

Evaluating the Utility of Cervical Flexion-Extension Imaging Prior to Endotracheal Intubation in Children with Down Syndrome

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Background

Currently some anesthesiologists employ routine cervical flexion-extension radiographs prior to endotracheal intubation in children with Down Syndrome (DS) due to risk of C-spine injury secondary to underlying atlantoaxial instability. The routine use of these studies, however, may be detrimental to patient outcomes given the delayed surgical care, increased expenses, and increased exposure to head and neck radiation. Though obtaining these radiographs is often not part of standard clinical practice for most anesthesiologists, a review of the current literature is needed in guiding proper procedure for children with DS regarding any preoperative imaging studies.

Aims

- Review the literature including randomized clinical trials, case reports, and society recommendations regarding the benefits of preoperative flexion-extension radiography in children with DS.
- Review society recommendations regarding these studies.
- Describe clinical scenarios in which these studies would be beneficial

Methods

- A literature review was conducted using PubMed and Scopus.
- Keywords included “Down syndrome”, “flexion-extension”, “preoperative”, and “endotracheal intubation”. Target patient age 2-18.
- 31 articles were selected for review; of these 8 were excluded due to irrelevance. 14 of these made recommendations regarding the practice.
- Articles included randomized clinical trials, case reports, and society guidelines.
- Articles were used from anesthesiology, pediatrics, family medicine, and radiology publications.

Results

Summary:

- 10-20% of children aged 2-18 with Down Syndrome have radiographic evidence of atlantoaxial instability.
- Out of children with Down Syndrome, only 2% had clinical evidence of cord compression secondary to atlantoaxial instability
 - Gait abnormality was found to be the strongest predictor of cord compression
- 12 articles on the topic recommended against the routine use of flexion-extension radiography, while 2 recommended for its use.
- The routine use of flexion-extension studies prior to endotracheal intubation was NOT associated with a decreased incidence of cervical spine injuries in these patients
- Furthermore, plain film studies were found to be a poor predictor of C-spine injury following intubation.
- The AAP and AAFP no longer recommend the use of flexion-extension radiographs prior to surgery.

Article Recommendations Regarding Routine Flexion-Extension Radiography

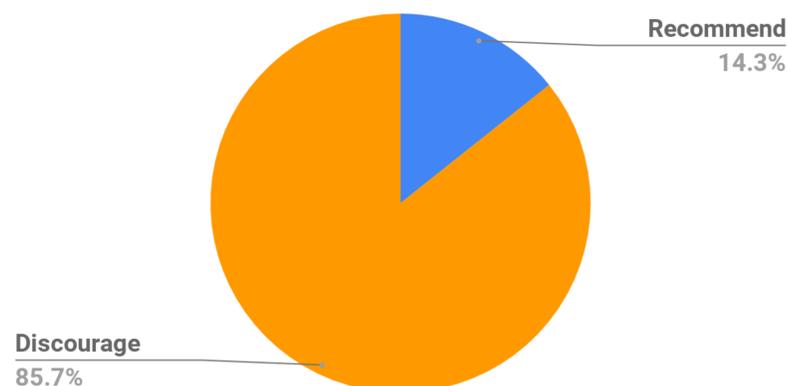


Figure 1: Breakdown of article recommendations regarding the use of routine preoperative flexion-extension studies

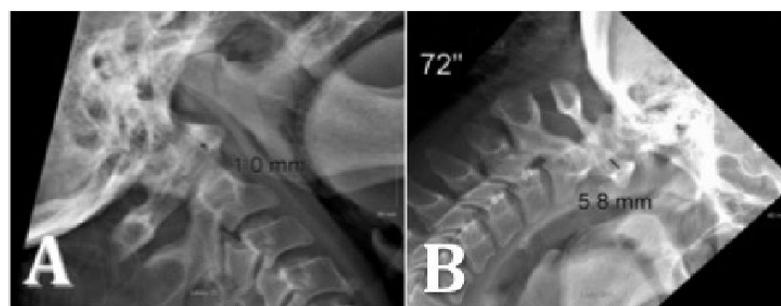


Figure 2: Demonstration of atlantoaxial instability by radiography showing an atlantoaxial interval greater than 5.0 mm.

Source: Surgical Correction of Severe Lumbar Spine Instability and Sagittal Deformity in a Patient with Rheumatoid Arthritis Without the Utilization of an Osteotomy - Scientific Figure on ResearchGate

Conclusions

- The use of routine flexion-extension radiography in pediatric DS patients is controversial though in practice most anesthesiologists defer this testing.
- There are few case reports of acute C-spine injury in following ET intubation, more studies that follow for long-term sequelae are needed.
- Currently, the evidence in support of flexion-extension studies in asymptomatic DS children is weak.
- A detailed history and physical exam to assess for neurological instability should be performed as this has higher predictive value for cervical spine injury than radiography.

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