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> *Acute Atlantoaxial Rotary Subluxation (AARS)*

STUDY GUIDE

Acute Atlantoaxial Rotary Subluxation (AARS)

Key Points:

Also known as **rotatory** dislocation, **displacement**, or **fixation** Important to differentiate from congenital muscular torticollis Vast majority can be managed with non-operative treatment by observation or traction

Description:

- Rotational subluxation or dislocation of **C1 on C2**
- Can develop from osseous or ligamentous abnormalities resulting from acquired or congenital disorders.
- As a **result of instability**, **excessive motion** and **spinal cord compression** may occur at the atlantoaxial joint.

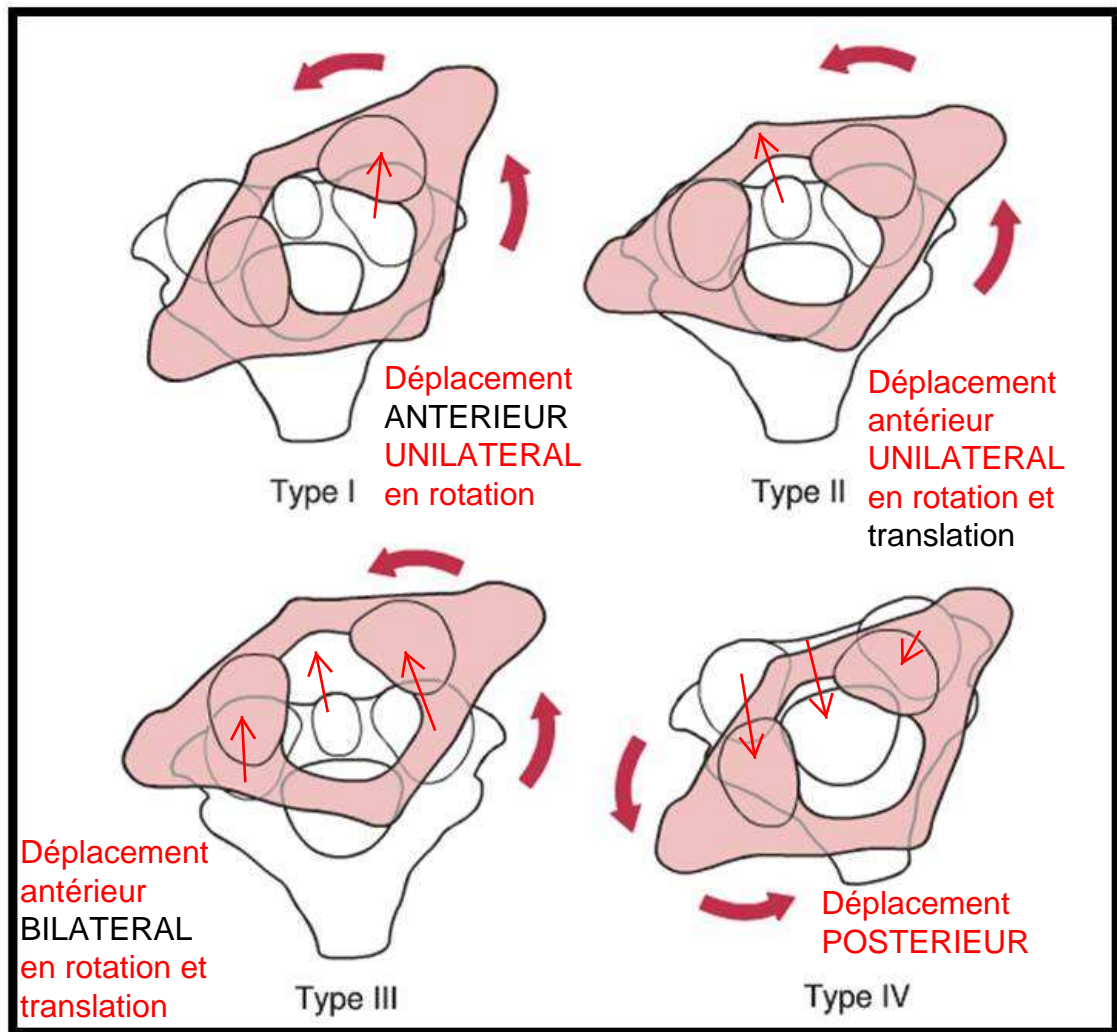
Epidemiology:

Anatomy

- **50% rotation** of the cervical spine occurs at **C1-C2** (Bogduk, 2000)
- Transverse ligament integrity is relevant, an **atlantodens interval (ADI) >5mm** indicates incompetent ligament and **denotes instability**
- Spinal canal stenosis can be secondary to **severe rotation** even with a competent transverse ligament.

Classification

- Fielding and Hawkins Classification. (Fielding, 1977) [Figure 2]
 - **Type 1: Unilateral** facet subluxation with intact transverse ligament. Most common; dens acts as pivot
 - **Type 2: Unilateral** facet subluxation with **ADI 3 to 5 mm**. Associated with **transverse** ligament **injury**; facet acts as pivot
 - **Type 3: Bilateral anterior** facet displacement **of > 5 mm**. Rare, with risk of neurologic deficit
 - **Type 4: Posterior** displacement of atlas, associated with dens deficiency. Rare, high risk of neurologic deficit



Clinical Findings:

- **Cock-robin** head position (rotation and contralateral tilt of the head in relation to the lateral mass of C1)
- **Neck pain** (increased with attempted passive correction in acute cases)
- **Headache**
- **Sternocleidomastoid spasticity on the side** to which the chin is rotated
- **Decreased cervical spine range of motion**
- **Plagiocephaly** can be noted in chronic cases

Imaging Studies:

Radiographs:

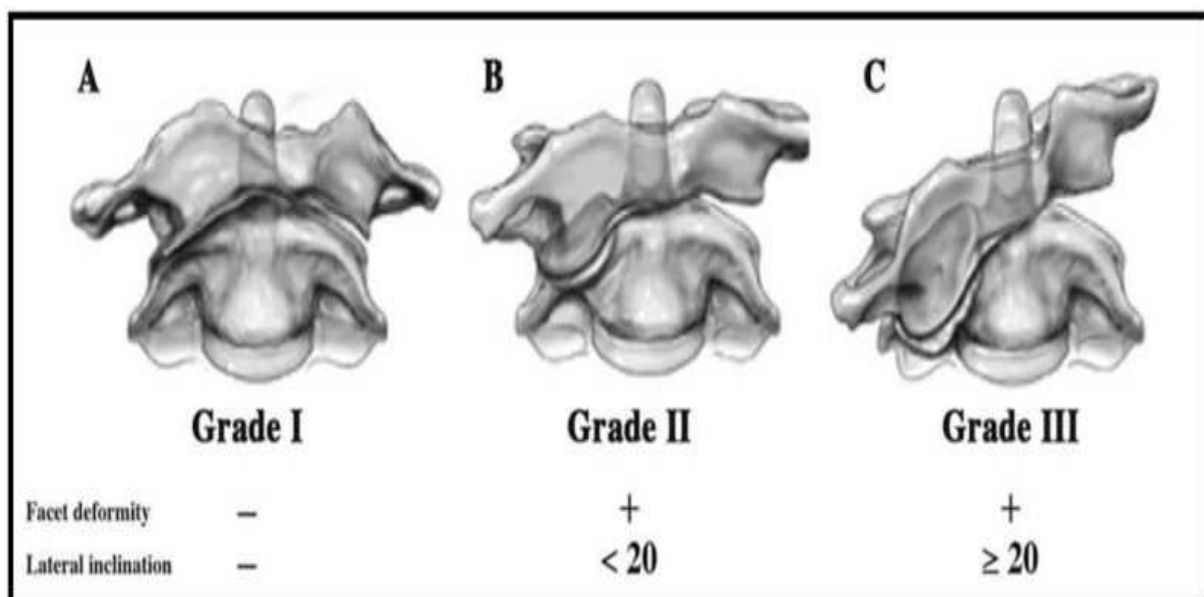
- Anteroposterior (AP), lateral, and open-mouth odontoid obtained in a position as neutral as possible
- AP and open-mouth views:
 - Asymmetric distance between the lateral mass and dens is a common finding
 - Anteriorly displaced lateral mass will appear wider and closer to midline
- Lateral view:
 - The lateral facet is translated anteriorly and appears wedged instead of oval shaped
- Flexion-extension views can be used to measure (ADI) and prove instability
 - However, these may not be useful acutely in the presence of pain and muscle spasm

CT Scan

- Will clearly demonstrate rotatory subluxation and remains the gold standard
 - May add dynamic CT with bilateral maximal rotation imaging
 - Can evaluate lateral inclination angle of C1: Classification of chronic AAR Fixation [Figure 1]
 - Grade 1 = 0°; Grade 2 = <20°; Grade 3 >20°. (Ishii, 2006)

MRI Provides soft tissue detail

- Possible findings:
 - Spinal cord compression
 - Disruption of transverse atlantal ligament
 - Bone or soft-tissue infection



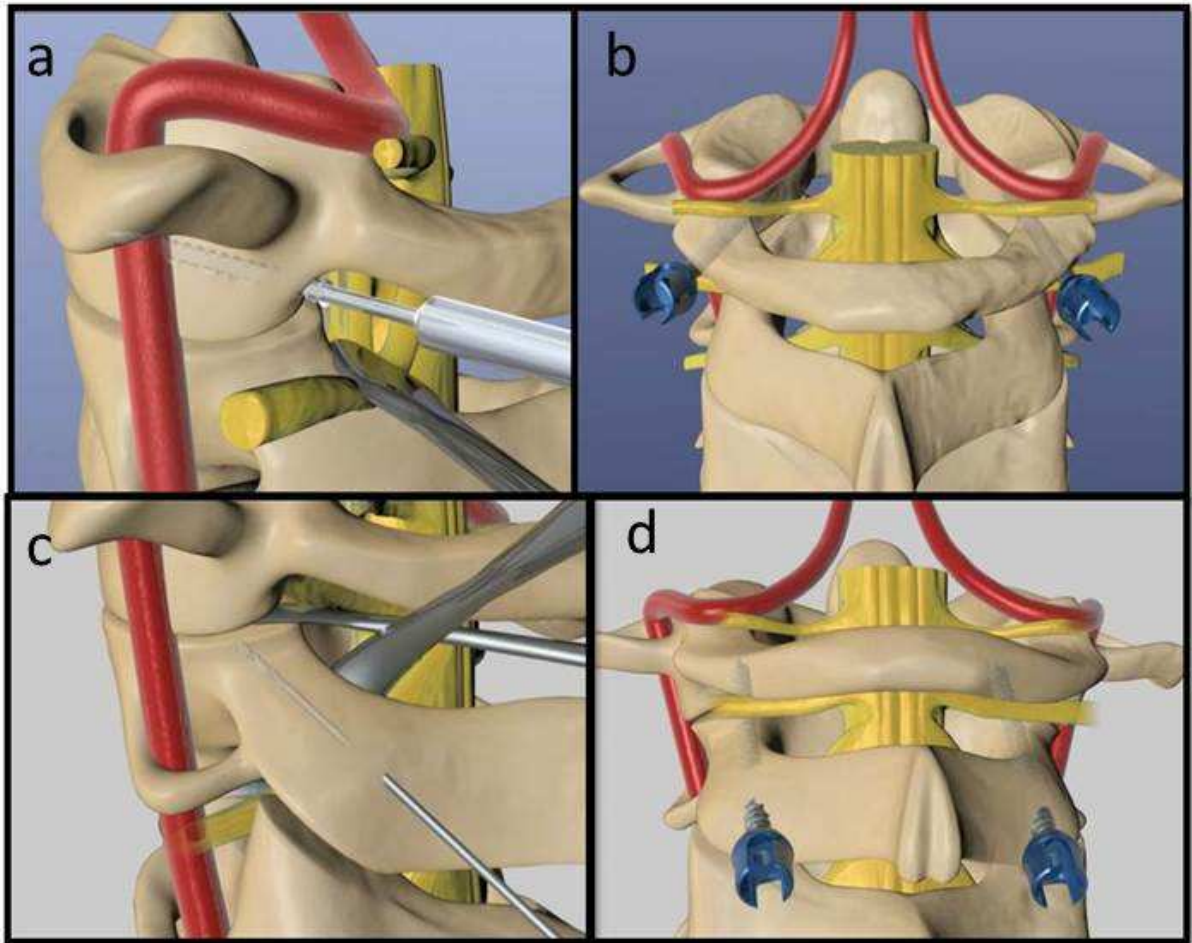
Etiology:

- Grisel Syndrome
 - Retropharyngeal irritation secondary to upper respiratory infection
 - Most common cause of AARS
- Trauma
- Postoperative (tonsillectomy, pharyngoplasty, etc.)
- Down Syndrome, Rheumatoid Arthritis, Ankylosing Spondylitis, Klippel Feil Syndrome and odontoid congenital anomalies

Treatment:

Based on duration of symptoms and clinical presentation.(Warner, 2015)

- Symptoms of less than 1 week duration:
 - Soft collar, therapy, NSAIDS and stretching exercise program.
- >1 week but < 1month symptoms and persistent subluxation:
 - Hospital admission vs. home head halter traction therapy (5lbs)
 - Muscle relaxants and analgesics
 - Followed by postreduction immobilization (soft collar) for 4–6 weeks.
- >1 month symptoms or subluxation:
 - Attempt halo traction for 3 weeks with gradual increased weight and ROM exercises to obtain reduction.
 - If reduction obtained, halo vest immobilization for 6 weeks.
- > 3months duration, neuro deficits or failure of previous management
 - C1-2 open reduction, posterior spinal instrumentation and fusion.
 - There are a variety of techniques for arthrodesis. One method utilizes C1 lateral mass and C2 pars screws. (Hedequist, Spine 2008) Other options include C1-2 transarticular screws or sublaminar wiring. Instrumentation can be supplemented with halo vest immobilization. [Figure 3]



Complications:

Figures and Tables:

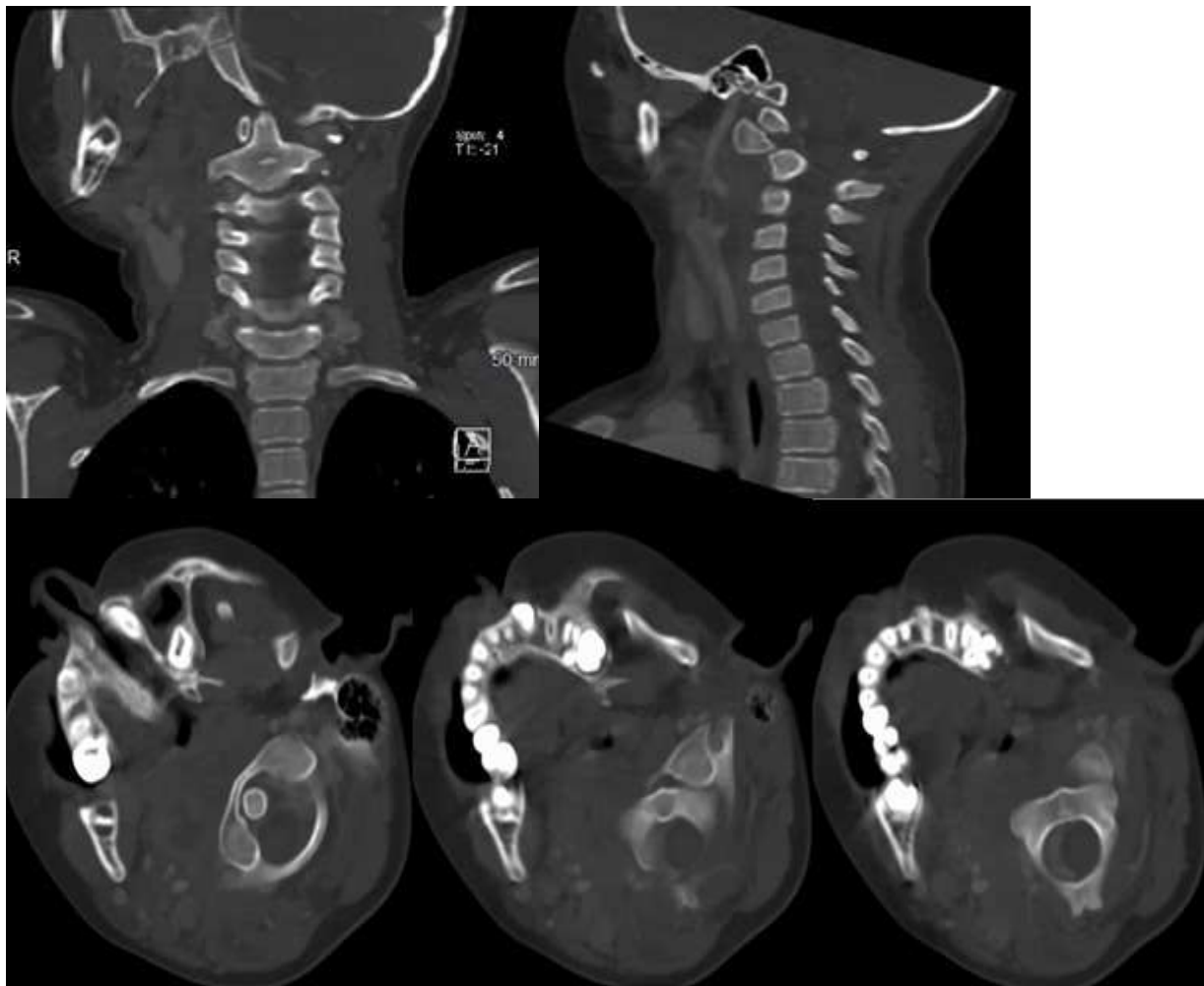


Figure 1 – 8 year-old female with chronic (>3 months) atlanto-axial rotary instability (AARI) secondary to a retropharyngeal abscess. Coronal (1a), sagittal (1b), and serial axial images (1c) demonstrate rotatory subluxation of C1 on C2





Figure 2 – Lateral skull radiographs of the 8 year-old female with chronic AARI treated with halo-gravity traction followed by a halo vest (2a) with subsequent maintenance of reduction and full neck range of motion 6 months following halo removal (2b).

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Top Contributors:

Jamie Gomez MD

Case Images courtesy of Ryan Muchow MD

Pediatric Orthopaedic Society Of North America (POSNA)

9400 West Higgins Road, Suite 500
Rosemont, IL 60018-4976

p: (847) 698-1692

f: (847) 268-9694

e: posna@aaos.org

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