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UNSTABLE FRACTURE OF THORACOLUMBAR SPINE;

OUTCOME OF TRANS PEDICULAR SCREWS FIXATION

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ABSTRACT… Objectives: To evaluate the functional outcome of unstable thoracolumbar fractures fixed with pedicular screws and rods. **Study Design:** Descriptive case series**. Setting:** Department of Orthopedics and Spine surgery Ghurki Trust Teaching Hospital Lahore. **Period:** February 2013 to October 2015. **Material & Methods:** Patients of either gender or all ages with thoracolumbar fractures fulfilling the inclusion criteria were fixed with pedicular screws and rods under general anesthesia. Post operatively patients were reviewed monthly for one year and results were analyzed according to modified McNab criteria as excellent, good, fair and poor at final follow up. **Results:** A total of 281 patients including 193(68.68%) males and 88(31.32%) females with mean age 28.32 years (range 18 to 60 years) were included in our study. Majority (91 patients) had fractures of L1 followed by L2 (73 patients) fracture and D12 (67 patients) fracture. Pre operatively 95(33.81%) were neurologically graded as Frankle grade D,73 (25.98%) grade C while 49(17.44%) were graded as Frankle grade E.Post operatively final follow up at one year yielded excellent clinical outcome in majority (91.46%,n=257) while good and fair outcomes were reported in 6.41%(18 patients), and 2.14%(6 patients) respectively according to modified McNab criteria. No post op neurological detoriation, mortality or other major complication was reported in the study. **Conclusion:** Pedicular screw and rod fixation for unstable thoracolumbar fractures gave excellent functional results in majority of patient as it reduces complications of recumbency and helps in early mobilization. We recommend it as a first line treatment for such fractures.

Key words: Thoracolumbar fractures, pedicular screw, short segment fixation

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INTRODUCTION

Causes of morbidity and mortality in the developing and developed countries are still mainly due to injuries.[1] The incidence of spine injuries are 8 to 246 cases/million while the prevalence is 236 to 1,298 p/million worldwide.[2] Each year a large number of Pakistani population sustain spinal injuries.[3] Studies on spinal injuries have been published in Pakistan but the exact incidence of spinal injuries in Pakistan is still unknown.[4,5,6] The spine is considered to be stable when the normal anatomical relationship between the vertebrae is maintain within the physiological load without pain, deformity, discomfort or neurological detoriation.[7] Unstable vertebral burst fractures are 2 or three column fractures according to the Three Column Concept of Denis[8] and all vertebral fractures with more than 50% loss of vertebral height, more than 20 degrees angulation or more than 50% spinal canal compromise need surgical intervention.[9] A uniform consensus has not yet been developed for the standard treatment of unstable burst fractures or fracture dislocation.[10] The aim of the treatment of unstable thoracolumbar injuries is to optimally decompress the spinal canal and stabilize the spine over a minimum possible segment.[11] The spine is approached from anterior, posterior or combine approach for stabilization.[12,13,14] However, posterior approach is less extensive and commonly used.[15] The introduction of pedicular screw for spine fixation has enabled the surgeon to perform rigid, stable and short segment spine instrumentation thus allowing early post-operative mobilization of the

patients.[16,17] The aim of this study was to evaluate the post op clinical outcome of transpedicular screw and rod fixation in unstable thoracolumbar fractures by using Mc Nab's criteria.

Materials and Methods

This study was conducted at department of orthopedics and Spine surgery Ghurki Trust Teaching Hospital Lahore from February 2013 to October 2015. All patients with unstable fractures of dorsolumbar spine (neurological deficit, kyphosis of more than 20 degree, vertebral collapse more than 50% of body height, canal compromise more than 50%) from D7 to L4 and single level fractured vertebrae were included in this study. Poly trauma patients requiring other interventions for thoracic, abdominal, neurosurgical and orthopaedic injuries were excluded from the study. All patients were admitted through emergency or OPD. Anteroposterior and lateral views radiographs were taken to properly evaluate the fractured vertebrae and their levels. MRI was done in all cases. Informed consent was taken. The study protocols were approved by Ethical Review Board of the respective hospitals. All patients were operated under general anesthesia in prone position using midline posterior approach within 24 hours of their arrival to the hospital. Pedicles were identified and screws were passed and rods were adjusted.

In doubtful cases screening was done with image intensifier. Posterior decompression was done. Wound was closed in layers over radivec drain. All patients were mobilized postoperatively as soon as they could tolerate the pain. All results were analyzed according to modified McNabcriteria (Table-I). Frequency and percentages were calculated for categorical variables. Data was analyzed using SPSS (Version 19). Data presented in graphs and tables.

Grade	Definition
Excellent	Complete resolution of all symptoms and free of pain; no restriction of mobility; able to return to normal work and activities
Good	Marked reduction of pain with the patient generally satisfied, returning to work or usual daytime activities, and taking analgesics seldom or not at all
Fair	Some improved functional capacity; still handicapped and/or unemployed
Poor	Continued objective symptoms of root involvement; additional operative intervention needed at index level, irrespective of repeated operations or length of postop follow up

Table-I. Clinical outcome according to Modified McNab's Criteria

RESULTS

In our study there were 281 patients out of which 193(68.68%) were males and remaining 88(31.32%) were females. Mean age was 28.32 years, ranging from 18 to 60 years of age. The cause of injury was fall from height in 168 patients and road traffic accident in 113 patients. All patients had unstable fractures and were due for fixation. Mean operative time was 2.5 hours ranging from 1.5 to 4 hours. All patients were operated at the time of presentation in emergency within 24 hours. The mean hospital stay was 6 days ranging from 4 to 15 days. All patients were followed for 12 months. Majority (91 patients) had fractures of L1 while 73 patients had fractures of L2 and the frequency of other vertebral fractures are shown in Figure-1.

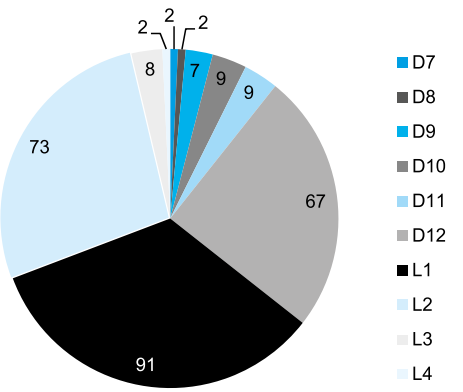

Figure-1. Showing frequencies of vertebral fractures at various levels.

Preoperative the neurological status of all of our patients were assessed according to Frankle grading and shown in Table-II.

Grade	Number of patients	Percentage
A	23	8.19%
B	41	14.6%
C	73	25.98%
D	95	33.81%
E	49	17.44%

Table-II. Preoperative Frankle grading

Post operatively at final follow up at one year clinical outcome was evaluated according to McNab's criteria the results are excellent in 257(91.46%), good in 18(6.41%), fair in 6(2.14%) while no poor results were reported. No post op neurological detoriation, mortality or other major complication was reported in the study. No revision surgery or implant removal was done.

DISCUSSION

Spinal trauma is a serious and debilitating mechanism for patients throughout world. Fall from height and road traffic accidents are the main causes of spinal trauma.[18] In developing countries fall from height is the main cause of spinal trauma.[19] In our study the main mechanisms for trauma were falls from height and road traffic accidents.

Spinal fractures need fixation when these fractures are unstable. The aim of fixation is early restoration of anatomy, neurological restoration and firm and stable fixation for early rehabilitation.[20] Various techniques are used for surgical intervention where necessary.

Unstable spinal fractures could either be fixed with anterior, posterior or both anterior and posterior instrumentation. In our series we used pedicular screws and rods for fixation of unstable spine fractures. There are certain advantages of posterior screw fixation with rods. It is easy and spine surgeons are more familiar with this approach. It also preserve the motion segment. The established disadvantage is difficulty in restoring anterior column from posterior which later on result in deformity later on, pain, instability and neurology in some cases.[21,22] In a series by Khan AA et al[23] and in our series no post-operative neurological deterioration has been observed.

Treatment for fractures of dorsolumbar spine could be either conservative or operative. Disadvantages of conservative treatment are deterioration in neurological status (17%), progressive kyphotic deformity (20%), persistent backaches, decubitus ulcer and deep venous thrombosis.[24,25,26,27,28] These complications can be avoided by early mobilization and decreased hospital stay by early surgery. Hegde and Shettay[29] treated 33 cases of thoraco-lumbar spine fractures with posterior decompression and pedicular screw instrumentation. During post-operative period and follow-up following complications were noted: Urinary tract infection (5), bed sores (3), superficial wound infection (1) and deep wound infection (1), implant prominence (1) and implant failure (1) They concluded that pedicular screw and rods for fracture fixation are a very rigid fixation with high percentage of fusion, low percentage of hardware failure, short segment immobilization and maintenance of curvature of spine. But the surgical technique has a very steep learning curve, exposure to radiation from image intensifier, chance of injury to nerve roots, cord and blood vessels are there.

Hwang and Hur[30] treated 46 consecutive patients with thoracolumbar burst fracture were with pedicular screw fixation with or without posterolateral fusion and the clinical outcomes were evaluated using the modified Mcnab criteria at the final follow-up. They concluded thatposterior pedicle screw fixation alone yielded satisfactory results that are equivalent to those of supplemented with posterolateral fusion. Moreover fusion takes longer operation time, increased blood loss and increased hospital stay and permanent motion loss in a spine. To avoid complications of pedicular screw placement, it require image intensifier, technical expertise and experience and has a steep learning curve. The results in our short series of 281 cases have been encouraging. Large sample size with longer follow up are require come to categorical conclusion.

CONCLUSION

Pedicular screws and rods fixation for unstable thoracolumbar fractures gave excellent functional

results in majority of patients. The procedure has minimum complications and helps to mobilize the patient early. We recommend it as a first line treatment for unstable thoracolumbar fractures.

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