

## MANAGEMENT OF FACET JOINT DISLOCATION OF CERVICAL SPINE

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### ABSTRACT

#### BACKGROUND

Facet joint injuries are increasing day by day due to increase in road traffic accidents produced by rotation of head in flexion or extension. It commonly affects lower cervical spine due to anatomical considerations being a very mobile part between head and a fixed torso. The architecture of vertebra in lower cervical spine also predisposes to injury are combination of lower height, smaller anteroposterior diameter of the superior facet and a more horizontally oriented superior facet at C6 and C7 levels.<sup>1</sup>

#### MATERIALS AND METHODS

In our series of 19 cases, both unilateral and bilateral facet dislocation were taken into consideration either with or without fracture. Unilateral fracture dislocations were associated with less neurological deficit, but were difficult to reduce while bilateral fracture dislocations had more and many times permanent neurological deficit. Majority of our patients were treated by open reduction and internal fixation with Bohler's triple wiring and bone grafting to achieve fusion.

#### RESULTS

The goal of treatment is to preserve functional and anatomical continuity of spinal cord and nerve roots, restore spinal alignment, establish spinal stability and provide freedom from post injury pain or delayed neurological problem. In our series of 19 cases, 16 were treated operatively and they experienced better stability and pain relief. None of our cases showed post-treatment deterioration in neurological status. Improvement in neurological status was seen more in partial or incomplete loss cases, i.e. Franklin B or C.

#### CONCLUSION

Cervical facet fracture dislocations should be reduced, stabilised and fused as early as possible for better rehabilitation and chances of neurological recovery. Bohler's triple wiring seems to be cheap and reasonably good method of fixation.

#### KEYWORDS

Cervical Facet Dislocation.

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#### BACKGROUND

Facet joint injuries even though very rare are serious injuries, which usually affect the cervical spine. In most cases, the lower part of the cervical spine is involved due to anatomical issues. Fractures of C6 and C7 account for nearly 40% of cervical spine injuries after blunt trauma.<sup>2</sup> A combination of lower height, smaller anteroposterior diameter of the superior facet and a more horizontally oriented superior facet at C6 and C7 levels in vivo may explain the predilection of translation relative to one another in the lower cervical spine.<sup>1</sup> The most common causes for these injuries are high velocity impact accidents like motor vehicle, fall from height, fall while carrying heavy object and sporting injuries. A bimodal peak in age distribution has been

noted with injuries most common in adolescents and young adults (15 to 24 years old) and middle-aged individuals (over 55 years old). The injury mechanism usually involves a combination of flexion or extension in combination with a rotatory component. While the flexion/rotation injury tends to produce facet joint dislocations, the extension/rotation mechanism commonly result in facet fractures with or without dislocations. This has been explained in detail by Allen's classification. Management of cervical facet joint injuries is still controversial in many aspects. This starts from the diagnostic workup with respect to the timing of an MRI (magnetic resonance image) scan of the spine and the issue of closed reduction. This article is intended to summarise the treatment concepts for facet joint injuries of the lower cervical spine.

#### MATERIALS AND METHODS

##### Sample Size

Nineteen cases, duration 24 months from January 2011-December 2012.

In the clinical setting, isolated facet joint dislocations are an exception. Most unilateral facet joint dislocations are associated with at least a fractured facet. This type of facet

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joint dislocation seems to be less harmful or debilitating than dislocation without a fracture because latter is more likely to injure the spinal cord and maybe more difficult to reduce.<sup>3</sup>

In this study, 11 (58%) patients out of 19 presented with bilateral facet joint dislocation and 8 (42%) out of 19 presented with unilateral facet dislocation. 25% of the patients with unilateral facet joint dislocation presented with a neurological deficit Frankel A (i.e., complete paralysis below the level of the injury), 2 out of 7 patients were neurologically intact (Frankel E). In bilateral facet dislocation, 7 patients out of 11 presented with neurological deficit Frankel A, 2 patients with neurological deficit Frankel B and 2 patients with Frankel C.

### ASIA Impairment Scale (Modified Frankel's)

- A = Complete- No motor or sensory function is preserved even in sacral.
- B = Incomplete- Sensory, but not motor function is preserved below the level.
- C = Incomplete- Motor function is preserved below the neurological level (power <3).
- D = Incomplete- Motor function is preserved below the neurological level (power >3).
- E = Normal.

These fracture dislocations are unstable either with or without bony injury, hence required stabilisation and fusion. Surgery is essential in neurologically compromised patient say Frankel A and B, but there is controversy in neurologically stable patients because of risk of iatrogenic neurological deficit induced by the procedure.

### Investigations

#### The Diagnostic Workup should include-

1. Plain x-rays of cervical spine AP and lateral, if necessary swimmers view and oblique view. In AP view, we see rotation at the dislocated segment observed by sudden disappearance of spinous process in unilateral facet dislocation, but in bilateral facet dislocation, amount of rotation is less. We also look for widening of interspinous distance. In lateral view, there is subluxation with displacement of 20-30% of the vertebral body diameter in unilateral dislocation, but can exceed 50% in bilateral dislocation.
2. CT (computed tomography) scan of cervical spine from occiput to T4 to determine the degree of bony injuries. Correct diagnosis based on only plain x-ray missed in about 25% especially at the cervicothoracic junction.<sup>4</sup>
3. MRI- MRI is necessary to visualise the spinal cord and soft tissue and a possible disc prolapsed.

### Management

We do not rely on close manipulative reduction because majority of the cases are associated with fractures and are unstable after closed reduction, which require stabilisation and fusion.<sup>5</sup> We only attempt closed reduction on OT table under GA stable reduction.

### Reduction Technique

Closed reduction under C-arm control. We succeed in only 15% of cases in achieving good and crutch field tong traction with initial weight of 5 to 10 lb applied, followed by a lateral x-ray to rule out occipitocervical instability or gross over distraction (>1 cm) of the injured segment. Serial neurologic examinations performed throughout the entire process-

#### a. Unilateral Facet Joint Dislocation

Crutchfield Tongs traction were applied slightly posterior to neutral position with a flexion moment to facilitate unlocking of the dislocated joints. We grasp the cervical tongs like a steering wheel with hand placed just above the pin sites (in the 4 and 8 o'clock positions). Axial compression is applied to the non-dislocated side while longitudinal distraction is applied to the dislocated side. The dislocated facet is now unlocked. Final reduction entails reversing the rotational deformity by rotating the head toward to the dislocated side. A subtle click or thump heard or felt. Manual traction then slowly released and a lateral x-ray obtained to confirm the reduction. Once reduced, traction decreased to 10 or 15 lb and the neck slightly extended. Neurologic status serially assessed throughout the process.

#### b. Bilateral Facet Joint Dislocation

Crutchfield tongs are applied as above. Because the facet reduction requires some flexion in addition to distraction, the pins placed slightly (1 cm) posterior. By positioning the pulley anterior to the patient, the traction vector used to apply a flexion moment to the cervical spine. Weight of the traction gradually increased at 10-15 minutes interval starting with 10-15 lb until reduction is achieved. Lateral x-ray taken to confirm the diagnosis. Once the dislocated facets reduced, traction changed to a neutral or in slight extension with 10-15 lb weight, which hold the facet joints reduced.

#### c. Open Reduction Manoeuvres

Open reduction of dislocated facet joints performed using a posterior approach in prone position. Cervical traction was applied as above. This facilitate intraoperative manoeuvres by providing distraction across the dislocated segments. If the spinous processes are intact, they are grasped with towel clips near their base to flex and distract the injured joint. If the spinous processes are fractured, a Penfield elevator or other small, flat instrument placed over the top of the superior articular process of the lower level. Then, angling it caudally, the inferior tip of the inferior articular process of the upper level levered up and posterior back into position. If these manoeuvres fail, the tip of the superior articular process of the lower vertebra respected using a small Kerrison rongeur. Once reduction is achieved, stabilisation with interspinous wiring done. A hole is created on either side of the superior third of the spinolaminar junction of the upper

vertebra by puncturing the bone with a towel clip or sharp bone clamp. One or more wires is passed through the hole and passed beneath the spinous process of the lower vertebra. The wire is then tensioned and bone graft placed posteriorly between the lamina. This method is cheap and efficacy is comparable with other methods.<sup>6,7</sup>

### Postop Management

If a facet dislocation can be reduced in skull traction, traction for 6 weeks and moulded cervical collar for 3 months were

given with the possibility that stability obtained by spontaneous fusion.

If skull traction does not reduce the dislocation or reductions were unstable, we proceed with open reduction and posterior cervical fusion with interspinous wiring. Postoperative management consists of immobilisation in a rigid cervical orthosis for 6-8 weeks.

### RESULTS

|                                               | Open Reduction  |         |         |                 |         |         |         | Close Reduction |                 |                               |
|-----------------------------------------------|-----------------|---------|---------|-----------------|---------|---------|---------|-----------------|-----------------|-------------------------------|
|                                               | U/L Dislocation |         |         | B/L Dislocation |         |         |         | U/L Dislocation | B/L Dislocation |                               |
| No of cases                                   | 7               |         |         | 9               |         |         |         | 1               | 2               |                               |
| Associated fractures                          | No (2)          | Yes (2) | Yes (3) | Yes (3)         | Yes (2) | Yes (2) | Yes (2) | Yes             | Yes             | Yes                           |
| Pre-reduction neurological status             | E               | A       | C       | A               | B       | C       | A       | B               | A               | A                             |
| Post-reduction neurological status at 3 weeks | E               | A       | D       | A               | C       | D       | C       | D               | C               | Expire due to medical problem |

**Table 1**

In this study, 16 patients out of 19 treated with open reduction and stabilisation with interspinous wiring and bone grafting, 3 patients out of 19 treated with closed reduction. One patient expired close post reduction due to medical complication. Most of the patients had associated bony injury mainly of facet, lamina, pedicle, lateral mass, etc. Surgically-treated patients were pain-free at follow-up even if there had been an incomplete reduction achieved with surgery.

### Pre and Postop Photographs of Unilateral Facet Dislocation



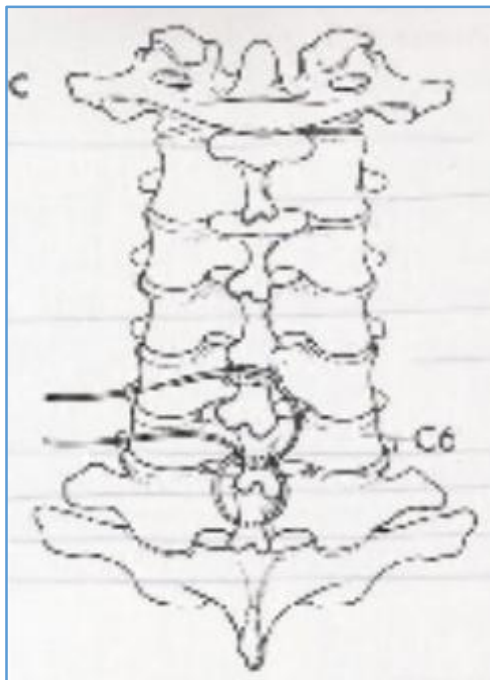
**Figure 1**



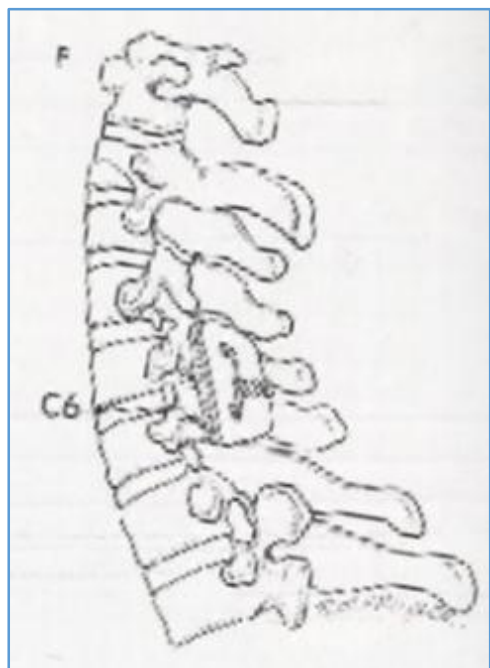
**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**



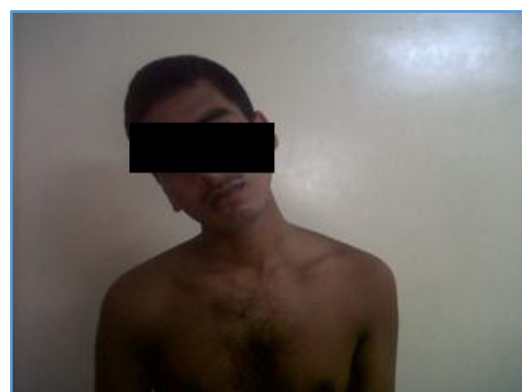
**Figure 7**



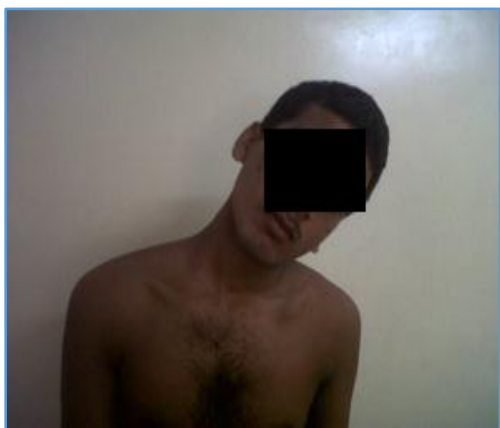
**Figure 8**



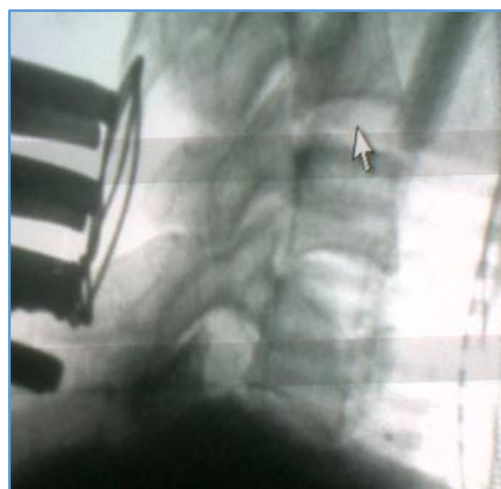
**Figure 9**



**Figure 10**

**Figure 11****Figure 12****Figure 13**

#### **Pre and Postop Photograph of Bilateral Facet Dislocation**

**Figure 14****Figure 15****Figure 16****Figure 17**

#### **DISCUSSION**

Goals of treatment are to preserve fictional and anatomical continuity of the spinal cord and nerve roots, restore spinal alignment, establish spinal stability and provide freedom from post injury pain or delayed neurological problems. Reviewing the literature, it is quite obvious that the conservative treatment of facet joint injuries have a high failure achieving the above-mentioned treatment goals. In majority of the patients, we did surgical stabilisation and fusion because majority of patients associated with bony injury and were unstable after reduction. Also, if there were

no associated injury, facet joint injuries have high failure rate in achieving foresaid T/t goals. In majorities of patients, we did surgical stabilisation and fusion, because majority of patients associated with bony injury and were unstable after reduction. Also, if there were no associated injury, closed reduction was difficult and requires open reduction. Unilateral facet dislocations were difficult to reduce skeletal traction. Closed reduction was successful in less than 30% of patients and patients who underwent open reduction and fusion had better results than the patients whose fractures were left unreduced. In our experience, open reduction and internal fixation of unilateral facet dislocations have provided consistently good results.

## CONCLUSION

Bilateral facet dislocations produce up to 50% anterior subluxation of one vertebral body on the vertebra below. Usually facet capsules, the posterior longitudinal ligament and the posterior annulus fibrous and disc are disrupted. These injuries are more frequently associated with neurological deficits than are unilateral facet dislocations. These dislocations are more easily reduced with closed traction methods than unilateral dislocations, but because they are so unstable, redislocation is frequent even if they are treated with prolonged skeletal traction.

## REFERENCES

- [1] Ebrahim NA, Patil V, Liu J, et al. Morphometric analyses of the cervical superior facets and implications for facet dislocation. *Int Orthop* 2008;32(1):97-101.
- [2] Goldberg W, Mueller C, Panacek E, et al. Distribution and patterns of blunt traumatic cervical spine injury. *Ann Emerg Med* 2001;38(1):17-21.
- [3] Crawford NR, Duggal N, Chamberlain RH, et al. Unilateral Cervical Facet Dislocation: Injury Mechanism and Biomechanical Consequences. *Spine* 2002;27(17):1858-1864.
- [4] Dvorak MF, Fisher CG, Aarabi B, et al. Clinical outcomes of 90 isolated unilateral facet fractures, subluxations, and dislocations treated surgically and nonoperatively. *Spine (Phila Pa 1976)* 2007;32(26):3007-3013.
- [5] Beyer CA, Canabala ME, Berquist TH. Unilateral facet dislocations and fracture-dislocations of the cervical spine. *J Bone Joint Surg Br* 1991;73(6):977-981.
- [6] Brodke DS, Anderson PA, Newell DW, et al. Comparison of anterior and posterior approaches in cervical spinal cord injuries. *J Spinal Disord Tech* 2003;16(3):229-235.
- [7] Mihara H, Cheng BC, David SM, et al. Biomechanical comparison of posterior cervical fixation. *Spine (Phila Pa 1976)* 2001;26(15):1662-1667.