

THE COMPLICATIONS WE HAVE EXPERIENCED IN TREATING SPINE FRACTURES WITH AO SPINAL INTERNAL FIXATOR

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ABSTRACT:

Between May 1989 and May 1994 AO Spinal Internal Fixator has been used for treating 76 patients with unstable thoracolumbar spine fractures in our department. Fiftyone of the patients were male and 25 were female. Their average age is 38.2 years; changing between 16 and 75. The follow-up period is between 1 and 48 months (Mean: 31 months). We invited the patients for control examination on the postoperative 1.5, 3, 6 and 12th months respectively. In the late follow-up, we saw that most of the patients have loss of correction in varying degrees (Mean: 12.09 degrees -Ranging between 0 and 24 degrees-). In five of the patients screw fracture and in four of them implant loosening were observed. Two patients came with superficial and another with deep infection. Also we have five paravertebral bursitis, one deep venous thrombosis and one urolithiasis among the patient group. In this study, we try to find out the reasons of and remedies for these complications.

Key Words: AO Internal Fixateur, complication.

INTRODUCTION

Pedicle fixation of thoracolumbar spine fractures has become popular throughout the world in recent years. Since 1989 we also have been using pedicle fixation and mainly the AO Internal Fixator for unstable vertebral fractures in our clinic. The possibility of immobilizing fewer motion segments and stronger bony fixation compared to distraction devices are the advantages of transpedicular fixation. On the other hand we also met with some complications during our work with this technique. Some of these complications have occurred at the beginning of the learning curve and decreased later but some of them remained unchanged with time. We investigated the complications of spine fracture treatment with Fixateur Interne in our series in this study.

MATERIAL AND METHOD

Our study group included 76 patients operated for unstable lower thoracic or lumbar vertebral fractures between May 1989 and May 1994. There were 51 males and 25 females in our series. The average age is 38.2 years varying between 16 and 75. Fortyfour of them were involved in motor vehicular accidents, 30 of them fell from a height and two of them were injured in some other way. According to Denis' three column concept, there were 70 burst fractures which 4 of them associated with stable compression fractures, 5 unstable compression fractures and one fracture-

dislocation among the group. Neurologic evaluation with the Frankel scale gave 1 Frankel A patient, 2 B, 2 C, 10 D and 61 Frankel E patients.

We have used Fixateur Interne for adults with unstable fractures -according to Denis- below 110 vertebra. All of the patients had fresh fractures and most of them were operated during the first 5 days after trauma. We haven't experienced any additional neurologic injury between acceptance to the emergency room and later to the operating theater. We routinely gave second generation cephalosporins during the induction of anesthesia and every 12 hours postoperatively for 3 days. We didn't use image intensifier in these operations. We preferred the site of screw insertion described by Dick (5), find the pedicle by blunt technique and controlled the tract by the pedicle probe in every patient. After inserting the screws, AP and lateral radiograms were obtained and the screw, positions were checked. In two patients we used allograft since they hadn't adequate autogenous iliac crest bone. In the remainder, we routinely used autogenous iliac crest bone. We placed closed suction drains between the fascia and subcutis and to the iliac crest for 48 hours. In the third postoperative day, we mobilized the patients with Jewett type three-point corset except the patient with fracture-dislocation. The patients were set free from the corset depending to their condition and severity of the fracture between postoperative 8 and 10 weeks.

RESULTS

As general complications, we have two superficial

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(2.63 %) and one deep (1.31 %) wound infection (Overall infection rate : 3.94 %). In one patient deep venous thrombosis (1.31 %) and in another one urolithiasis (1.31 %) was occurred. There was no perioperative deaths in our series. Paravertebral bursitis developed in 5 patients (6.57 %) due to the irritation of screw ends. A total of 304 screws were placed in the operations. Screw misplacement was noted in 5 patients (6.57 %) for a total of 9 screws (2.96 % screws). In one (1.31 %), among them, also a painful radicular injury was developed due to screw impingement which was substantiated by EMG. As hardware failure, we have experienced screw breakages in 5 patients (6.57 %) for a total of 9 screws (2.96 % screws) and in 4 patients, nut loosening (5.26 %). Although we have found in most of the patients an increase in local kyphosis angle in the follow-up (Average: 12.09 degrees, changing between 0 and 24 degrees); we saw that this was not related with the healing vertebra itself but the disk space degeneration.

DISCUSSION

In Table 1, complication data of other reported series and our clinic is compared. Esses, noted in a recently report that, the most common perioperative complication is unrecognized screw misplacement in transpedicular fixation (7). Among the postoperative complications, deep wound infection is reported as the dominant one (7). In most of the series about pedicle screw fixation systems, hardware complications are dominant (1, 2, 3, 4, 7).

Table 1: Complications with AO Internal Fixator (% of Patients)

Author	Patients	Breakage	Malpos.	Loosen.	Neur.	Infec.	DVT
Dick (5)	183	4 %	2 %	0.6 %	—	1 %	—
Lindsey (9)	80	6.25 %	10 %	—	—	1.25 %	—
Esses (6)	89	3 %	9 %	3 %	2 %	4.5 %	2.2 %
Aebi (1, 2)	30	—	—	6.7 %	3 %	—	—
Our Clinic	76	6.57 %	6.57 %	5.26 %	1.31 %	3.94 %	1.3 %

Screw malpositions were seen with a higher frequency early in our series. Nowadays we don't experience this problem. We do not use image intensifier and interestingly in some of the reported series most misplaced screws were guided by an image intensifier (6). In the patient with a misplaced screw impinging on a radix and produce symptoms, the screw was re-

moved. Except this case we don't have any neurologic complications. We relate this result to the blunt pedicle finding technique and controlling the tract with the pedicle probe.

Our main unchanged complication is screw breakage. We didn't find any difference in the incidence of screw fractures between patients with or without posterior fusion. Most of the breakages occurred after vertebral healing. In these patients we removed the instrument and if possible the fractured part of the screw.

In 4 patients nut loosening occurred but fortunately they didn't affect the outcome.

We have 2 superficial and one deep wound infection. In all of the three infections, Staphylococcus aureus was found in the wound cultures. The two superficial infections responded well who lacked adequate iliac crest bone and therefore posteriorly fused with allograft; deep infection developed. He was managed with thorough debridement of the affected tissues and allograft, irrigation with antibiotic solution, appropriate intravenous antibiotics and delayed skin closure. We think antibiotic prophylaxis, gentle tissue handling during the operation, closed suction drainage to prevent the development of seromas and late bacterial contamination and optimal wound closure is essential for a low infection rate.

Painful paravertebral bursitis developed in 5 patients which was relieved with implant removal.

Deep venous thrombosis developed in the patient with fracture-dislocation due to prolonged bed rest and treated with anticoagulant therapy. Since deep venous thrombosis is unusual after spinal surgery (8), we only give prophylactic anticoagulants to the risk group in our clinic.

We have experienced an increase in the local kyphosis angle in nearly all patients. This occurred both during the healing period and after implant removal. Among the reported series, Lindsey (9, 10) also noted a similar increase in kyphosis in a group of 80 patients. He found that this increase was originating from mainly the disk spaces, particularly the upper disc space. After investigating our series, we have also found similar results. We excluded two pa-

tients that were operated recently since they have not adequate follow-up period. Table II shows our results and Table III shows Lindsey's results for comparison.

Table II. (Our Results)

	Preop (n = 74)	Postop (n = 74)	Follow-up (n = 74)
Kyphosis (Cobb)	12.11	2.61	14.70
Kyphosis (One-seg)	14.02	10.17	12.94
Wedge Angle	17.79	14.87	15.26
Wedge Index	0.595	0.664	0.661

Table II. (Lindsey's Results)

	Preop (n = 80)	Postop (n = 80)	2 Year Follow-up (n = 76)
Kyphosis (Cobb)	16.5	6.0	14.5
Wedge Angle	17.4	7.9	8.2
Wedge Index	0.61	0.83	0.81

As shown in Table II, although the increase in Cobb angle is important, the wedge angle and wedge index of the fractured vertebrae increase slightly in the follow-up period indicating a minimal loss of correction in the fractured body itself. We also measure a different kyphosis angle (One-segment method) from lower healthy vertebra's lower end plate and fractured vertebra's upper end plate to exclude the most affected upper disc space. The modest increase in kyphosis documented with the "One segment" method also showed us that, the fractured vertebra and the lower disc space didn't cause this large increase in kyphosis but the upper disc space.

CONCLUSION

In treating vertebral fractures with AO Spinal Internal Fixator, we have experienced some problems mainly related with the hardware. Screw breakage, nut loosening, screw misplacement and loss of correction mainly in the disc spaces were the most common ones. With blunt pedicle finding technique and check-

ing the position of the placed screw with two-plane radiograms, screw misplacement and neurologic complications can be minimized. As in the VSP screw example (4), with device modifications screw fractures might be reduced. We share the opinion with Lindsey that to overcome loss of correction, transpedicular grafting to restore the physiologic vertebral body height and adequate posterolateral or transpedicular interbody fusion is essential (9).

REFERENCES:

1. Aebi, M., Etter, C., Kehl, T., Thalgot J.: Stabilization of the Lower Thoracic and Lumbar Spine with the Internal Skeletal Fixation System: Indications, Techniques and First Results of Treatment. *Spine* 12: 544-551, 1987.
2. Aebi, M., Etter, C., Kehl, T., Thalgot, J.: The Internal Skeletal Fixation System: A New Treatment of Thoracolumbar Fractures and Other Spinal Disorders *Clin. Orthop.* 227: 30-43, 1988.
3. Blumenthal, S. Gill, K.: Complications of Lumbar Spinal Fusion with Transpedicular Instrumentation *Spine* 17 (6 Suppl.): 184-189, 1992.
4. Davne, S.H., Myers D.L.: Complications of Lumbar Spinal Fusion with Transpedicular Instrumentation *Spine* 17 (6 Suppl): 184-189, 1992.
5. Dick, W.: The "Fixateur Interne" as a Versatile Implant for Spine Surgery, *Spine* 12: 882-900, 1987.
6. Esses, S.I., Botsford D.J., Wright, T., Bednar, D., Ballely, S.: Operative Treatment of Spinal Fractures with the AO Internal Fixator *Spine* 16 (3 Suppl.): 146-150, 1991.
7. Esses, S.I., Sachs, B.L., Dreyzin, V.: Complications Associated with the Technique of Pedicle Screw Fixation: A Selected Survey of ABS Members. *Spine* 18 (15): 2231 - 2238, 1993.
8. Ferree, B.A., Stern, P.J., Jolson, R.S., Roberts V. J.M., Kahn III. A.: Deep Venous Thrombosis After Spinal Surgery, *Spine* 18 (3): 315 - 319, 1993.
9. Lindsey, R.W., Dick, W.: The Fixateur Interne in the Reduction and Stabilization of Thoracolumbar Spine Fractures in Patients with Neurologic Deficit *Spine* 16 (3 Suppl.): 140-145, 1991.
10. Lindsey, R.W., Dick, W., Nunchuck, S., Zach, G.: Residual Intersegmental Spinal Mobility Following Limited Pedicle Fixation of Thoracolumbar Spine Fractures With the Fixateur Interne, *Spine* 18 (4): 474 - 478, 1993.