10.5005/jp-journals-10039-1121

CASE REPORT

Broken Spinous Process and Posterior Dynamic Stabilization

[1]Sumeet G Pawar, [2]Apurva Prasad, [3]Arjun Dhar, [4]Premanand S Ramani

ABSTRACT

Introduction: Complications occurring during surgery are not uncommon and may lead to abandoning of the procedure. Discussed here is one such case where complication was managed and optimal surgical treatment was carried out as was planned preoperatively.

Case report: A 72-year-old male planned for posterior dynamic stabilization (PDS) broke his spinous process during surgery without any undue stress or force. Spinous process was reconstructed and PDS done as planned with improvisation on table.

Conclusion: A broken spinous process during surgery was successfully reconstructed and stabilized with two Coflex dynamic devices at either end.

Keywords: Broken spinous process, Coflex, Posterior dynamic stabilization.

How to cite this article: Pawar SG, Prasad A, Dhar A, Ramani PS. Broken Spinous Process and Posterior Dynamic Stabilization. J Spinal Surg 2017;4(1):26-29.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

There was a time when instrumented posterior lumbar interbody fusion had become very popular not only for instability in lumbar spine but even for degenerative process.[1] However, in recent times, surgeons are dismayed by the increased number of complications arising from this procedure,[2-4] and there is a trend to choose posterior dynamic stabilization (PDS) as an alternative process in spinal degeneration in the elderly causing symptoms.[5] The senior author now has adopted uniform policy with good outcome with the use of internal decompression of spinal stenosis (IDSS) and PDS at one or multiple levels using interlaminar functional dynamic devices.

Degeneration in the spine is more commonly in the elderly population. These patients suffer from comorbidities and the risk is very high, and symptomatology plays an important role in surgery, namely low back pain, claudication, and sciatica. In the Western world, there is nine times higher risk of complications in patients above the age of 70 years as 80% of them have comorbidities, the spine is already rigid due to osteoarthritis in the facet joints and disk degeneration, poor bone quality with osteoporosis, and restricted life expectancy.[5,6] In our population, the risk factor is equally higher in patient above the age of 60 years. There are innumerable studies outlining the unpleasant effects of rigid stabilization.

Once the surgery is planned and some complication occurs on the operation table, it puts the surgeon in quandary as to the further surgical management. Discussed here is one such case that we encountered and outlined how the surgeon successfully handled the situation.

CASE REPORT

The patient was a male aged 72 years, short stature and broad in constitution (Fig. 1), weighing 100.7 kg suffering from high blood pressure but no diabetes or thyroid problem. He had protuberant belly. He has been suffering from low back pain since several years, but for the last 10 months he suffered from severe back pain and right sciatica. His walking was severely restricted and an active

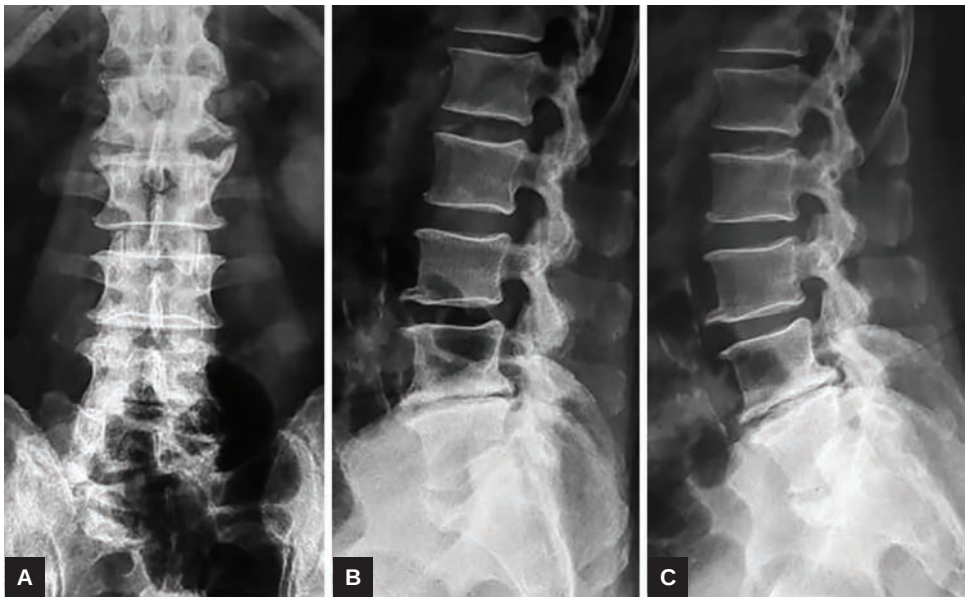
Fig. 1: The patient

[1-3]Resident, [4]Senior Consultant

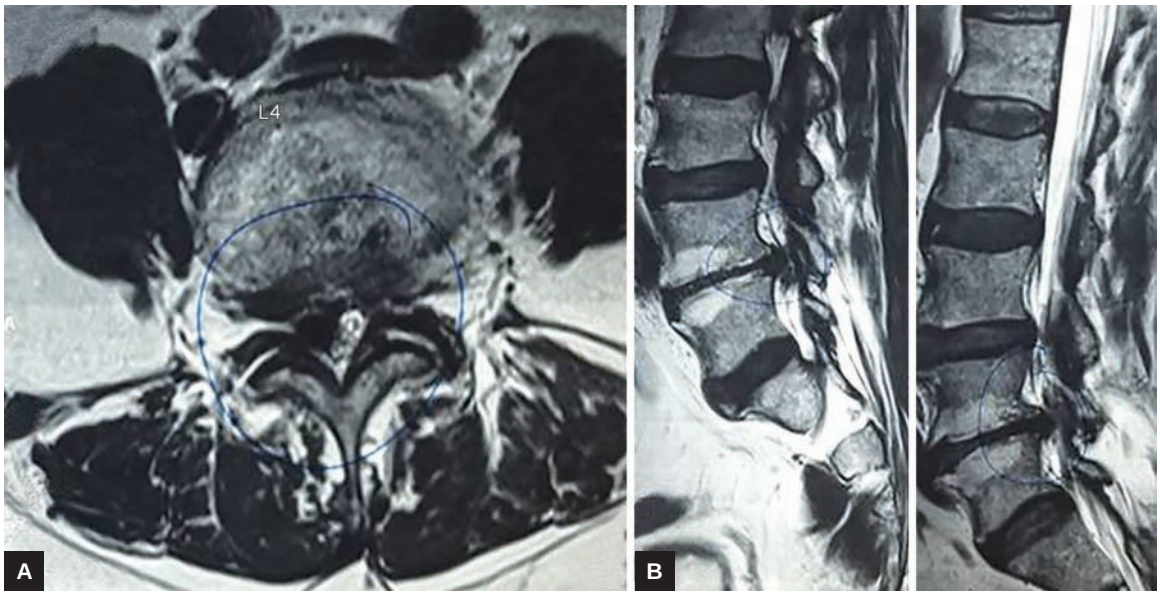
[1,2,4]Department of Neurospinal Surgery, Lilavati Hospital and Research Centre, Mumbai, Maharashtra, India

[3]Department of Neurosurgery, Lilavati Hospital and Research Centre, Mumbai, Maharashtra, India

Corresponding Author: Sumeet G Pawar, Resident, Department of Neurospinal Surgery, Lilavati Hospital and Research Centre Mumbai, Maharashtra, India, Phone: +9102226417001, e-mail: drsumeetpawar@gmail.com



Figs 2A and B: X-ray lumbar spine anteroposterior, (B) lateral view in flexion, (C) degenerative changes in the spine predominantly at L4-L5

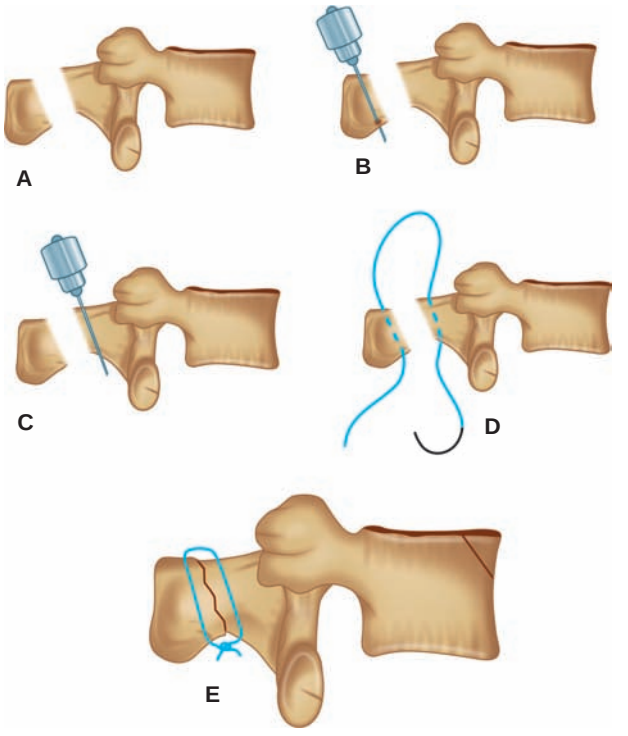


Figs 3A and B: Magnetic resonance imaging lumbar spine confirming X-ray findings with lateral recess stenosis at L3-L4 and L4-L5

man in the past could hardly walk 5 minutes. He could not get up from bed without support and was virtually bedridden. Clinical examination and investigation confirmed that he had lateral recess stenosis at two levels, namely L3-L4 and L4-L5 (Figs 2A, B and 3A, B).

He agreed for immediate surgical intervention as during the last 10 months all conservative treatment modalities had not produced any amount of relief. The surgical plan was to do bilateral IDSS to decompress nerve roots at L3-L4 and L4-L5 and then stabilize the spine by putting two interlaminar dynamic devices Coflex at L3-L4 and L4-L5.

Following preoperative evaluation, surgery was undertaken under general anesthesia. Bilateral IDSS was done successfully. The supraspinous ligament was separated from the spinous process of L5, L4, and L3. And while excising the interspinous ligament between L4 and L5, the spinous process of L4 broke in two pieces with posterior half hanging with the support of L3-L4 interspinous ligament. This was a setback for the planned surgical procedure, and once the interspinous ligament between L3 and L4 was excised, the posterior half of the excised spinous process was a free bone piece. The senior surgeon is conversant with putting intralaminar wire with a fine drill and this technique was utilized to produce an intralaminar drill hole in the anterior and posterior broken spinous processes. The holes were threaded with No 1 Vicryl and approximated together



Figs 4A to E: Diagrammatic representation of spinous process repair: (A) Broken spinous process; (B) intralaminar hole drilled through posterior broken fragment; (C) hole drilled through anterior segment of the spinous process; (D) suture No 1 Vicryl passed through the two holes; and (E) sutures tied to reconstruct the spinous process

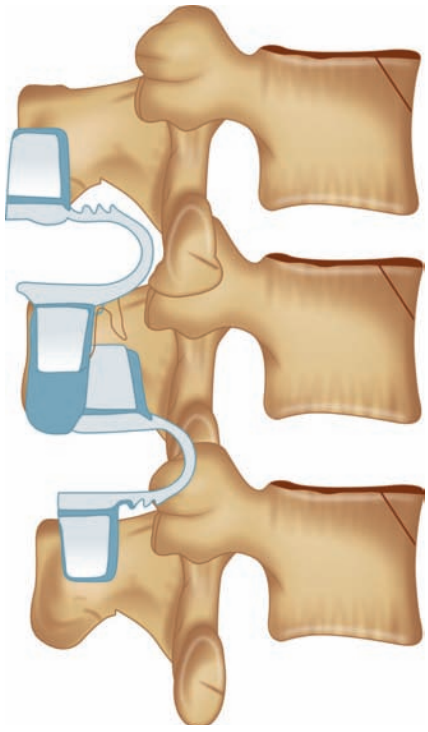


Fig. 5: Diagrammatic representation of final construct using two Coflex and the broken spinous process acting as pivot

by tying the Vicryl, thereby reconstructing the spinous process (Figs 4A to E).

Admittedly, this was a weaker central pole, but when two interlaminar devices were fixed in position, the central pillar was very stable as it functioned more with the stability of the other two spinous processes (Fig. 5). The assembly was very stable and when the patient as a whole was turned from side to side on the operating table, the construct proved to be very stable.

Postoperatively, patient was very satisfied and for the first time after 10 months, he was able to walk freely in the hospital corridor without any support and without any lumbosacral belt (Fig. 6).

DISCUSSION

In the literature, there are number of papers discussing complications of posterior dynamic devices, but we could not find any paper where such complication was managed in the manner we have described. On personal communication with various workers internationally and on reviewing the literature, we find that breakage of spinous process during surgical procedure is not uncommon.[7-9] However, all the time, when there was an intraoperative breakage of spinous process, the procedure was abandoned. In this case, by using the technique described earlier, we have managed to treat the patient

Fig. 6: Pictures taken 24 hours after surgery with corresponding X-rays showing double Coflex assembly functioning well

successfully with the surgical strategy as planned before the operation.

The Food and Drug Administration guidelines for the product[10] state that the data demonstrated spinous process fractures can occur during surgery. Potential predictors for spinous process fractures include:

- Overdecompression during surgery leading to instability in the spine, which was not in our case.
- Resection of the spinous process to ≤14 mm. In this case, we had not even touched the spinous process.
- Height of the spinous process ≤23 mm preoperatively. The spinous process in our case was more than 23 mm.
- Osteopenia or osteoporosis, and there was no clinical evidence of osteoporosis in this patient.

The lateral force required to fracture a human lumbar spinous process with varying bone densities ranges between 95 and 786 N with a load of average 317 N.[11] The distraction force necessary to break the lumbar spinous process ranged between 242–1 and 300 N, with an average load of 339 N.[12]

The lateral experimentally measured force to implant an interspinous device ranges from 11 to 150 N.[11] Based on these data, a severely osteoporotic patient may be contraindicated for interspinous device, because a fracture of the spinous process might occur intraoperatively or postoperatively.

Surgeons should be aware that the insertion of an interspinous device requires personalized forces and caution, but osteopenia is not an absolute contraindication for the operation.[10]

Generally when the spinous process breaks during surgery, the surgeon has given up the procedure.

Many reports describe fracture of spinous process as one of the complications occurring during insertion of Coflex or postoperatively. Zang et al[8] have described device-related complications in their series of 133 patients. They report three cases of intraoperative fracture of spinous process and two cases of fracture postoperatively. All cases of intraoperative fracture and one case of postoperative fracture were managed by pedicle screw fixation, whereas one postoperative fracture was managed conservatively.[9]

Xu et al[9] in their analysis of complications in interlaminar device Coflex studied 131 patients reporting spinous process breakage in 1 patient. The fracture of spinous process was seen after 1 week of surgery on computed tomography (CT) scan. Patient was conservatively managed and showed bone healing on CT scan done 1 year.[11]

We have not come across any paper where the spinous process was fractured and yet, the Coflex was implanted. Ours was the first case where spinous process had fractured without any force on it and it was reconstructed and PDS stabilized using two Coflex devices.

CONCLUSION

A broken spinous process during surgery has been successfully reconstructed and stabilized with two Coflex dynamic devices at either end.

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