Atlantoaxial rotatory fixation in a case of tubercular lymphadenitis

AJ Kasyap,[1] AK Kasyap,[2] P Chatterjee[3] and GS Gurung[4]

[1]Department of Radiology and Imaging, KIST Medical College and Hospital, Gwarko, Lalitpur, Nepal, [2]Department of Medicine, KIST Medical College and Hospital, Gwarko, Lalitpur, Nepal, [3]Consultant Radiologist, C-15 MRI Diagnostic Centre, Green Park Extension, New Delhi, India [4]Department of Radiology and Imaging, TUTH, Maharajgunj, Kathmandu, Nepal

Corresponding author: Anamika J Kasyap, Lecturer, Department of Radiology and Imaging, KIST Medical College and Hospital, Gwarko, Lalitpur, Nepal; e-mail: anamikajha_dr@hotmail.com

ABSTRACT

Atlantoaxial fixation is a relatively rare cause of torticollis which may be easily missed in practice. Early diagnosis is important as this indicates a compromised atlantoaxial complex with the potential to cause neural damage or even death. Here, we report a case of atlantoaxial rotatory fixation in a 13 yr old male with torticollis for two years and history of defaulting treatment for tubercular lymphadenitis. In this case, the odontoid peg view revealed asymmetric distance between the odontoid and lateral mass of atlas which was confirmed with Fluoroscopy and Computed Tomography (CT) scan. Magnetic Resonance Imaging (MRI) was also done which showed hyperintensity in alar ligaments with posterior inclination of the odontoid peg along with cervical lymphadenopathy.

Keywords*:* atlantoaxial rotatory subluxation, atlantoaxial rotatory fixation, torticollis

Atlantoaxial rotatory fixation is a rare cause of torticollis.[1] It is one of a spectrum of rotatory abnormalities of the atlanto-axial joint and is called so as usually the abnormality is clinically irreducible.[2,3] In this condition, the normal rotation of atlas (C1) on axis (C2) cannot occur, and the abnormal relationship between the atlas and the axis becomes fixed. This fixation may occur with subluxation or dislocation or when the relative positions of atlas and axis are still within normal range of rotation. Definitive diagnosis may be made with dynamic Computed Tomography (CT) scan or cine-radiography which show fixed relation of atlas and axis.[4] The significance of early diagnosis lies is that it indicates a compromised atlantoaxial complex with the potential to cause neural damage or even death.[2]

CASE REPORT

A 13 year old male presented with history of gradual onset painless torticollis over 2 years, with head turned to the left. He had defaulted treatment for tubercular lymphadenitis in the past. On examination his head was turned to the left and movement was limited.

The lateral and antero-posterior cervical spine x rays were normal. The odontoid peg view revealed asymmetric distance between the odontoid peg and the lateral mass of atlas (Fig 1a, 1b). Fluoroscopy during head rotation demonstrated a fixed approximation of the odontoid process to the right articular mass of the atlas. CT scan confirmed the increase in distance between the right lateral mass and odontoid peg while the relation with the anterior arch was well maintained (Fig 2a, 2b). MRI showed hyperintense area involving the alar ligament with posterior inclination of the odontoid peg in T2 weighted sequence (Fig 3a, 3b, 3c, 3d). Also, bilateral cervical lymphadenopathy was present (Fig 4). Diagnosis of type I atlanto-axial rotatory fixation probably inflammatory due to tubercular lymphadenitis was made and the child was treated with anti-tubercular treatment (ATT) for tubercular lymphadenitis and immobilisation of the neck for the torticollis.

DISCUSSION

Atlantoaxial rotatory subluxation is a cause of torticollis and can occur either secondary to trauma or may be non-traumatic - spontaneous, as a result of infections, or in association with underlying congenital abnormalities, spinal cord tumors, or an underlying abnormality within the sternocleidomastoid muscle.[5,6] Though mostly these rotatory disorders are correctable, sometimes these persist and are called as rotatory fixation of the atlanto-axial joint.[2] The anterior facet of C1 becomes locked on the facet of C2, which causes impaired rotation at this joint. Atlantoaxial subluxation may occur with or without C1-C2 dislocation.

About one-third of the cervical spine diameter is occupied by the odontoid process, another one-third by spinal cord and remaining one-third by subarachnoid space which provides the cord a margin of safety during neck motion. However, when this exceeds its normal limits, the cord can get injured.[7] The vertebral artery lies outside the foramina transversum for about 1.5 cm at C1-C2 level and may also be compromised by excessive rotation leading to brainstem infarction.[8,9] So,

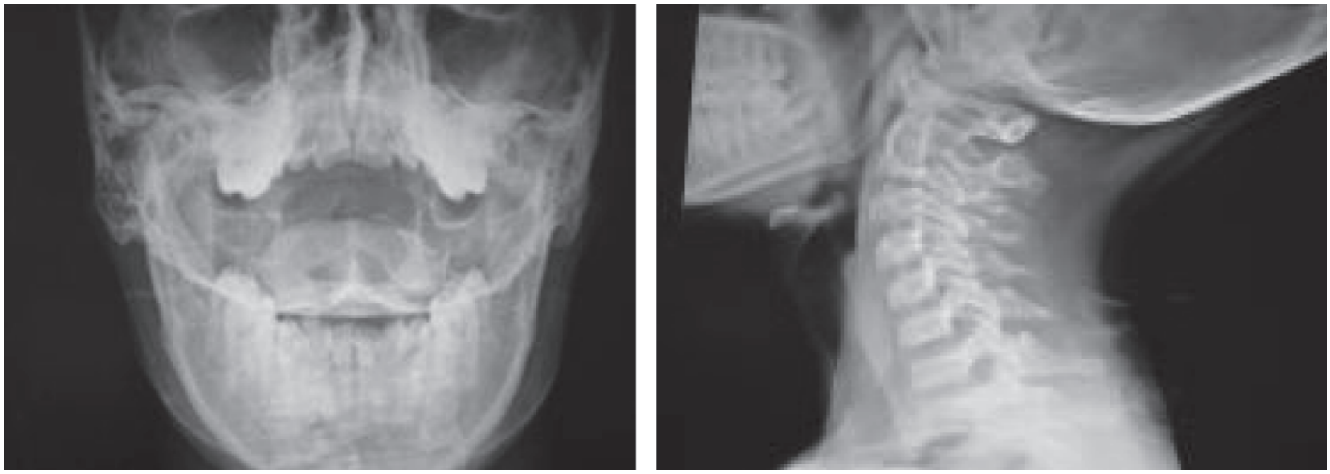

Fig.1 a)Odontoid peg view showing asymmetric distance between lateral mass and odontoid process; b)Lateral X Ray Cervical spine is normal.

there is need for significance of early diagnosis in order to avoid these catastrophic complications.

Radiologic evaluation of the patient with this condition may be difficult because of the patient's rotated head position. At lateral radiography, there may be loss of definition of the craniocervical junction, and the anterior arch of C1 is not oriented in a true lateral plane. In antero-posterior/ odontoid peg views, one lateral mass of C1 rotates forward and appears wider and closer to the midline whereas the other is narrower and farther away from the midline.

These findings may also be seen in healthy patients with marked head rotation or any cause of torticollis and may be differentiated with functional scan through C1-C2 in which patients are scanned initially as they present (with their heads fixed in lateral rotation) and then with their heads turned to the maximum contralateral rotation. CT scans in patients with atlantoaxial rotary fixation demonstrate no motion at C1-C2 during this manoeuvre, while those in patients with transient torticollis show a reduction or reversal of the rotation of C1 on C2.[3]

Spiral CT with 3D and sagittal reconstruction greatly aids early diagnosis.[3,10] Fielding *et al* proposed cine radiography, but the level of radiation is relatively high and again cooperation by the patient may be inadequate, due to pain and spasm.[2,8]

Fielding and Hawkins have classified atlantoaxial rotatory subluxation into four categories Type I being the most common.[2] (Fig 5)

- Type I demonstrates no displacement of C1,
- Type II demonstrates 3-5 mm of anterior displacement of C1 and is associated with abnormality of the transverse ligament,
- Type III demonstrates over 5 mm of anterior displacement of C1 on C2 and is associated with deficiency of the transverse and alar ligaments, and
- Type IV demonstrates C1 displacement posteriorly.

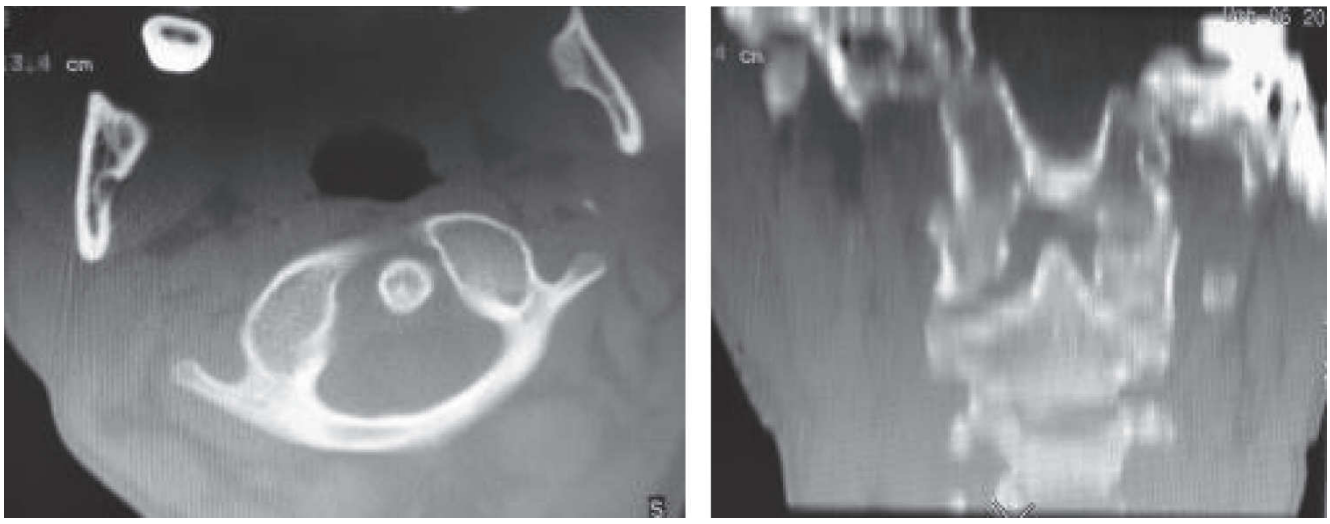

Fig.2a and b. CT scan (axial and 3-D reconstruction)- increase in distance between right lateral mass and odontoid process.

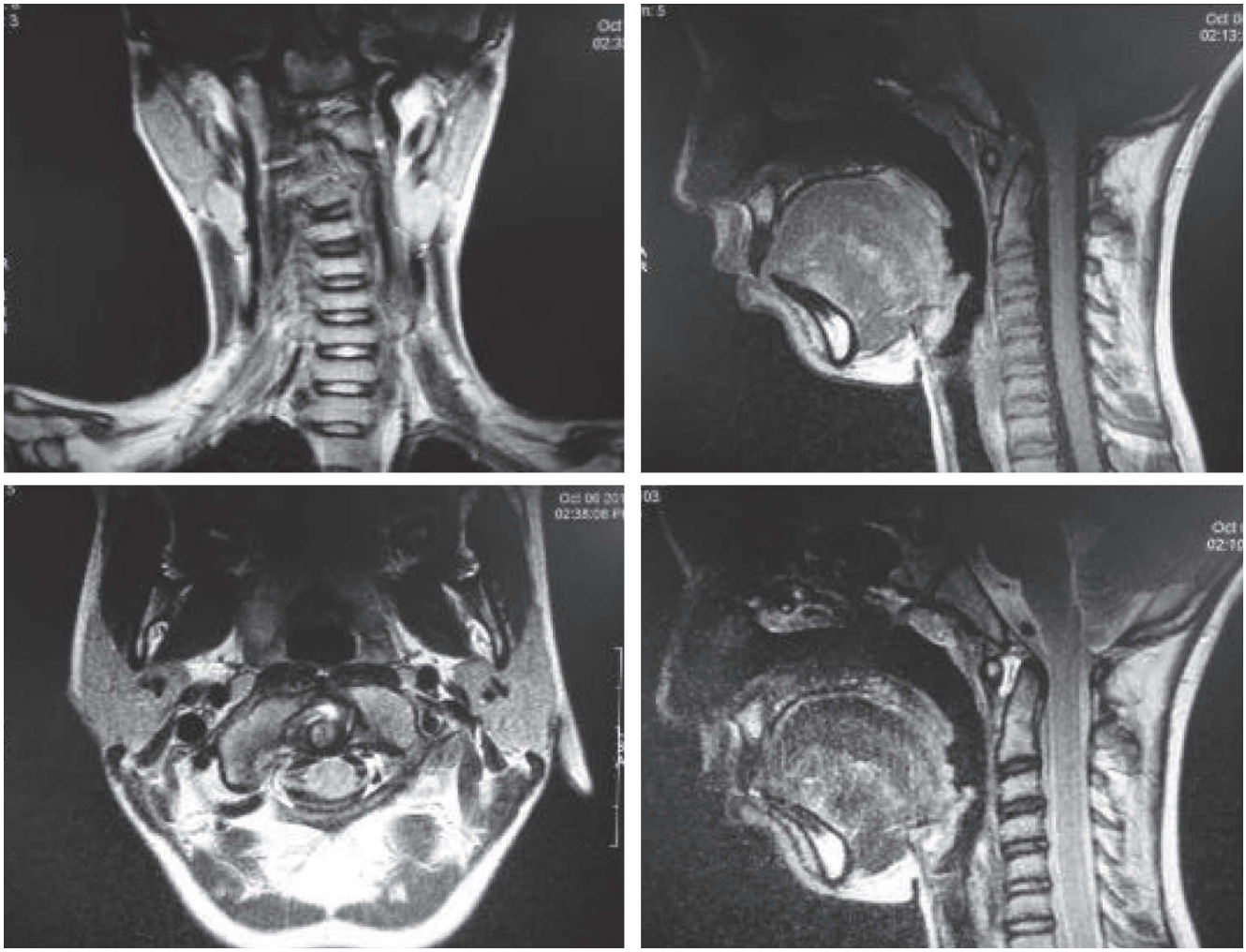

Fig.3 a) Coronal T2W, b) Sagittal T1W, c) Axial T2W and d) Sagittal T2W MRI images show bilateral cervical lymphadenopathy, posterior inclination of the odontoid peg and hyperintensity in alar ligament (T2WI).

The mechanism or etiology of rotatory fixation of the atlanto-axial joint is still not well understood.[7] Fixation is probably caused by capsular and synovial interposition with muscle spasm and/or contractures. While ruptured ligaments like in trauma cases, cause excess and abnormal movement, the abnormal laxity of the ligaments in conditions like Rheumatoid Arthritis, Marfan's, Down's syndrome and also in children may also predispose to atlantoaxial rotatory fixation.[6] Although CT and radiography/ fluoroscopy can show the rotatory atlanto-axial fixation, these techniques usually fail to demonstrate the underlying cause for

Fig. 4 USG showing cervical lymphadenopathy.

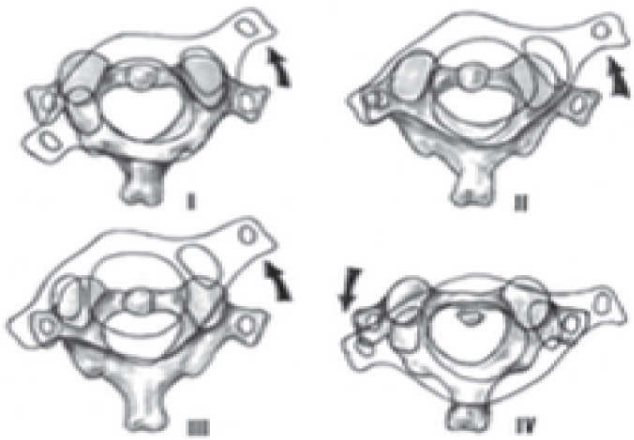

Fig 5 Fielding and Hawkins classification of atlantoaxial rotatory subluxation (Arrows indicate direction of movement.)

which MRI may help. In our case cervical lymphadenitis was present which suggests a possible inflammatory cause of the fixation.

Patients presenting with persistent torticollis need to be evaluated carefully for atlanto-axial subluxation as this may cause serious neural complications or even death. This case highlights the importance of early diagnosis of the condition. The diagnostic criteria are a resistant torticollis and fixation of the atlas on axis demonstrated radiographically.[2]

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REFERENCES

1. Temerman GD. Rotatory fixation of the Atlantoaxial Joint. *JBR-BTR* 2003; 86: 322-4.
2. Fielding JW, Hawkins RJ. Atlantoaxial rotatory fixation. *J Bone Joint Surg* 1977; 59: 37-44.
3. Murray JB, Ziervogel M. The value of computed tomography in the diagnosis of atlanto-axial rotatory fixation. *Brit J Radiol* 1990; 63: 894-7.
4. Kowalski HM, Cohen WA, Cooper P, Wisoff JH. Pitfalls in the CT diagnosis of atlantoaxial rotary subluxation. *Amer J Roentgenol* 1987; 149: 595-600.
5. Fidler MW, de Lange J. Atlanto-axial rotatory fixation- a cause of torticollis. *Clin Neurol Neurosurg* 1979; 81: 114-8.
6. Crook TB, Eynon CA. Traumatic Atlantoaxial Rotatory Subluxation. *Emerg Med J* 2005; 25: 671-2.
7. Lustrin ES, Karakas SP, Ortiz O *et al*. Pediatric Cervical Spine: normal anatomy, variants and trauma. *Radiographics* 2003; 23: 539-560
8. Fielding JW. Cineroentgenography of the Normal Cervical Spine. *J Bone Joint Surg Amer* 1957; 39: 1280-8.
9. El-Khoury GY, Clark CR, Gravett AW. Acute traumatic atlanto-axial rotatory dislocation in children. *J Bone Joint Surg Amer* 1984; 66: 774-7.
10. Cowan IA, Inglis GS. Atlanto-axial rotatory fixation: improved demonstration using spiral CT. *Australas Radiol* 1996; 40: 119-24.