

Introduction

Congenital atlanto-axial dislocation (CAAD) is often seen as abnormal antero-posterior or axial rotational. The focus in such cases has shifted to c1-2 joints. The c1-2 joints have six degrees of freedom of movement and caad is often multiplanar rather than the commonly described antero-posterior or rotational. The purpose of this study is to objectively assess CAAD in each plane.

Methods

CT CVJ of 100 patients with irreducible congenital aad was studied in axial, coronal, and sagittal planes. The relationship of c1-c2 along with the c1-c2 joint inclination was studied in each plane. Newer indices were described to assess dislocation in each plane both pre and postoperatively. Japanese orthopaedics association score (JOAS) was used objectively assessing clinical status and was compared with the plane of dislocation. The dislocations were objectively assessed as described below.

AP dislocation (Fig 1)- distance between 2 parallel lines drawn along antero-superior point of C2 body and the other as tangent to posterior cortex of anterior C1 arch in mid sagittal plane. **Vertical dislocation (Fig 2)**-assessed as the ratio between the vertical distance between inferior border of C2 and inferior point of C1 and the height of C2 till odontoid tip in mid sagittal plane. The ratio closer to 1, suggested normal orientation. **Lateral angular dislocation (Fig 3)**- this was measured as the angulation between line joining the lower border of C2 and C1 in coronal plane.

Lateral translation (Fig 4)- in coronal plane the average of distance between outer edge of C1 and C2 lateral mass.

Rotational dislocation (Fig 5)- the angle between lines joining transverse foramen of C1 and C2 in axial plane

Results

The dislocation could be antero-posterior, lateral translation, lateral angular, rotation (axial), vertical (traditionally known as basilar invagination). The commonest variety was a combination of anteroposterior (AP) and vertical c1-c2 dislocation (65 patients). Five patients had predominant ap, 6 vertical, 4 axial rotational, 10 lateral angular tilt, and 3 had lateral translational. Seven patients had a combination of dislocation in AP, vertical, and rotational planes. AP dislocation was seen with sagittal inclination of c1-c2 joints and vertical dislocation with coronal inclination. Asymmetry in the joint's sagittal inclination added to a rotational component, whereas asymmetry in the coronal angulation caused lateral angular tilt. Pure rotational or lateral translation dislocation had near normal c1-c2 orientation. Preoperative JOAS was worst in the lateral tilt and the lateral translation. Correction in all planes was achieved in nearly all patients.

Conclusions

The newer indices assess c1-c2 dislocation and joints in each plane and compare it postoperatively. Studying the radiology in all three planes is important to plan the surgery and achieve multiplanar correction.

Antero-posterior dislocation

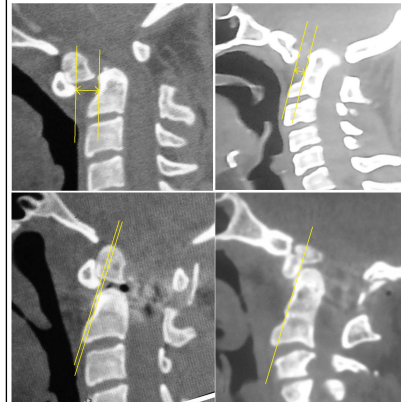


Fig 1

Vertical dislocation

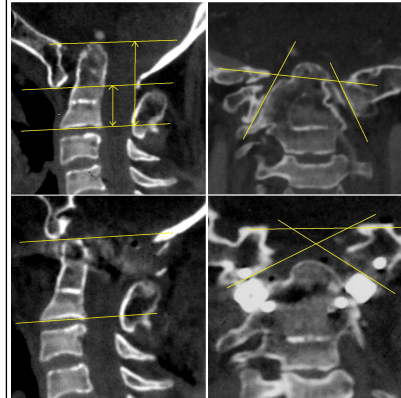


Fig 2

Learning Objectives

By the conclusion of this session, participants should be able to discuss 1) Identification of C1-2 dislocation in each plane and objectively assess them. 2) The type of dislocation and the orientation of C1-2 joints would help in planning the management by facet drilling and maneuvering the lateral masses 3) The facet drilling and realignment using screws can correct C1-2 dislocation in all planes. Furthermore the effectiveness of any new technique can be assessed using the indices described

Lateral angular dislocation

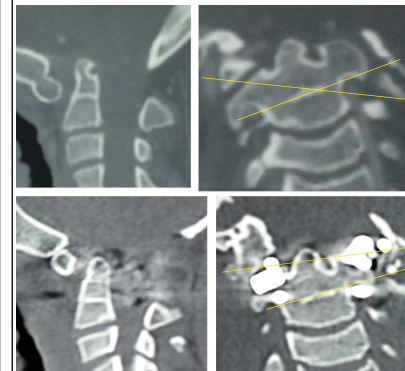


Figure 3

Lateral translation

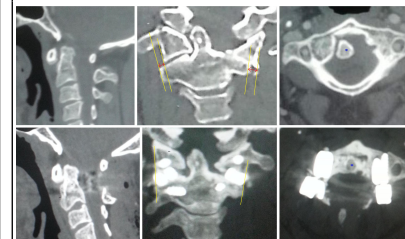


Fig 4

Rotational with vertical and AP dislocation

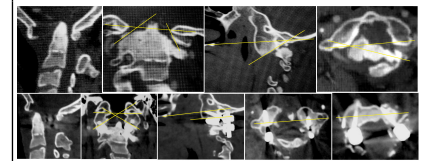


Fig 5

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