

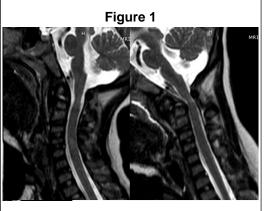
Predicting Neurologic Injury using Dynamic MRI in Patients with Down Syndrome Albert Tu MD FRCSC FAANS; Edward F Melamed BA; Mark D. Krieger MD Children's Hospital of Los Angeles



Learning Objectives

By the conclusion of this session, participants should be able to:

1) Describe the normal movement parameters of the craniocervical junction and sub axial spine in Down Syndrome patients; 2) Discuss some potential parameters in Down syndrome patients corresponding to neurologic compromise; 3) Discuss radiographic indications for further investigation and intervention



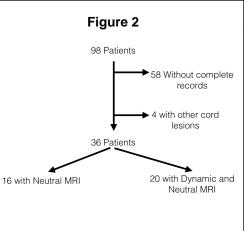
Latent Instability on Dynamic Imaging

Introduction

Down syndrome is the most common inherited disorder. Some patients develop craniocervical instability. Existing screening guidelines were developed prior to direct imaging of the neuraxis. Here we present predictors for potential deficit using dynamic MRI of the craniocervical junction.

Methods

A retrospective review of Down's patients referred to CHLA Neurosurgery from 2001 - 2015 was carried out. Patients were considered symptomatic if they had deficit from neuraxis compression or signal change at the craniocervical junction. The Atlanto-Dental Interval (ADI), Clival Axial Angle (CXA), Cervical Angle (CA), Cervical Canal diameter, Cervical Cord diameter, and Space Available for the Cord (SAC) was measured. Bony abnormalities at the craniocervical junction were also recorded. Data analysis was performed with SPSS. A p-value of less than 0.05 was significant.



Patient Selection

Results

36 patients were included. Patients averaged 93 months of age on presentation with a follow up of 57 months (Figure 1). No asymptomatic patients developed myelopathy during follow up. 2 patients presented with myelopathy, while 4 had cord signal change. Symptomatic patients had smaller SAC and greater ADI on resting MRI . During dynamic imaging, symptomatic patients had significant changes in SAC and ADI. These patients were also more likely to have a bony anomaly (Table 1, 2, 3).

Table 1				
Sex (n = male) Mean Age at Presentation (mont Mean Follow Up (months)	n 19 hs) 93 57	n – 17	Range na 17 – 240 12 – 168	
Patient Demographics				
Tabl	e 2			
Imaging Findings Neutral position ADI (mm) Neutral position SAC (mm) Change in ADI during Flexion to Extension (mm) Change in SAC during Flexion to Extension(mm) Patients with Bony Abnormality (%)	Asymptomatic 3 14 1.3 1.2 13.3	Symptomatic 4.4 9.4 2.8 5.2 50	p value 0.01 0.003 0.04 <0.0001 0.03	
Predictors for Neurologic Injury and				
Instability in Patients				

Conclusions

This study identifies parameters that can be used to predict patients at risk for neurologic injury. A SAC of less than 5 mm or ADI greater than 4 mm on static imaging; change greater than 3mm in ADI or 5mm on SAC during dynamic imaging; or any bony abnormality warrants further investigation and potential intervention. Asymptomatic patients without these features should be followed although most do not progress.

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Please contact Albert Tu at albert.d.tu@gmail.com

Further Information