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Atypical Fracture of Axis With False Localising Sign

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Abstract

Introduction: Injuries of upper cervical spine often associated with false localizing signs as a neurological deficit meaning there is a no clinico-radiological correlation. Purpose of this case report is to diagnose a rare clinical presentation due to injury of pyramidal tract decussating at lower medulla.

Method and Materials: A 21-years old male patient was presented with traumatic quadriplegia (ASIA scale-A). Primary treatment was given along with immobilization of neck with collar. Routine X-ray of cervical spine was taken. X-ray was showing shear fracture of C 2 vertebra with intact dens. Crucified tong was inserted. Methyl Prednisolon injection in proper dose within 8 hours was given. (NASCIS II). CT SCAN was done to know exact fracture geometry. It was showing a fracture of C2 body in an oblique plane shearing off one part with the dens which one tilted towards right side and other part subluxated with C1-C2 articular process on left side.

Clinically patient improved in 24 hours in form of 4/5 power grade in all limbs except left upper limb. Left shoulder and elbow muscle power was grade 2/5 and o/5 in hand. Bladder/bowel were improved. Even though there was a weakness of left upper limb, but reflexes were preserved remarkably (Cruciate paralysis as a false localizing sign).

Considering atypical unstable fracture, open indirect reduction of C-1-2 done from posteriorly and stabilization done with apofix clamps after fusion between C1-C2 posterior arches.

Result: Patient had ASIA scale-A on admission. At three months follow up patient had almost full neurological recovery except finger grip power grade was 4/5. On final follow up at 12 months, neurology improved to ASIA scale-E. He had no neck pain with mild restriction of rotation. X-ray of cervical spine in flexion-extension shows stability and fusion of C1-C2 posterior elements.

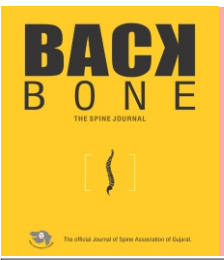
Conclusion: Atypical clinical presentation like cruciate paralysis as a false localizing sign should be kept in mind while dealing with fracture of upper cervical spine. As this fracture has good prognosis, proper treatment is needed. If close reduction is not achieved then open reduction and stabilization with fusion will provide early mobilization and faster neurological recovery.

Keywords: Fracture; Axis; Cruciate; Paralysis.

Introduction

Injuries of upper cervical spine often associated with false localizing signs as neurological deficit meaning there is a no clinico-radiological correlation. Purpose of this case report is to diagnose a rare clinical presentation due to injury of pyramidal tract decussating at lower medulla.

This is a case of atypical shear fracture of C2 vertebra presented with atypical clinical syndrome-cruciate paralysis. Very few cases of this type have been reported in literature. This variety of atypical fracture is very unstable and many a times difficult to reduce non-operatively and it may require surgical stabilization.



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Method and Materials

A 21-year old male patient had a fall of heavy object over right side of the head. He was presented with neck pain and inability to move all four limbs with loss of bladder and bowel control after the injury. There was no associated injuries. On examination he had tenderness on upper neck. He developed deformity of neck, which was tilted on left side. Higher functions and cranial nerve examination were normal. ASIA impairment scale-A neurology of all limbs.

Primary treatment was given along with immobilization of neck with collar. Routine hematological investigation and x-rays of cervical spine in form of AP (anteroposterior), lateral, and open mouth view were taken. X-ray showed a shear fracture of C2 vertebra with intact dens (Fig. 1). Crucified tong was inserted immediately. Intravenous Methyl-Prednisolone (Solumedrol) injection in proper dose was given within 8 hours of injury as per NASCIS-II [5].

CT SCAN was done to know exact fracture geometry. It exhibited a fracture of C2 body in an oblique plane shearing off

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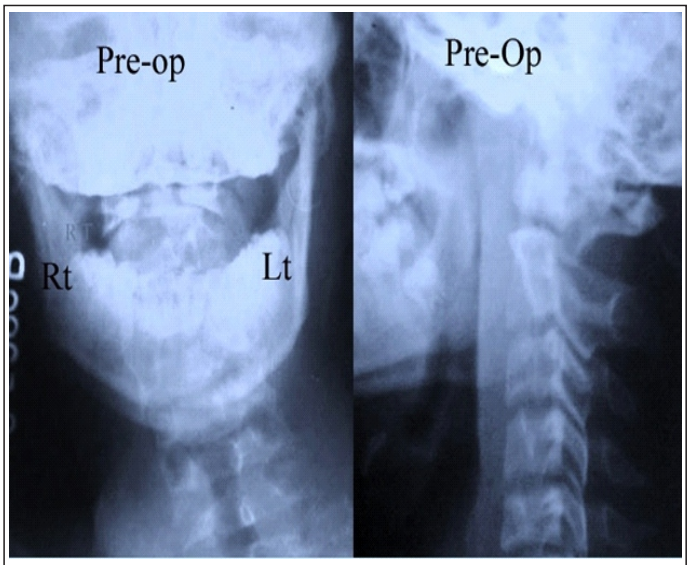

Figure 1: Pre-operative x-rays, Open mouth AP and Lat view

in one piece with the dens tilted towards right side and with subluxation of C1-C2 articular process on left side. There was a more separation of posterior elements on right side. Dens with fractured part of C2 body remains with C1 arch. The fragment displaced mainly in coronal plane on right side and dens- C1 anterior arch relation maintained without posterior neural canal compromise (Fig. 2). As neurology improved and MRI was not available indoor so not done.

Clinically patient improved in 24 hours in form of 4/5 power grade in all limbs except left upper limb. Left upper limb shoulder and elbow muscle power was grade 2/5 and 0/5 in both hands. For Bladder function, as feeling of fullness sensation on clamping urine catheter so catheter removed after ten days on discharge. Even though there was a weakness of left upper limb, but reflexes were preserved remarkably (Cruciate paralysis as a false localizing sign).

As correction of deformity and reduction of fracture not

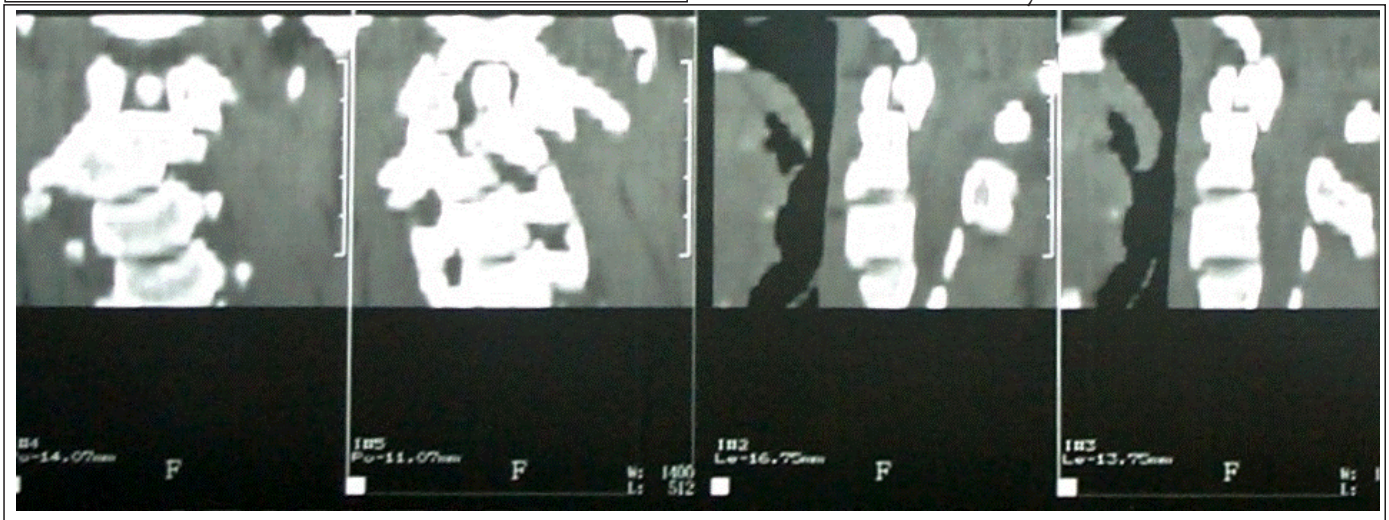

Figure 2: CT scan showing shear fracture of C-2 body with intact dens and subluxation of C1- C2 joint on left side.

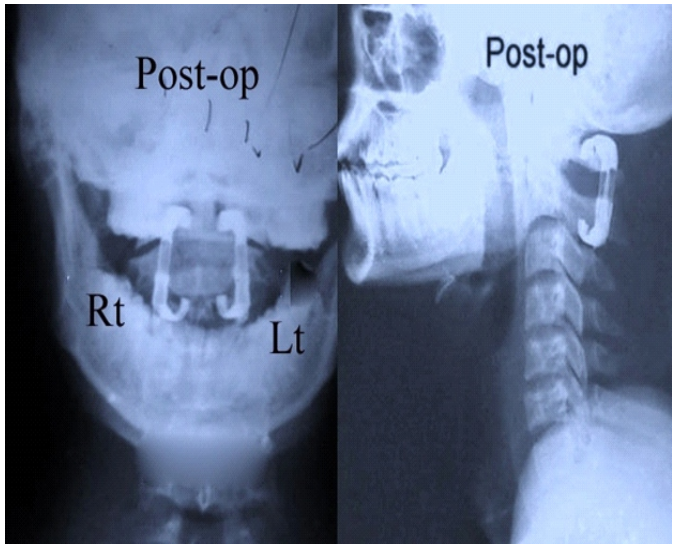

Figure 3: Post-operative x-rays showing indirect anatomical reduction of shear fracture of C-2 body, and C1-C2 joint.

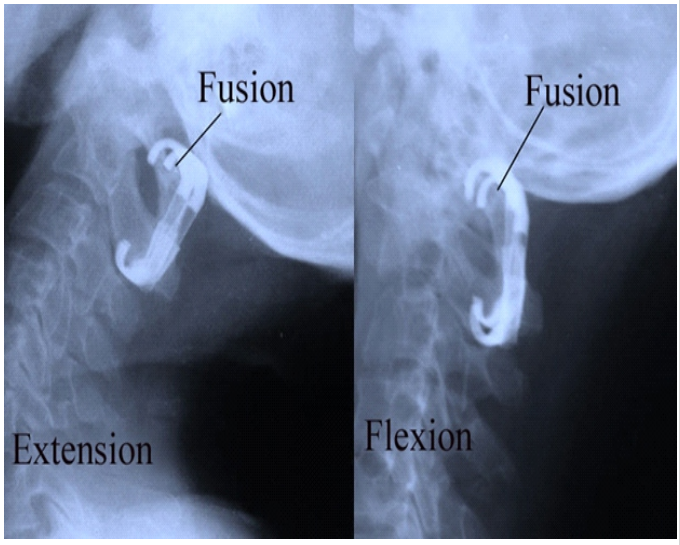

Figure 4: 1 year follow up x-ray in extension and flexion showing fusion of C1-C2 posterior arch.

achieved even after traction, operative plan was decided with reduction of C1-C2 facet subluxation and fusion by posterior approach. After proper posterior approach fixation of Apofix clamp was done between C1-C2 posterior arches (Both Lamina) [6] [8]. Right side clamp was compressed first to get reduction. Reduction was confirmed under IITV. Final compression and clamping of both side clamps done with cortico-cancellous bone block graft interposed between C1-C2 posterior elements. Post-operative traction was continued for 3 weeks then Philadelphia collar was applied.

Result

Immediate postoperative period was uneventful. Neurological status of patient was same as preoperative status of ASIA impairment scale-A. Post-operative X-ray was showing stable and anatomical reduction (Fig. 3). Deformity of neck was corrected.

At three months follow up patient had ASIA impairment scale-D neurological recovery, except left hand grip power grade 4/5. X-ray showed stability of reduction and fusion at the fracture site. At final follow-up at 12 months, he had no neck pain with mild restriction of neck rotation. Patient had full neurological recovery (ASIA impairment scale-E). X-ray of cervical spine in flexion-extension shows stability and fusion of C1-C2 posterior elements (Fig. 4).

Discussion

According to Anderson and d' Alonzo dens fracture is classified according to anatomical level. In which, type II is common at junction of dens with vertebral body. Indirect forces usually cause fracture-involving dens and they are considered unstable injuries. This is atypical case of undescribed-shear fracture of body of axis vertebra. Mechanism involve in this fracture is lateral hyper-flexion injuries due to asymmetrical axial compression which cause shear fracture through body of axis vertebra. Three cases are reported till now in literature with this type of atypical clinical features [2, 3, 4].

Clinically this patient is presented with different kind of clinical syndrome. There is contra lateral left upper limb weakness with preservation of power of both lower limb and right upper limb with preserved reflexes of all limbs (Cruciate paralysis). Here clinical and radiological correlation is difficult so it is known as a false localizing sign. It is because of lateral flexion injury, which compressed cord on one side at the level of pyramidal decussating at lower medulla where tracts are crossing to opposite side [2]. The leading hypothesis involves disruption of the anatomy of the pyramidal decussation at the cervicomedullary junction [7]. The anatomical decussation extends longitudinally, spanning from the cervicomedullary junction to the C-2 level. Within this region, the motor tract fibers of the upper extremities cross both ventrally and superiorly to the fibers supplying the lower extremities. By crossing at a spatially different location, the independent upper extremity fibers provide a way for lesions to preferentially damage upper extremity fibers while sparing those of the lower extremities.[7] However, cruciate paralysis is a rare condition with few reported studies; hence, treatments have been variable and are often without supportive evidence. This type of clinical syndrome should be differentiated from central cord syndrome [2] and Man-in-barrel syndrome [3], where we get more or less similar kind of clinical presentation. This patient has well functional outcome [4] from an initially disabling trauma. Cases which are reported were treated conservatively with one patient had facet joint arthritis because of incomplete reduction [1].

In this case Apofix clamp used for fixation, which is stable in torsion and bending, as compare to routing tension bend wiring methods. With Anterior approach reduction of facet joint may not be possible and it is associated with more morbidity. By doing posterior approach anatomical reduction of facet joints was achieved with indirect reduction of fracture of body of C2 vertebra and fusion of C1-2 posterior elements was possible.

Conclusion

Upper cervical spine injury many times presented with false localizing signs means anatomical injury and clinical presentation may not be co-relating. Atypical clinical presentation like cruciate paralysis should be kept in mind while dealing with fracture of upper cervical spine causing injury to spinal cord (lower medulla). As this fracture has good prognosis, proper treatment is needed. Stable fixation and fusion after reduction will provide early mobilization and faster neurological recovery.

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