

Study of Management of Pediatric Craniovertebral Junction Abnormalities

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Introduction

craniovertebral Junction anomalies present unique challenges especially in pediatric population. Many new theories about anomalies like instability of lateral mass and Prof Atul Goel's recent proposition that Atlanto Axial instability being cause of Chiari malformation have provided new insights into this complex problems. We hypothesise that in view of multiple anatomical substrates involved and also growing bones may present dynamic progressing problems

Results

Out of these, 5 patients who had C1C2 fixation surgery needed resurgery. 2 needed additional occipital fixation and 3 Occipital and subaxial fixation surgery. Both patients who had transoral surgery done needed revision realignment surgery with spacers and occipitocervical fixation. One patient who had foramen magnum decompression for chiari with syrinx had worsening of syrinx after 3 years. She was treated by atlanto axial fixation. She had complete resolution of syrinx after fixation. In all 8/35 patients needed resurgery.

Conclusions

Inclusion of occiput for fixation may provide additional stability and prevent telescoping of dens. In patients with recurrent syrinx possibility of sub clinical Instability should be evaluated. Surgeon and patient should be open to the fact that these patients may more than one surgery regardless of type.

Methods

Thirty five pediatric cases were studied, 21 had Irreducible AAD with 10 having basilar invagination. 5 had reducible AAD and 4 traumatic AAD. One of the Traumatic AAD child had congenital Anomaly which was uncovered by trauma. About 12 patients had significant disabling myelopathy. Eight patients had cord changes and 4 had syrinx complicating the problem. Eleven presented with quadriplegia. Eleven patients needed distraction realignment with spacers and fixation surgery. Two had tranoral odontoidectomy and Occipitocervical fixation surgery.

Question we seek to Answer

Where is Pathology ?

Is it in Dens or Lateral Joints?

- Stability-Is it related to only C1, C2 Complex?
- Dynamics?-Dynamic compression of Neural and or Vascular elements
- Syrinx-Is Chiari malformation the culprit

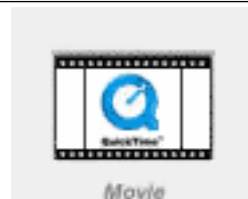
OUR SERIES			
Total Cases	35		
Mobile AAD	04		
Syrinx	02		02- Treated by Fixation
Resurgery	05		02- Scarring at foramen magnum 01- PND converted to Fixation 01- Fixation extended to Occiput 01- Sub axial Fixation
Abnormal Vertebral Artery course needing alteration in fixation	08		02- Laminar Screw 09- C1 Fixation (C1C2 Block/Vertebrae) 09- Occiput instead of C1

Stability-

Not only the CV Junction played role in the problem. We found even subaxial spine also contributed. Probably due to ligament laxity we found apart from Basilar invagination two of our patients had increased arching of the subaxial spine. On barium swallow it showed that these patients had mechanical obstruction due to increased arching causing compression of oesophagus. The symptoms resolved after including Subaxial spine in the stabilization.

Stability

The Biomechanics may extend even to Sub Axial Spine



Dynamic compression-

We had two cases of dynamic compression of Vertebral artery in flexion. They presented with episodes of fall and one patient has cerebellar infarct also due to prolonged compression. One of these patient also had dysphagia due to subaxial spine arching as described above. CV junction stabilisation resulted in complete amelioration of symptoms

Dynamic compression of Vertebral Artery

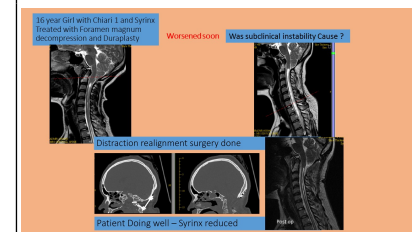
Learning Objectives

To learn about unique features of Pediatric Craniovertebral Junction Pathologies
Learn and tackle different Challenges

Syrinx

We had two patients with syringomyelia and Chiari 1 malformation, who after foramen magnum decompression came with recurrence. After Atlanto axial fixation, their syrinx decreased. We need to study further whether there is associated instability in some cases and methods to recognise these. We at present do not advocate Atlanto axial stabilisation in all cases of Chiari 1 malformations.

Recurrent Syrinx resolved after Fixation



Summary

To Summarize: Challenges- Solutions		
Variation	Challenges	Solution
Occipitalization of Atlas	High and inaccessible C1, vertebral,	Condylar screw, Occipital fixation
Absence or destruction of C1	Introduction of spacer may be difficult	Sarat Chandra Technique- using Pseudo Joint for distraction
Narrow C2 pedicle	High riding vertebral, placement of C2 screws	Pars - Pedicle Screw, Laminar screw, C2-3 Screw, Goel Screws- Technique

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