

THE LATE RESULTS OF VERTEBRAL FRACTURES TREATED BY AO SPINAL INTERNAL FIXATOR

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ABSTRACT :

In our clinic since May 1989, we have been treating some of unstable thoracolumbar fractures with AO Spinal Internal Fixator. We have treated 74 patients with Fixator Interne since then. Fourty-nine of them were male and 25 were female. Their average age is 38.2 -changing between 16 and 75. We have performed posterior fusion for 28 patients among them. The follow-up period is between 1 month and 48 months (Mean: 31 months). We have asked the patients to come for reexamination on the postoperative 1.5, 3, 6 and 12th months respectively. We have performed physical, neurological and radiological examination at each visit.

In the late follow-up, we obtained that most of the patients have loss of correction in varying degrees (Mean: 12.09 degrees -Ranging between 2 and 24 degrees-). We classify the patients with their follow-up periods. The average loss of correction in 0-11 months, 12-23 months, 24-35 months and 36 and more months are 9.64, 12.15, 12.75, 15.60 degrees respectively. We couldn't see a clinical difference between the groups with or without posterior fusion (12.17 degrees loss of correction in patients with-out posterior fusion and 11.62 degrees with posterior fusion). In this study we wil discuss and try to find out the causes of these results.

Key Words : Internal Fixator, Thoracolumbar Spine Fractures, Posterior Instrumentation

INTRODUCTION :

Since May 1989 in our clinic, we have been treating some of the unstable thoracolumbar fractures with AO Spinal Internal Fixator. For lower thoracic and lumbar fractures mostly we prefer this system (1, 2, 3, 6). Our operation criteria is neurological, mechanical or combined instability according to Denis Classification (4). Since Fixateur Interne immobilizes only two motion segments, spinal mobility and postoperative functional value doesn't alter significantly (5, 6). The system is also versatile that compression, distraction or neutralization availability is present. With the implant design, fracture reduction is also not difficult. Some authors advocate anterior decompression and strut grafting with or without instrumentation for correcting and maintaining the relative lordosis of the spine. A study by Esses et al (7, 11) has shown that there is no significant difference in the correction of the kyphotic deformity between anterior techniques and posterior distraction instrumentation. In this study we have evaluated the late results of fresh thoracolumbar fractures treated by Internal Fixator in our clinic.

MATERIAL AND METHOD :

Between May 1989 and December 1993, we have treated 74 fresh thoracolumbar unstable fractures with Fixateur Interne. Fourty-nine of the patients were male and 25 female. Their average age is 38.2 -changing between 16 and 75-. Seventy of them were single level fractures (94.59 %). All of the two level fractures were combination of compression and burst fractures. Two of the combined fractures were included in the fixation. In the other two, the compression fractures were not adjacent to the instrumented vertebra and were stable, so they were treated conservatively. According to Denis Classification (4) there were 68 burst, 9 compression fractures (Five of them were stage II that is compressed more than 50 % of vertebral height and the other 4 were stable and combined with burst fractures) and one fracture dislocation. The prime etiologic factor is traffic accidents with 42 cases (56.75 %), followed by falls in 30 cases (40.54 %) and other injuries. We have evaluated the patients neurologically according to Frankel Scale (9). One patient - with fracture dislocation - was rated as Frankel A, 2 patients as B, 2 patients C, 10 patients D and 59 patients as Frankel E. We have operated the patients with neurologic deficit urgently and the remaining electively between 3-7 days

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after the trauma. We have performed posterolateral fusion (10) in 28 patients. Postoperatively, we routinely used three-point corsets of Jewett type for 8 to 10 weeks.

RESULTS :

We have asked the patients to come for reexamination on the postoperative 1.5, 3, 6 and 12 months respectively. We have performed physical, neurological and radiological examination in each visit. The follow-up period is between 1 month and 48 months (Mean : 31 months). In neurological evaluation, we achieved approximately one degree improvement in Frankel Scale.

As complication we have two infections (relieved by antibiotherapy), one deep venous thrombosis, one urolithiasis, in three cases screw fracture, four implant loosening and five paravertebral bursitis relieved by implant removal.

We measured preoperative, postoperative and follow-up local kyphosis and if present local scoliosis values of the patients. The measurements were obtained from the uninjured lower and upper vertebrae adjacent to the fractured one. At this point we must draw attention to that; in our opinion this kind of measurement is not a very reliable one since all radiographs could not be obtained in a standardized technique and also evaluations can vary from person to person. To minimize these, we revised and remeasured all of them.

We have found the average local kyphosis angle as 12.11 degrees (Ranging between -26 and 50 degrees) preoperatively, 2.61 degrees (Between -35 and 30 degrees) postoperatively and 14.70 degrees (Between -29 and 48 degrees) in the followup. In 9 patients also 11.62 degrees scoliosis was present preoperatively. Postoperatively the values decreased to 5.77 degrees. In the follow-up 4 among the 9 patients had an average loss of correction of 4 degrees. In local kyphosis angle the mean loss of correction is 12.09 degrees (Range : 0-24 degrees). We have classified the loss of correction

values according to the patients follow-up periods. The average loss of correction in 0-11 months, 12-23 months, 24-36 months and 36 months and more are 9.64, 12.15, 12.75 and 15.60 degrees respectively.

Because of the amount and progression in the loss of correction values; we also measured a "one segment" kyphosis angle from the lower healthy vertebra's lower endplate and the fractured vertebra's upper end-plate, the anterior wedge compression angle (10, 11) and the wedge index (the anterior vertebral body height divided by the posterior vertebral body height) of the affected vertebra (10, 11). In "One segment method" by excluding the upper disc space -which was mentioned as the most affected and disrupted disc space by Dick and Lindsey (5, 10) during the reduction- we can investigate the changes in kyphosis of the injured vertebra and the lower disc space. The results are documented in Table 1.

Table 1. Radiologic Measurements on Lateral Films

	Preop	Postop	Follow-up
Kyphosis (Cobb Method)	12.11 R: -26 and 50	2.61 R: -35 and 30	14.70 R: -29 and 48
Kyphosis (One Segment Method)	14.02 R: -14 and 32	10.17 R: 0 and 28	12.94 R: 0 and 30
Wedge angle	17.79 R: 3 and 35	14.87 R: 0 and 31	15.26 R: 4 and 35
Wedge index AVH/PVH (mm)	0.595 M: 20.27/34.02	0.664 M: 22.91/34.49	0.661 M: 22.76/34.42

R = Range, M = Mean

AVH = Anterior Vertebral Height. PVH = Posterior Vertebral Height

From these results we saw that :

1) There is an increase in the kyphosis angle that measured by Cobb method in the followup (Mean loss of correction is 12.09 degrees).

2) But when we exclude the upper disc space by using the "One segment method" the loss of correction is 2.77 degrees mean. This points out that the main cause of the loss is the upper disc space.

3) The loss of reduction in the healing vertebral body itself is very low as seen from the changes in the anterior body wedge angle and wedge index (The difference between postop and followup wedge angle is 0.39 degrees mean, the wedge index difference is 0.003).

4) Since we did not perform transpedicular grafting (3, 5) with the fear of bone retropulsion into the spinal canal (11); the improvement in the body height of the injured vertebra was limited to the correction achieved by distraction (Mean improvements in wedge angle and wedge index are 2.92 degrees and 0.069 respectively).

5) Interestingly, we could not find a dramatical difference in the loss of correction values between the posteriorly fused patient group and the patients which had not fusion mass (11.62 degrees loss the correction in patients with posterior fusion and 12.17 degrees without it).

CONCLUSION :

Our clinical experience has shown that the AO Internal Fixator is succesful in treating low thoracic and lumbar fractures. Although there is an increase in the kyphosis values during followup this is mainly caused by disc space degeneration. This can be corrected with the restoration of the physiological vertebral body height by transpedicular grafting and adequate posterolateral or transpedicular interbody fusion (5, 8, 10).

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