short segment to long segment fixing in these injuries. Instrumentation for short segments of the pedicle has a significant failure rate. However, lengthy segment instrumentation lengthened the surgical procedure and greatly increased blood loss.

Aly[22] findings revealed that the frequency of implant failure did not vary between the two groups, despite the fact that there were ten 'events' in the short segment fixation group and three incidents in the long segment fixation group.

4.2. Change in VAS of pain

In current study, there were insignificant improvements in PVAS in both groups. 7 cases (23%) and 3 cases (10%) of short and long segment group was improved from mild PVAS to no pain. 7 cases (23%) in both groups were improved from moderate to mild PVAS. 2 cases (6%) in both groups were improved from severe to mild PVAS. 3 cases (10%) of long segment group was improved from severe to moderate PVAS compared to no cases in short segment group ($P = 0.246$). There was substantial variation between both groups regards absolute reduction of VAS of pain (Mean ± SD: 1.41 ± 0.33 vs. 0.50 ± 0.16, $P < 0.01$) and also relative reduction % of VAS in short segment fixation group was substantially greater than long segment fixation group (Mean ± SD: 38.52 ± 20.49% vs. 10.18 ± 9.87. %, $P < 0.01$). Similar to current findings, Ye et al.,[13] Steib et al.[19] and Aoui et al.[20] series revealed There was no substantial variation between the two groups' VAS scores prior to surgery, one week after surgery, six months after surgery, or one year after surgery.

4.3. Change in ODI

There was high statistical substantial variation between both groups as regard absolute reduction of ODI (Mean ± SD: 5.82 ± 4.12 vs. 9.50 ± 1.59, $P < 0.001$), also relative reduction of ODI % was insignificantly lower in short segment than long segment fixation group (Mean ± SD: 20.45 ± 32.75% vs. 28.08 ± 13.73%, $P = 0.244$).

In Ye et al.,[13] Both groups' ODI scores dramatically increased from their pre-surgery levels. But much as with VAS ratings, there was no discernible variation in ODI scores between the two groups prior to surgery or at any of the follow-up intervals ($P = 0.44$, 0.95, 0.07, and 0.30, respectively).

4.4. Conclusions

The instant stabilization of the spine, restoration of sagittal alignment, and potential for spinal canal decompression are all benefits of surgical therapy for thoracic and lumbar fractures. Using three column spinal fixation, pedicle screw fixation has improved deformity repair and allowed for earlier mobilization and more stable structures. The short segment open posterior transpedicular fixation technique presents clinical, functional results as regard PVAS and ODI that are significantly better than the long segment open posterior transpedicular fixation technique. As regard radiological correction of cobb's angle at last follow up is significantly better in long segment open posterior transpedicular fixation technique than The short segment open posterior transpedicular fixation technique.

Conflicts of interest

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