

EARLY RESULTS OF THORACAL AND LUMBAR VERTEBRAE INJURIES WITH TREATMENT BY ALICI SPINAL INSTRUMENTATION

E.Alıcı, Ö. Baran, M. Tolgay, E.Serin

18 Patients with injury of the thoracic and lumbar spine were surgically treated with Aha Spinal Instrumentation. In patients preoperative and postoperative, clinical and radiological results were evaluated. This report presents the early results of stabilization and recovery of neurological function achieved by this method. We were not confronted with early complications related to the treatment with Ahci Spinal Instrumentation We accept this ASI method advantageous due to having the patients who were applied this instrumentation achieve a successful reduction and stabilization, and therefore early ambulation and rehabilitation. Spinal canal is assessed by CT preoperative and postoperative. Spinal canal was restored mean 58% to 91%. In all patients except for one, anterior decompression was not required because restorations of the spinal canals were sufficient. In only one patient we primarily applied an anterior decompression and Alici Anterior Spinal Instrumentation (AASI). Then we achieved stabilization with Alici Posterior Spinal Instrumentation (APSI).

Key Words : Fractures of the spine, Alici Spinal Instrumentation

We still consider fractures and dislocation of thoracic and lumbar spine as important injuries as they lead to complications such as paraplegia. Failures related to restoration of medulla spinalis is the reason why vertebral column restoration and rehabilitation is preferred

In reduction and stabilization of fractures and dislocation of spine, Harrington Instrumentation is the most common method and this method should be accepted as an important step taken in spinal surgery (5,7). In the previous years, Luque's (10,13) Segmental Spinal Instrumentation, Weiss Spring (2), Internal Fixator (12) and Cotrell Dubousset (CD) (3) are being used for the same purpose.

This report presents the early results of 18 patients treated with Alici Spinal Instrumentation at three hospitals in Izmir, in the past year.

MATERIALS AND METHODS

To 18 patients who consulted with thoracic and lumbar spine injuries, ASI and fusion operations were applied in the Departments of Orthopaedic Surgery and Traumatology of Dokuz Eylül University Medicine Faculty, Ege University Medicine Faculty, and Izmir Government Hospital between August 1989 and March 1990.

There were 7 female (38.9 %) and 11 male (61.1%) patients who ranged in age from 18 to 68

with a mean age of 38.6. 4 patients (22.2 %) had been injured in automobile accidents, 12 (66.7%) from falls from height and 2 (11.1%) from hits by heavy objects (Table I).

The levels of the lesion in 5 patients (27.8 %) were T12, in 8 patients (44.4%) L1, in 2 patients (11.1%) in 1 patient (5.6%) L3, in 1 patient (5.6%) L4. One patient (5.6%) had T12-L1 fractures and dislocation (Table II). The duration period between the trauma and the operation in 16 patients (5.6 %) were in average 1-14 days. One of the other two patients were operated 60 days after the injury and the other 10 years after injury.

Preoperative and postoperative neurological evaluation was performed according to the classification of Frankel et al (7) for spinal cord injuries. In 2 patients (11.1 %) Frankel A, in 2 patients (11.1 %) Frankel C, in 4 patients (22.2 %) Frankel D and in 10 patients (55.6 %) Frankel E was determined (Table III).

During radiological the examination of the cases, the angle of local kyphosis ranged in from 4 degrees to 38 degrees, with a mean angle of 15 degrees. Angle of anterior compression ranged in from 6 to 30 degrees with a mean angle of 14.6 degrees, angle of scoliosis ranged from 0 to 12 degrees with a mean angle of 2 degrees. Percentage of A/P dislocation ranged from 0 to 33 % with a mean of 12.5 %. M/L dislocation ranged from 0 to 9 % with a mean of 0.6 %, height loss of vertebral body ranged from 15 to 80 % with a mean of 44.6 %. CT evaluation of spinal canal ranged in from 36 to 75 % with a mean of 58% The average operation period was 106 minutes (range 80-120 minutes). The average transfused blood was 2.4 units (range 1-4 units).

The patient is placed prone on the table. Through a

E. Alıcı, Ö. Baran, M. Tolgay, E. Serin : From the department of Orthopaedic surgery and Traumatology, Dokuz Eylül University, Faculty of Medicine IZMIR - TURKEY

longitudinal median skin incision, a muscle splitting approach is made to expose the spine and lamina. Fractured vertebra and one upper and one lower vertebra processus spinosus is cut out. To the two upper intact vertebra pedicles open pedicle hooks, and to the two lower vertebra laminae two closed lamina hooks are inserted.

Distraction was applied by using appropriate size Table 1

Reason of Trauma	Number of Cases	Percentage
Motor vehicle accident	4	22.2
Falls from heights	12	66.7
Hit by Heavy object	2	11.1
Total	18	100.0

Table 2.

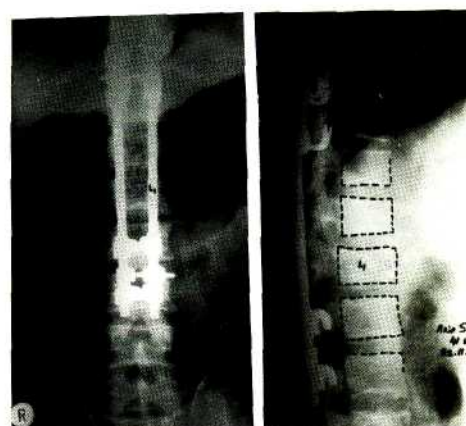
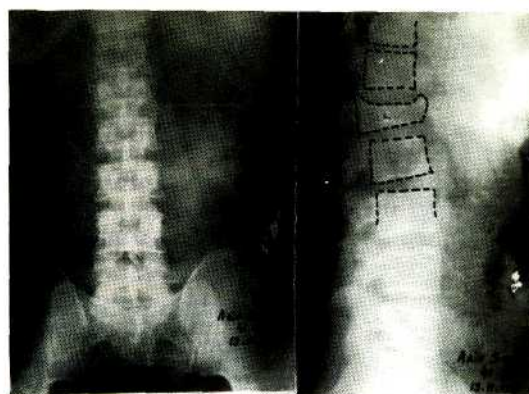
Level of Injury	FRACTURE PATTERN			Total	Percentage
	Compression Fractures	Burst Fractures	Fracture Dislocation		
T-12	1	4	1	6	33.3
L-1	2	6	-	8	44.4
L-2	-	2	-	2	11.1
L-3	-	1	-	1	5.6
L-4	-	1	-	1	5.6
Total	3	14	1	18	100.0

rods. Same procedure was also carried out for the other side. Between the rods which were inserted bilaterally, two transverse connectors were applied so to stabilize the system. Three level short fusion was included from the posterior. To all patients, decompression surgery was applied except for the one who was applied anterior decompression.

Spinal canal was examined with CT in early postoperative period. During the postoperative period, after the wounds healed, the patients were mobilized with thoracolumbar brace.

RESULTS

The patients early results of postoperative period were evaluated clinically and radiologically. The patients were observed 2 to 6 months.



The angle of Local Kyphosis changed from 0 to 26 degrees with a mean angle of 5.8 degrees. The angle of anterior compression ranged in from 0 to 16 degrees with a mean angle of 5.8 degrees. The angle of scoliosis was 0 degrees. A/P dislocation ranged from 0 to 8 percent with a mean percentage of 0.5 %; M/L dislocation ranged from 0 - 1% with a mean of 0.1 %. Height loss of vertebral body ranged from 0 to 30 % with a mean of 7 %. CT evaluation of spinal canals ranged from 85-100 % with a mean percentage of 91 % (Table IV).

In the early period neurological evaluations, we saw that two of the patients after a 1,5 month observation reversed to Frankel E from Frankel D (Table III).

The patients were not confronted with complications such as delay in healing of wounds, infection and loss of reduction.

DISCUSSION

Fractures and fractures dislocation of spine is associated with neurological injuries, therefore their diag-

nosis and treatment are very important. As the restoration of medulla spinalis is impossible according to the current studies, the restoration of vertebral column and its stabilization is of vital importance.

In order to prevent injury of neural elements which during a trauma were not injured and to be able to prevent any injuries then on, and also on patients with neurological findings, it is very important to achieve early rehabilitation by the restoration of vertebral canal and the stabilization of the vertebral column.

Although very seldom, it is possible to see developments in the neurological status.

The Harrington Instrumentation technique has been widely accepted as the standard method of surgical treatment (5,7) in vertebral stabilization and vertebral canal restoration. As the rotational stability of the system is very low in this method (1), surgeons started exercising other methods and searching for new instruments for this specific reason (4,6,9,10,11,12,13).

Table III.
Returned of Neurological Function (Frankel)

A	2	A
B		B
C	2	C
D	2	D
E	10	E

Table IV	Pre-op		Post-op	
	Range	Mean	Range	Mean
Angle of local kyphosis (°)	4-38	15	0-26	5,8
Angle of anterior Compression (°)	6-30	14,6	0-16	5,8
Angle of scoliosis (°)	0-12	2	0	0
Dislocation of the A/P offset (°)	0-33	12,5	0-8	0,5
Dislocation of the M/L offset (°)	0-9	0,6	0-1	0,1
Height loss of vertebral body (°)	15-80	44,6	0-30	7
CT evaluation of spinal canal (%)	36-75	58	85-100	91

Weiss Springs (2) compress the vertebral column from the posterior and provide a progressive reduction. This method can not be used in cases in which the posterior elements are also fractured. As it is im-

possible to determine that the posterior elements are intact in all patients, this method is not commonly used.

Even though Luque's Segmental Spinal Instruments (10,13) provide a successful stabilization, early mobilization causes loss of correction and the restoration of vertebral canal is not very effective (1).

Internal fixator (12) gives successful results in the reduction of fractures and stabilization at the dorso-lomber area (1). But this method is not preferred because the schanz pins used are more narrow than the pedicles at the thoracic area (1). CD instruments are suggested to be used in the vertebral fractures.

The Alici Spinal Instrumentation is very successful because it provides a strong distraction on the spine as it is a successful method in providing restoration at the vertebral canal. The stabilization is provided with 4 hooks at the proximal and 4 hooks at the distal on intact vertebrae. The system becomes a closed system by using two transverse connectors and therefore a rotational stabilization is achieved.

On the other side, cases in which anterior decompression is inevitable through Alici Anterior Spinal Instrumentation anterior decompression, fusion and stabilization can be applied. According to C-D method, Alici Spinal Instrumentation is considered to be advantageous.

The early results show that the method reaches its aim (Table III,IV).

The examination of the preoperative and postoperative vertebral canal through CT shows that by Alici Spinal Instrumentation the vertebral canal opening has increased to 90% from 58%. Also the local kyphosis angle has decreased in average to 5.8 from 15 degrees, the average of anterior compression angle has decreased to 5.8 degrees from 14.6 degrees, the average scoliosis angle has decreased to 0 degrees from 2 degrees, the anteroposterior dislocation rate in average has decreased to 0.5% from 12.5%, the medio-lateral dislocation rate has decreased from 0.6% to 0.1% and the height loss of vertebral body has decreased to 7% from 44.6% (Table IV).

Despite early mobilization of the patients, during the short follow-up we have not seen any correction losses.

We have accepted the Alici Spinal Instrumentation as a successful method in treatment of vertebral fractures.

REFERENCES

1. Aebi, M; Mohler.J.: Zoch, G.; Monschr, E.Analysis of 75 Operated Thoracolumbar Fractures and Fracture Dislocations With and Without Neurological Deficit. Arch Orthopedic Travma Surgery 105: 100-112 (1986)
2. Benzel.E.C; Lovson,S.J.: Operative Stabilization of the Posttraumatic Thoracic and Lumbar Spine. A Comparative Analysis of the Harrington Distraction Rod and the Modified Weiss Spring. Neurosurgery Vol 19 No 3: 378 1986.
3. **Cotrell**, E; Dubousset, J; New Universal Instrumentation in Spinal Surgery. Clinical Orthopaedics 227-P: 10 Feb. 1988.
4. Denis, F; Rucz, H. and Searls.K.: Comparison Between Square-ended Distraction Rods and Standard Round-ended Distraction Rods in the Treatment of Thoracolumbar Spinal Injuries. A Statistical Analysis Clinical Orthopaedics and Related Research. 189: 162 1984
5. Diskson, J.H.; Harrington,P.R. and Erwin, W.D. Results of Reduction and Stabilization of the Severely Fractured Thoracic and Lumbar Spine. J. Bone and Joint Surg. 60.A. 799-805 Sept.1978
6. Edwards, C.C.; Levine, A.M.; Early Rod Sleeve Stabilization of the Injured Thoracic and Lumbar Spine Orthop. Clin. North Am. Vol. 12-1 121 1986.
7. Flesch, J.R.; Leiden,L.L.; Erickson, D.L.; Chou, S.N. and Bradford, D.S.: Fussion for Unstable Fractures and Fractures Dislocations of the Thoracic and Lumbar Spine J. Bone and Joint Surg. 59-A 143-153 March 1977
8. Frankel, H.L.; Hancock, D.O.; Hyslop, G.; Melzok, J.; Michaelis, L.S.; Ungar.G.H.; Vernon, J.D.S.; Welsch,J.;The value of postural reduction in the initial management of closed injuries of the spine with paraplegia and tetraplegia Part I Paraplegia 7: 172-192 1969
9. Kostvik, J.P.; Anterio-Fixation for Fractures of the Thoracic and Lumbar Spine with or without Neurologic Involvement; Clinical Orthopaedics and Related Research 189: 103 1984
10. Luque, E.R.; Cassis, Nelson, and Ramirez- Wiella, Gustavo; Segmental Spinal Instrumentation in the Treatment of Fractures of the Thoracolumbar Spine. Spine 7: 312-317 1982
11. Mageul, FP; Stabilization of the Lower Thoracic and Lumbar Spine with External Skeletal Fixation
12. Stouffer.ES; Internal Fixation of Fractures of the Thoracolumbar Spine. J. Bone and Joint Surg. 66-A 7:1136,September 1984.
13. Wegner,DR; CarolleJ; The Mechanics of Thoracolumbar Fractures Stabilized by Segmental Fixation. Clinical Orthopaedics and Related Research 189: 89,1984