THE SURGICAL TREATMENT OF THORACOLUMBAR UNSTABLE VERTEBRA FRACTURES

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ABSTRACT:

The results of unstable thoracolumbar vertebral fractures classified according to Denis are discussed. 32 patients were enrolled in the study. Initial kyphotic deformity of 15.8° was corrected to a mean of 7.3°.

***Key Words :** Spinal fractures, surgical treatment, instability.*

INTRODUCTION :

The fractures and dislocations of thoracolumbar vertebrae are severe injuries. Neurologic injury has been reported to occur in 30%-60% of patients with thoracolumbar fractures (2, 10, 12, 13, 14, 15). Neurologic symptoms both incomplete and complete as depend of compromise of medullar canal, Large series demonstrated that persons with complete cord injury lasting longer than 24 hours do not recover neurologic function, but those with incomplete lesions have some chance for useful recovery (1, 6, 9, 11). The recently has shown the term "Instability" to be a key word in therapeutic indications (2).

This article includes: the cases which instability of the second degree according to Denis classification had been treated surgically.

MATERIALS AND METHODS :

Between Januray 1990 and October 1993, 32 fractures of the thoracolumbar vertebras were threated at the Orthopaedic Surgery of Ege University School of Medicine. The study included 21 male, 11 female patients. The age of the patients ranged from 15 to 61 years (average 32 years). Cases were followed during a period ranging between 2 to 48 months. The aethiology of injury was motor vehicle accidents in 16, falls in 14 and direct trauma in 2 cases.

The levels of fractures were L1 in 11 patients (34.3%), T12 in 7(21.8%), L2-L3 in 7(21.8%), L4-L5 in 3(9.3%). The Radiograms were obtained before surgery and after surgery. The degree of scoliosis and kyphosis was determined by the cobb method. Also CT Scanning was performed to access the degree of canal encroachment before surgery. The degree of neurologic deficit was recorded on the basis of the Frankel's Scoring System. Twenty-nine patients had neurologic impairment at initial presentation. 19 patients had complete motor and sensory loss below the level of injury and were classified as Frankel Grade A. 10 patients had incomplete paraplegia and were classified grade B, C, D. 3 patients were neurologically intact despite CT-scan documented neural compression and were classified as grade E.

All fractures were classified according to Denis Classification. These is shown in table 1.

Table 1. Classification of fractures

TYPE OF FRACTURE		NUMBER	PERCENTAGE
Burst	Type A	10	31.3%
	Type B	7	21.8%
	Type D	3	9.3%
Frac-Disloc	Type A	7	21.8%
	Type B	1	3.2%
	Type C	4	12.8%

The average time from injury to operation 36 hours (Range 1-25 days).

Treatment included 14 patients with Harrington Instruments, 11 patients with ALICI instruments and 7 patients with various instruments. The patients were mobilised by body orthosis in average 14 days (Min: 7, Max. 28 days) postoperatively.

RESULTS :

Initial kyphotic deformity was averaged 15.8 degree (range 0-40 degree). The postoperative correction was to a mean of 7.3 degree (range 0-15 degree). Preoperative scoliosis was preset in 6 patients and 10 de-

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gree (range 3-21 degree). The scoliosis was less than 5 degree in all patients after surgery. The loss of vertebral anterior height was recorded as 20% to 80% (Ave. 37.5%). The vertebral wedge index was found from 0.35 to 0.80. The degree of spinal canal encroachment was determined from analysis of transaxial tomography of the fracture site. The canal occlusion is classified in the Table 2.

Table 2. Results of the CT Scan

Category	Occlusion Ratio (%)	Patient Number
A	0 - 25	3
B	25 - 50	5
C	50 - 75	9
D	75 - 100	15

DISCUSSION :

The goals of treatment of thoracolumbar vertebra fractures should include: 1) direct or indirect decompression of the spinal canal, 2) Restoration and maintenance of normal alignment and 3) early mobilisation and physical therapy (16). According to Denis: 1) Instabilty of the first degree is a mechanical instability with risk of chronic kyphosis, 2) Instability of the second degree is a neurologic instability, 3) Instabilty of third degree is both a mechanical and a neurologic instability (2). Fracture-dislocations and unstable burst fractures with or without existing neurologic damage are in this category (2, 14).

We agree with Denis Classification and we have treated as surgically the cases to be neurologically unstable. However, in the severe damaged vertebral column, the normal constrains to distraction and lengthening may be ruptured and direct distraction of the spinal cord. This may further injure the neural elements. Application of simultaneus compressive and distraction forces may correct the deformity, restore preinjury vertebral height and prevent over distraction of the unstable spinal segment (4).

Fracture-Dislocations are the most unstable of injuries and presents with failure of all three columns under compression, tension, rotation or shear (2). We added interspinous wiring to posterior instrumentation in the burst fractures and fracture-dislocations for more controlled distraction and to achieve more stabilisation.

The hooks and rods systems mainly apply distraction force in the posterior column. Based on three column concept of Denis, burst fracture is a result of the spine under axial loading. This systems cannot apply distraction force through the middle column to the anterior column directly (16).

We use pedicular screw to lumbar vertebras for posterior stabilization, because, pedicular screw systems allow direct reduction force transmission to both anterior and middle columns of spine.

Hashimoto et al have recently demonstrated a relationship between amount of traumatic canal stenosis and neurologic defet (7, 14). Herndon and Galloway were not able to show any relationship between preoperative and postoperative neurologic function and canal area on kyphosis (8, 14). Indeed we weren't able to fine a correlation between neurologic deficit and canal compromise in our cases.

As in the sduy of Edwards et al, the spinal canal could reliably be fairly well calibrated using posterior indirect correction technique with in the first 48 to 72 hours (3, 14). We performed immediate surgical treatment to paraplegic patients who come to emergency cervices in the first 12 hours. Other mechanically unstable cases our the cases who come in the 12 hours after injury are operated on as elective. The purpose of this management to allow early mobilisation and rehabilitation of the patients.

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