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Neglected Traumatic Atlantoaxial Rotatory Dislocation in Adult: A Case Report

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Abstract

Purpose: Atlantoaxial rotatory dislocations (AARD) are common in the pediatric population and rarely seen in adults. We describe a case of neglected AARD and subsequent management.

Methods: 25 year old gentlemen who developed a Fielding type 1 AARD following a road traffic accident. He was managed conservatively for one and a half months before being referred to us. The patient underwent surgery 1.5 months after the accident.

Results: Closed reduction failed and C1–C2 fixation with Harm's technique was performed after intra-operative reduction resulting in correction of deformity.

Conclusion: Delay of treatment makes intraoperative reduction more difficult and increases the possibility of the chronic permanent change of neck muscles and ligaments.

Keywords: Atlanto axial dislocations, Atlanto Axial Rotatory Dislocations, Atlanto Axial Rotatory,Fixation, Fielding type 1, AARD.

Introduction

Atlantoaxial rotatory dislocations (AARD) result from extreme rotation and distraction trauma of the cervical spine. They occur more commonly in children from 0 to 18 years in whom there is a high degree of concordance for rotational behavior of C1 and C2 [15], weakness and malleability of periarticular soft tissue and increased mobility of the articular joints. AARD is defined as a departure from the normal motion dynamics as delineated by abnormal motion curves between C1 and C2.[16] Closed reduction with traction should be instituted immediately to avoid the serious consequences of chronic AARD. Recurrent dislocation and incomplete reduction should be treated with posterior C1-C2 fusion in the best achievable alignment.[17] Occasionally they are seen in adults, especially when pre-existing C1–C2 instability is present or with high energy trauma. [15]

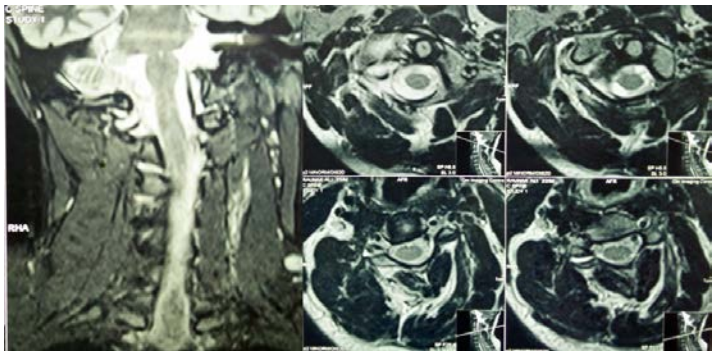
Case Report

A 25 year old gentleman, met with a road traffic accident while riding a two wheeler. He is alleged to have run into a stationery vehicle following which his helmet fell off. He regained consciousness few minutes later and helped his pillon rider. He was taken to the emergency department in another centre and evaluated. Non contrast computed tomography of the head was normal. The patient could not move his head from its position, tilted to the right (cock robin position). He had clear consciousness and no motor paralysis or sensory disturbances. A MRI of the cervical spine was done at this time showing atlantoaxial rotational subluxation with an intact tranverse atlantal ligament (TAL). (Figure 2) A computed tomography of the cervical spine was not done at this time. The patient was treated with conservative measures that included NSAID's and cervical

traction for 3 days. He was later discharged and advised best rest and symptomatic measures. The head continued to be in a tilted position.

Figure 1: a) Pre op clinical photograph showing "cock robin" position and b) Immediate post op clinical photograph showing resolution of neck tilt. c-e) Post op images at 2 years show no residual deformity and minimal restriction of rotation.

Figure 2: Pre op MRI a) Coronal scans showing lateral tilt. b) T2W axial scans showed intact TAL.



The patient presented to us after 1 ½ months of the injury having failed various treatments. At presentation, he had pain in the left C2 distribution, tilted “cock robin” position of the head but no motor deficits. A Xray and plain CT of the cervical spine showed the atlas rotated to the right centering on the dens of the axis with no increase in atlanto-dental interval (Figures 3,4). No developmental deformities were observed. CT angiography showed normal course of vertebral arteries. This corresponded to a diagnosis of Fielding type 1 AARD[5] or White and Panjabi unilateral combined anterior and posterior dislocation.[26] C1-2 rotation angle was around 40 degrees.

Figure 3: Pre op X ray: a) Note eccentric position of the odontoid. b) Lateral X ray showing rotation at C1-2 with elliptical appearance of the C1 arch.

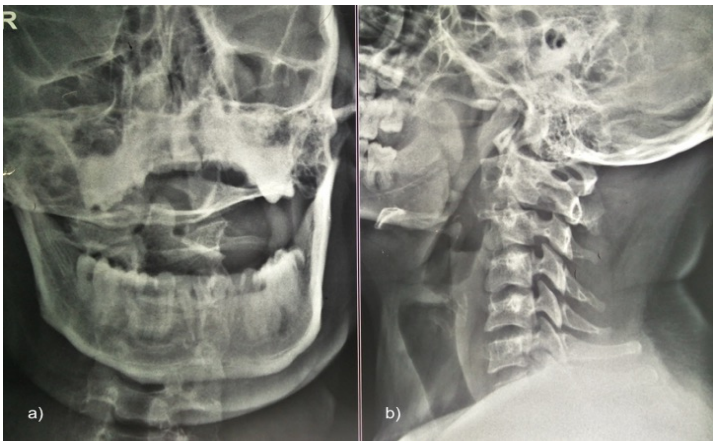
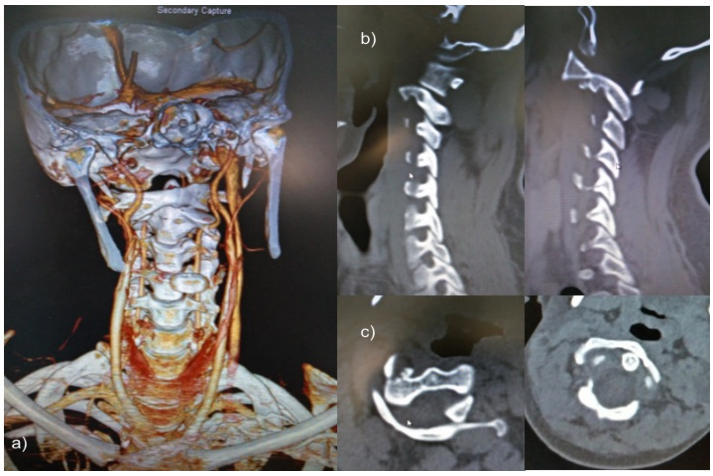


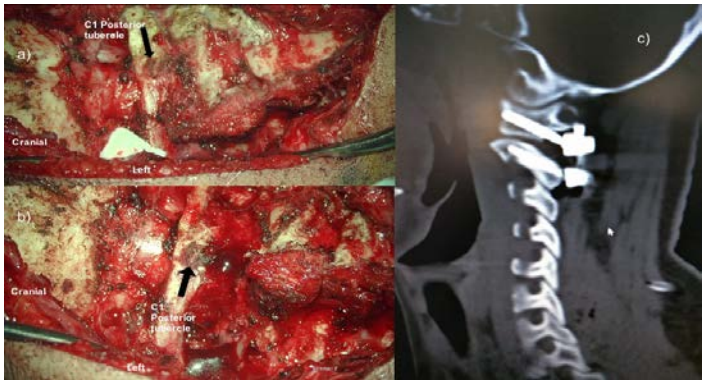
Figure 4: a) Pre op CT Angiography with 3D recon showing AARD. b) Parasagittal view showing dislocation of facet joints. c) Axial view showing maintained AADI with rotatory AAD.



Awake manipulation and attempts at correction of deformity failed due to neck pain and attendant muscle spasm. The patient was taken up for surgery and after induction, patient’s head was fixed on a Sugita 4-pin head clamp and again closed reduction was attempted under general anaesthesia but it failed. The patient was placed in a slightly reversed Trendlenberg position to allow the body weight to provide traction. Consequently, we proceeded with open reduction and fixation. After muscle dissection, the subaxial

cervical spine was seen to be rotated to the left. C1-2 posterior atlantoaxial membrane was cut and the atlantoaxial joints were traced. The right C1 lateral mass was found to be perched anterior to the C2 pars. The rotational deformity had severely stretched the left C2 nerve which was divided to expose the C1-2 interval. The C1 arch was found resting upon the C2 pars on the right side. A periosteal elevator was inserted into the space between the arch of the atlas and the C2 pars and rotated to achieve a distraction effect and release the perched C1 facet. This resulted in spontaneous derotation and correction of the deformity. The C1-2 joint spaces were then denuded of cartilage in preparation for fusion. Posterior fixation was done using Goel-Harm's C1-2 fixation technique.[8] Following the surgery, his neck pain subsided and the normal neck alignment was restored. (Figure 5)

Figure 5: a) Initial exposure depicting severe rotation of subaxial spine in relation to C1. b) Following opening of joint spaces C1-2 re-alignment noted. c) Post op CT scan



Discussion

AARDs are post-traumatic pathologies resulting from rotatory trauma at C1–C2 bone-ligament complexes. Physiologically, the C1–C2 joint is responsible for as much as 60% of the total rotation of the neck behaving as the main rotational pivot of the cervical spine. The stability of C1–C2 joint is ensured by the atlas transverse ligament having high resistance against flexion and extension, by the alar ligaments limiting lateral flexion movements and by the joint capsules limiting rotatory movements. In the absence of an intervertebral disc between atlas and axis, any rotational stress is transmitted through the articular facets and O-C1 joints. Excessive rotational forces may lead to capsular distraction and subsequently, AARD. In children, this condition is responsive to conservative measures and traction in view of the more elastic and slack joints ligaments, and also weak periarticular soft tissue.[11]

AARD are rare in adults and often the result of high energy trauma.[20] The small number of cases described in literature may be attributable to the lethality of injuries producing traumatic AARDs. Mazarra and Fielding have showed that the relative atlanto-axial rotation beyond 63° results in narrowing of the spinal canal and neural injury.[14] However, cases have been described as a result of seizure[22] , Grisel's syndrome[19] and cervical dystonia.[23] Diagnosis of AARD is often delayed as a result if it's uncommon occurence and subtle findings on conventional X-rays. [5],[4] Unilateral atlanto-axial subluxations are possible with a ruptured tranverse atlantal ligament (TAL). The TAL is intact in bilateral subluxations. On a lateral view, the rotational dislocation of the atlas leads to an elliptical appearance of the arch. Eccentric position of the odontoid process will be seen on true anterior-posterior view on plain radiographs. In a patient with persistent post traumatic torticollis, a high index of suspicion of AARD must be maintained. 3D CT scan must be performed to diagnose and classify the dislocation and evaluate C0–C1 and C1–C2 joints. [16],[18] MRI scan is needed to evaluate transverse and alar ligaments, the articular facets, and periarticular edema. CT or MR angiography is needed to evaluate the exact status of vertebral arteries.

Most cases of adult post traumatic AARD have been managed non operatively[2],[9],[13],[20],[21],[24],[1],[12],[27] while 2 cases having associated odontoid fractures[7],[6] and 1 having articular facet fracture[10] were managed with open reduction

and posterior fixation. For irreducible AARD, open reduction and fixation may become mandatory. Many surgical approaches are described for the treatment of AARDs. The posterior approach with the Harms fixation is the gold standard in fixed luxations, achieving a complete realignment and a correct stabilization. It allows intra operative manipulation and reduction. Other authors have described reduction and fixation using extreme lateral approach.[3)] Weißkopf et al have used transoral reduction followed by temporary transoral fixation or definitive fusion in their series of pediatric and adult AARD.[25)]

Delay in reduction more than 1 month in adult result in more difficult intraoperative reduction and could have clinical consequences. The delay in reduction and the cervical muscle spasm caused permanent changes that set the fixation.

Conclusion

Atlanto-axial rotatory dislocations are rare in adults. Early diagnosis and treatment can allow closed reduction and bracing as an optimal treatment. High success rates have been reported with conservative therapy in patients with promptly diagnosed, stable, rotatory atlantoaxial dislocation not associated with transverse ligament disruption. When reduction is not possible, it is advisable to perform surgery as soon as possible, in order to reduce the dislocation and stabilize the joint. Delay in treatment is associated with worse outcome and permanent changes in muscle and ligaments. Authors would like to stress the importance of evaluation of post traumatic torticollis in adults by specialists and maintaining a high index of suspicion for AARD.

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