

Anterior Cervical Spine Surgery in Fracture Dislocations of the Cervical Spine: Clinical Outcome

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ABSTRACT

BACKGROUND: Anterior cervical discectomy and fusion (ACDF) is the one of the commonly performed procedures in the treatment of pathology related to cervical discs. ACDF has been shown to achieve successful stabilization in about 95% of cases. The anterior approach to the cervical spine was initially described by Smith, Robinson, Bailey, Badgley and Cloward. These techniques have been refined with the use of internal fixation with or without bone implants.

MATERIAL AND METHODS: This prospective study was conducted in Shree Birendra Hospital, Chhauni from August 2012 to September 2015. Twenty nine patients operated for fracture dislocations of cervical spine were included. All patients were operated with the left side Smith and Robinson approach. The cervical spine level was confirmed with the help of image intensifier after putting a bent needle at the disc level. Iliac crest tricortical graft was harvested and put into the disc space and fixed with an anterior cervical plate. All patients were discharged after removal of stitches at 2 weeks post-op. They were followed up at 6 weeks, 3 months and 6 months, and then yearly upto 2 years. At each visit, X-rays were taken to evaluate the progression of fusion and maintenance of sagittal alignment.

RESULTS: There were 29 operated patients - either ACDF or corpectomy and fusion. Out of 29 patients, 26 were male. 19 patients had incomplete cord injury, 5 patients had complete cord injury and 5 had intact neurology. All incomplete cord injury patients had improvement in their neurology by grade 1-2 after surgery. One patient developed a sacral bed sore and one died after surgery. The mean VAS score for pain improved from 6 ± 2 to 2 ± 1 post operatively.

CONCLUSION: Anterior cervical spine surgery improves the neurology and pain scores in traumatic cervical spine patients with a low rate of complications.

KEYWORDS: Fracture-dislocation, corpectomy, fusion

INTRODUCTION

The principle in the treatment of fracture dislocations of the cervical spine is reduction and stabilization of the injured segments¹. The modalities of treatment are conservative and surgical. Surgical approach can be anterior, posterior or combined approach. There are no absolute indications for anterior, posterior

or combined surgery. Cervical traction is not widely accepted in treating such injury, due to its potential for neurological damage, and surgery seems to represent the gold standard². Owing to the development of spinal instrumentation, internal fixation is frequently done nowadays and halo vest application is almost obsolete.

Table 1: Inclusive and exclusive criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Traumatic discoligamentous injuries. • No previous spine surgeries. • Involvement of neurology 	<ul style="list-style-type: none"> • Previous spine surgery • Additional (Posterior) spine surgery. • Associated comorbidity (malignancy, osteoporosis, infection) • Non contiguous cervical spine injuries

Anterior cervical decompression, fusion, and plating is commonly performed and accepted as the standard method³ of treatment. The anterior approach is less traumatic and enables the surgeon to perform decompression and interbody grafting with reconstruction and maintainance of cervical lordosis^{4,5}. In contrast, the posterior approach may be injurious to adjacent levels and ultimately causes deformity⁶. The posterior approach is not ideal for addressing the ruptured disc prior to reduction, and cannot prevent kyphotic deformity unless more segments are incorporated into the fusion mass. According to the commonly applied treatment algorithm for traumatic cervical fracture–dislocations, an anterior or posterior approach can be used if disc fragments are not found in the canal. However, if the disc fragment is present, the only recommended approach is anterior cervical discectomy and fusion⁷. The appropriate method of cervical spine fracture dislocation fixation is not defined. The morphology of fracture pattern will determine the method of fixation to some extent. It is vital to use validated measurement tools to assess relevant clinical outcomes, and to help determine the effectiveness of different treatment modalities.

The objective of the current study was to assess clinico-neurological parameters in patients with subaxial cervical spine fracture dislocation injuries subjected to anterior cervical decompression, fusion and plating.

MATERIAL AND METHODS

This prospective study was conducted in Shree Birendra Hospital, Chhauni from August 2012 to September 2015. A total of 88 patients with cervical spine injuries were admitted in Shree Birendra Hospital during the study period. Out of 88 patients, only 31 patients needed surgical treatment. The exclusion and inclusion criteria are tabulated below (Table 1). 29 patients who gave written informed consent and underwent surgery were included in the study and followed up for 1 year.

Clinical parameters including medical history, neurologic examination, and ASIA grading evaluation details were entered in the master chart and the general demographic, clinical, and radiologic features of the patients were analysed.

All the patients were operated using a left sided transverse incision. The required level was identified with the help of an image intensifier after putting a bent needle in the concerned disc space. All the patients underwent decompression (either discectomy or corpectomy), fusion with tricortical iliac crest graft, and anterior cervical plating. The posterior longitudinal ligament was removed in corpectomy cases but not removed in ACDF. Patients were supported post operatively with a Philadelphia cervical collar for 6 weeks. All the patients were discharged at 2 weeks post surgery, after removal of stitches. Physical therapy was started after 6 weeks. They were followed up at 6 weeks, 3 months, 6 months and then yearly. In each visit radiographs were taken to see the progression of fusion and maintenance of sagittal alignment. The data was analysed using SPSS version 2.1

RESULTS

There were 29 operated patients: 23 males and 6 females. The age of the patients ranged from 26 to 70 years and the mean age was 58 years. Out of 29 patients, 26 had fall injuries (tree, building, height), 2 had road traffic injuries and 1 patient had sustained an animal attack. 6 patients had C3-C4 injuries, 8 had C4-C5, 9 had C5-C6, and 6 had C6-C7 injuries.

The VAS for pain improved in subsequent follow ups in all patients, except one patient who was on ventilator support (Table 2).

Five patients had ASIA-A neurology and did not improve their lower limb neurology and bowel & bladder status even after surgery. In case of lower cervical spine injuries, there was improvement in upper limb neurology above the injured level, even in complete cord injuries (Table 3).

The pre-op average sagittal alignment of the cervical spine (SACS) was 14.2 ± 2.5 degrees which improved to 20.5 ± 4.5 degrees at 6 months follow up. The mean time taken to achieve good radiographic fusion was 6 months (range 3-10 months). Good fusion was achieved in all patients. (Figure 1)

One patient developed a grade 3 sacral bed sore and was managed with flap cover with help of the plastic surgeons. Two patients developed

grade 1 bed sores preoperatively, both of whom improved with back care and dressing.

One patient who was on ventilator support preoperatively as well as post operatively, died on the 5th post op day.

DISCUSSION

Appropriate management of cervical spine injury patients requires an understanding of the mechanism and type of injury. Neurological involvement and instability are the main concerns. Correct interpretation of injuries and application of appropriate treatment principles result in optimum management of these injuries⁸.

Preoperative low neck specific disability, low pain intensity, non smokers, male sex, good preoperative hand strength, and active neck ROM were significant predictors for a good long term outcome of pain intensity and NDI after ACDF⁹.

Table 2: Visual analogue score for pain

Characteristic	Pre-op	6 weeks	3 months	6 months	12 months
VAS	6 ± 2	3 ± 1.5	2 ± 1	2 ± 1	2 ± 1

Table 3: Difference in Pre-op and Post-op neurological status

Pre-op Neurological Status(no)	Post-op(no)
ASIA-A(5)	ASIA-A(4), One Expired
ASIA-B(4)	ASIA-B(1), ASIA-C(2), ASIA-D(1)
ASIA-C(11)	ASIA-D(7), ASIA-E(4)
ASIA-D(9)	ASIA-E(7), ASIA-D(2)

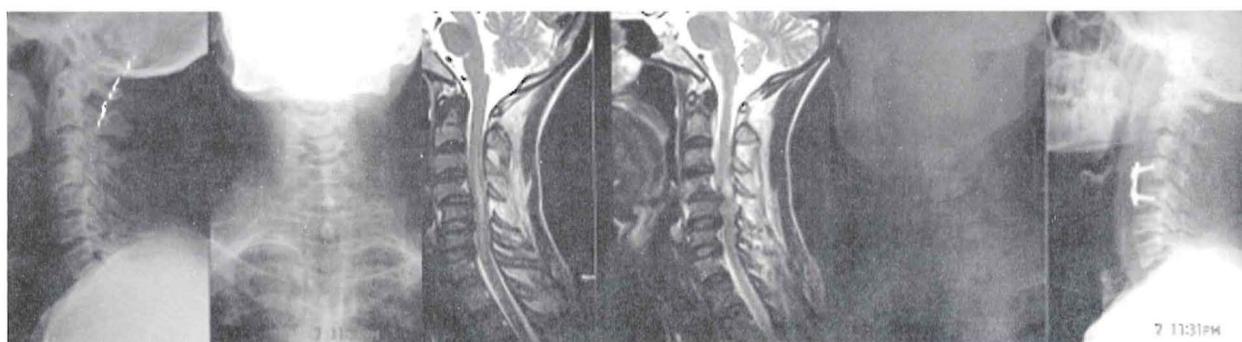


Fig. 1: Pre-op and Post-op imaging

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ACDF gained popularity as satisfactory clinical outcomes, low complications and high fusion rates were reported^{10,11}.

In our study, the most common cause of injury was fall from height, whereas RTA and sports injuries were not common. In contrast, common causes of spine injuries in western countries are motor vehicle accidents, sports and diving¹². In our study, there was predominantly male involvement (23 out of 29 patients=80%) which was similar to other studies¹³.

In our study, the diagnosis was missed on the first visit of one patient. She started to develop weakness of upper limbs and after 2 weeks, a kyphotic deformity was seen on radiographs. The incidence of delayed diagnosis ranges from 5 to 20%¹⁴.

The mean pre-op VAS score for pain was 6 (range 4-7); the mean post-operative VAS at the last follow up was 2 (range 1-3). This was comparable with other studies¹⁵.

In our study, all patients had good radiological fusion within 10 months. The sagittal alignment improved and was maintained. This was found to be similar to other studies¹⁵.

None of the patients with ASIA-A neurology had improvement in their bowel and bladder habits and lower limb neurology, but their upper limb neurology improved by grade 1-3 except for hand grip. In incomplete cord injuries, patients' neurology improved by grade one or two. Similar results have been found in other studies¹⁶.

CONCLUSION

Anterior cervical spine surgery improves the neurology and pain scores in traumatic cervical spine patients with a low rate of complications.

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