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Delayed Presentation of Pediatric Atlantoaxial Subluxation with Cervical Myelopathy After Clavicle Fracture
- A case report -

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Clinical Context

▪ Pediatric Clavicle Fractures

: Clavicle fractures are among the most common and typically straightforward pediatric injuries.

▪ The Rare Association : AARS

: Atlantoaxial rotatory subluxation (AARS) is rarely associated with clavicle fractures.

Potential for Misdiagnosis

Epidemiological Gap : Coexistence of clavicle fracture and AARS is exceedingly rare.

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Clinical Blind Spot : Symptoms of AARS are frequently misattributed to benign muscle spasm, protective posturing, or hardware irritation from clavicle surgery.

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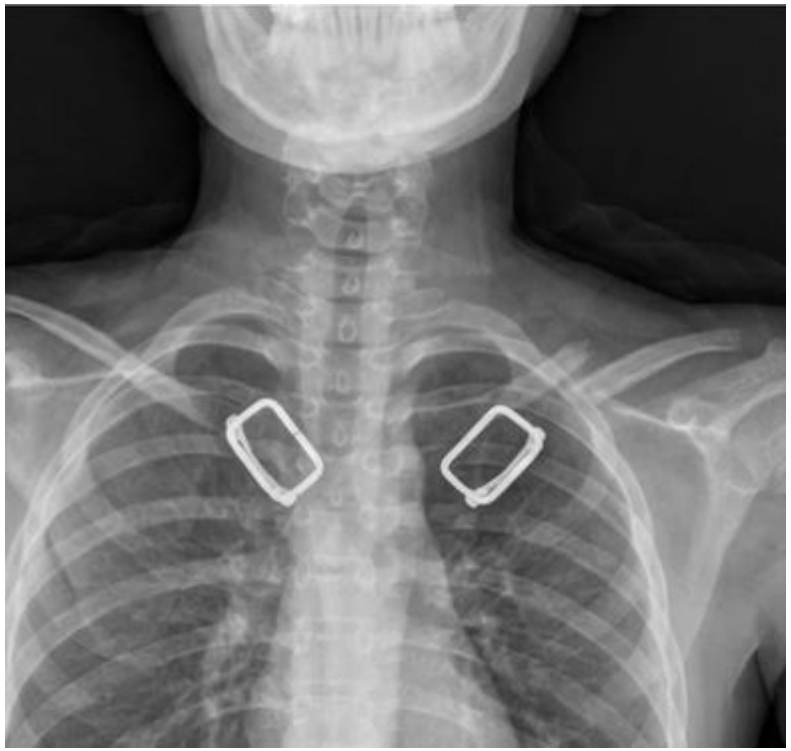
Consequence : Delayed diagnosis (>4 weeks) severely reduces conservative treatment success, risking irreversible cervical myelopathy.

Case presentation – Initial injury



- Initial AP radiograph : Displaced mid-shaft fracture of the left clavicle.
- No neck-related symptoms or abnormal findings immediately after the injury

Patient

- 10yr-old previously healthy girl

Mechanism of injury

- Fall and lateral roll during kickboard accident.

Initial diagnosis

- Left midshaft clavicular fracture.

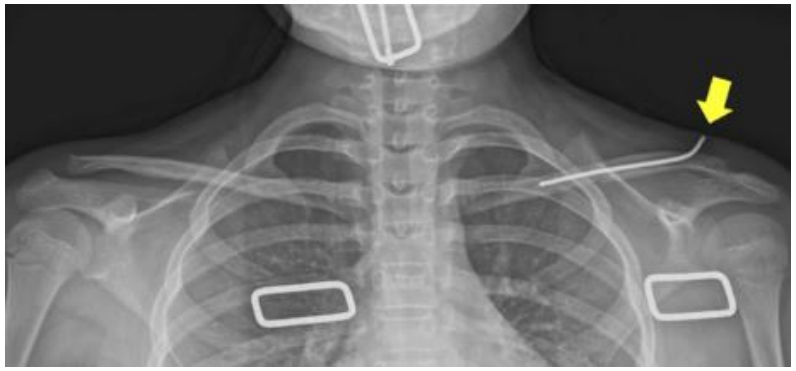
Intervention

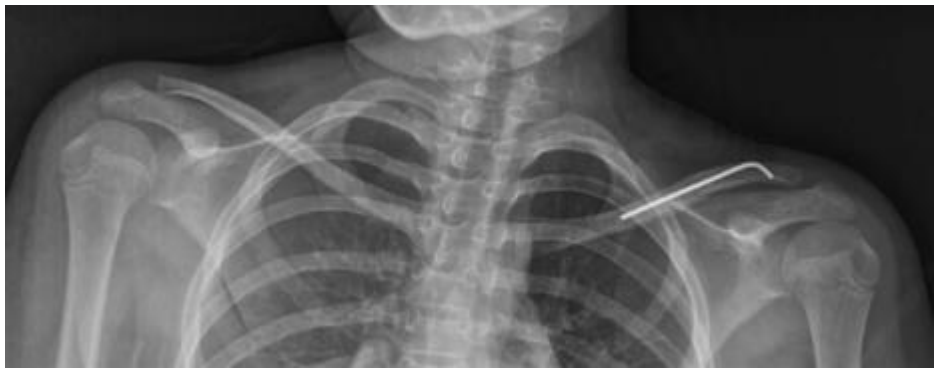
- ORIF c Titanium Elastic Nail (TEN) system at an outside hospital

Immediate post-op status

- No neck related symptoms reported by patient, family, or surgeon
- Neurologically intact

Clinical course : The masking of delayed symptoms





3 Weeks Post-Op

Symptoms : Implant protrusion, skin tenting & localized pain.

Management : Hardware trimmed under local anesthesia.

Diagnostic Oversight :
Formal cervical exam omitted.
Overshadowed by clavicle fracture.

6 Weeks Post-Op

Symptoms : Pain improved, but patient reports torticollis.

Management : No imaging obtained.

3 Months Post-Op

Symptoms : Worsening neck tilt (cock-robin posture).

Management : Hardware removal were performed.

Diagnostic Oversight :
Misattributed to muscle spasm;
Cervical imaging still omitted.

From Torticollis to Acute Neurologic Deterioration

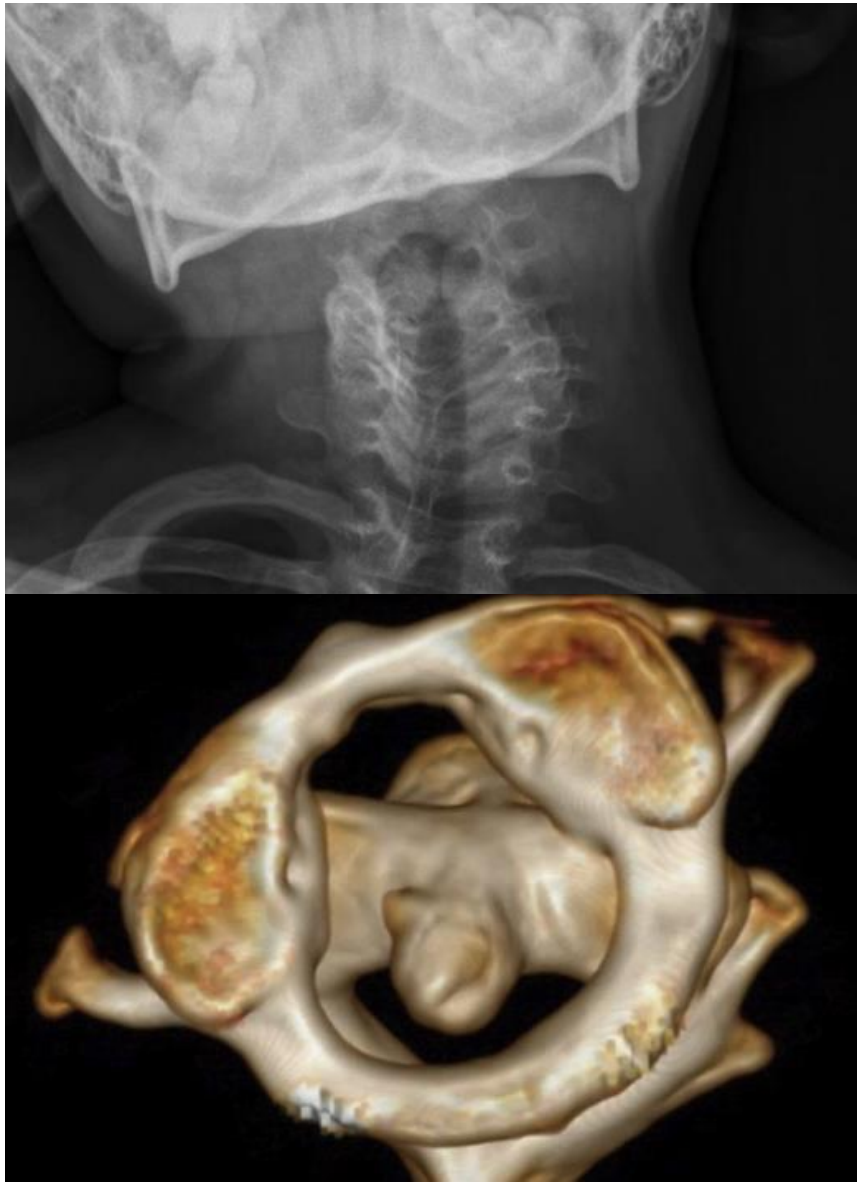
- **Presentation**
  - Sudden lower limb weakness and fall while walking.

- **Trigger event**
  - Patient sought for sports massage therapy to correct "Neck alignment". immediately after one session, developed new paresthesia in extremities.

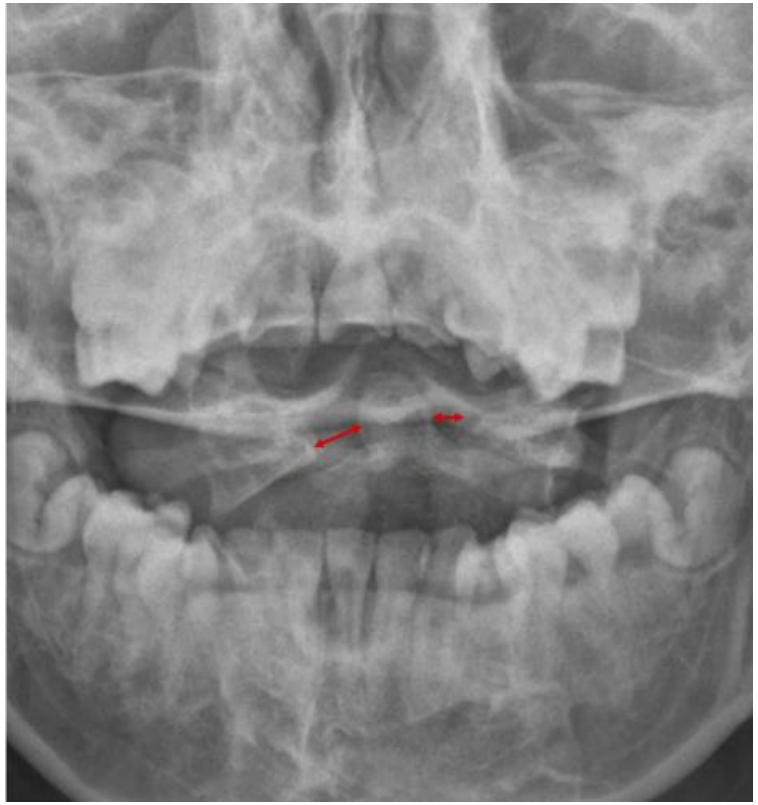
- **Clinical Findings (Myelopathic signs)**

Exaggerated deep tendon reflexes in bilateral knees (+++)	Hoffman sign (+)
Decreased motor strength in the left upper limb (Grade III-IV)	Ankle clonus (+++)

- **Diagnostic Pivot**
  - Presentation shifts from hardware complication of clavicle fracture to acute cervical myelopathy.

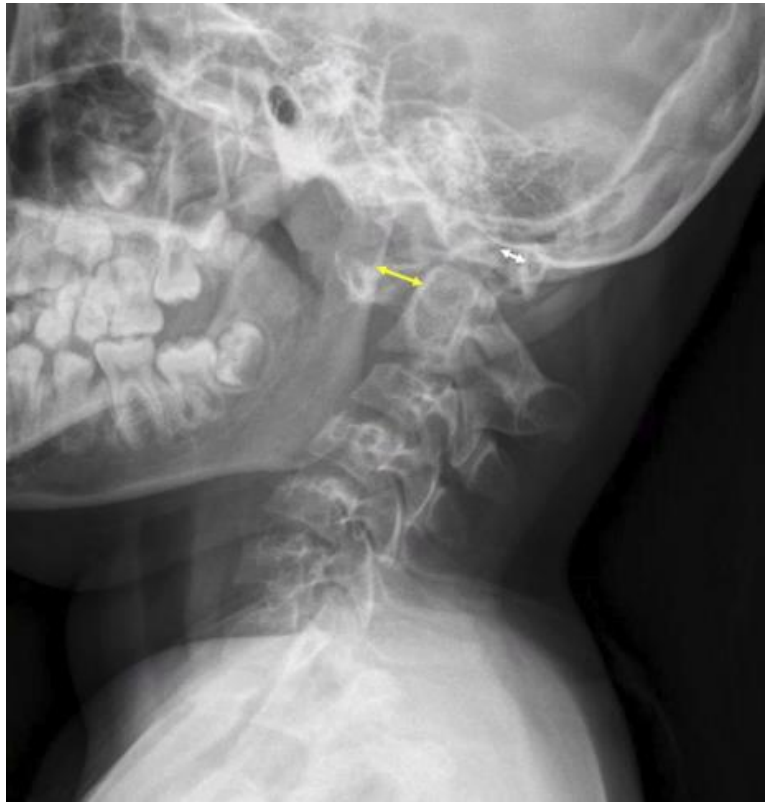


DIAGNOSIS
: AARS type III with compressive cervical myelopathy



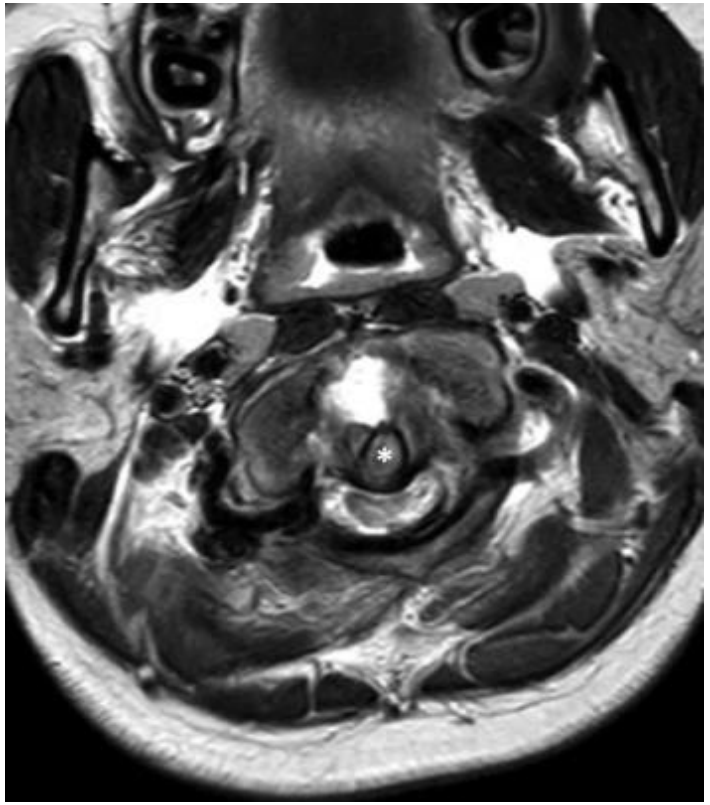
Open-mouth X-ray

Asymmetric Lateral Atlanto-Dental Interval (LADI)



LATERAL X-RAY

Widened anterior Atlanto-Dental Intervial (AADI) ~ 10mm
Narrowed space for spinal cord ~5mm (High risk of paralysis)



Axial T2-weighted MRI

Complete rupture of transverse/alar ligament.
spinal cord compression by the odontoid process

Fielding and Hawkins Classification of AARS

Type I:

Rotation around odontoid (dens = pivot).

No anterior displacement.

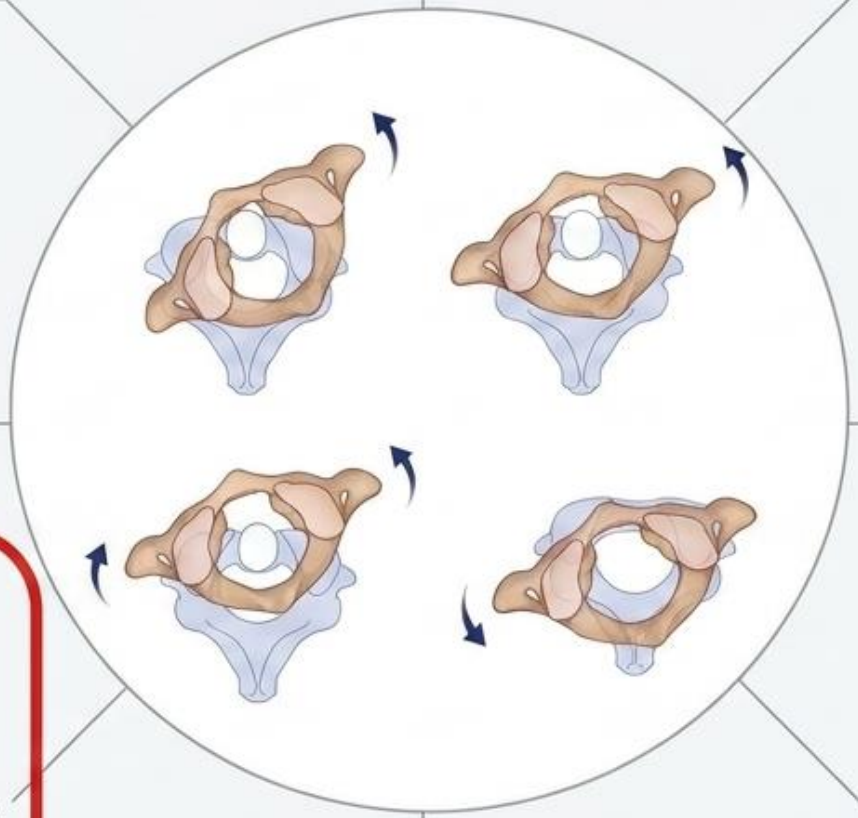
Most common.

Type II:

Anterior displacement of 3–5 mm.

Indicates transverse ligament injury.

Facet joint = pivot.



- **Type III:**

Bilateral anterior displacement > 5 mm.

Severe ligamentous injury.

High risk of neurologic compromise.

Type IV:

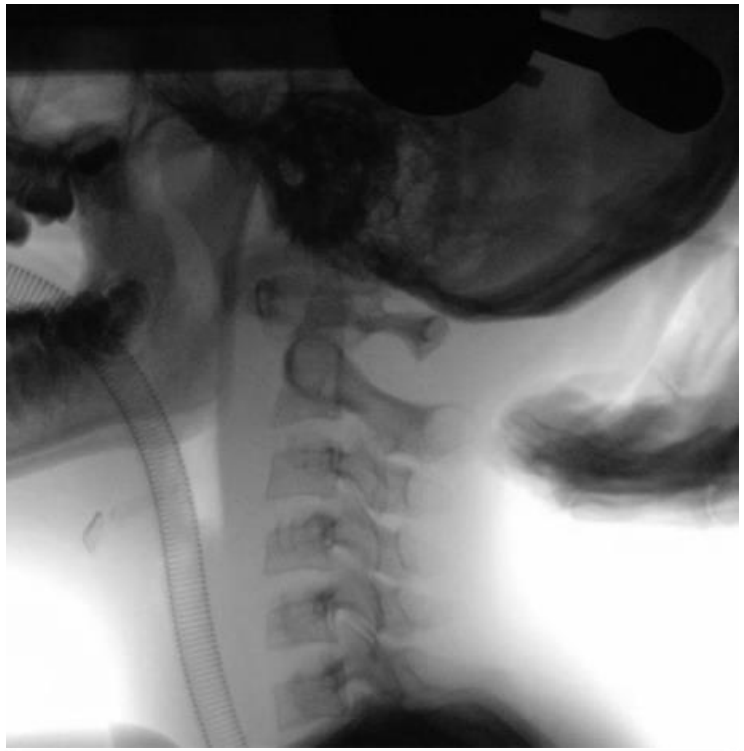
Posterior displacement of the atlas.

Typically seen with odontoid deficiency.

Highly unstable.

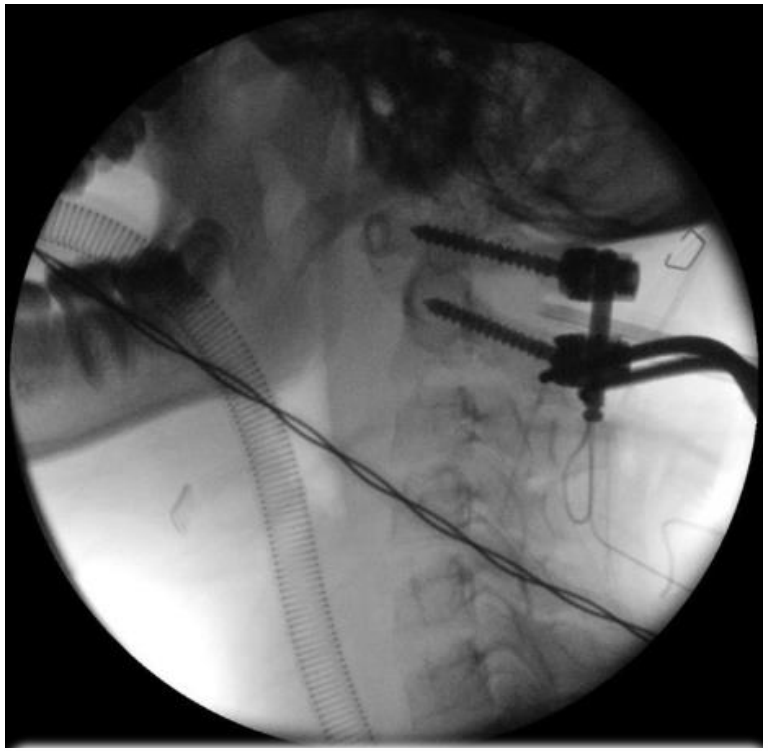
Surgical management : Posterior C1-C2 fusion

Step 1 : Closed reduction attempted



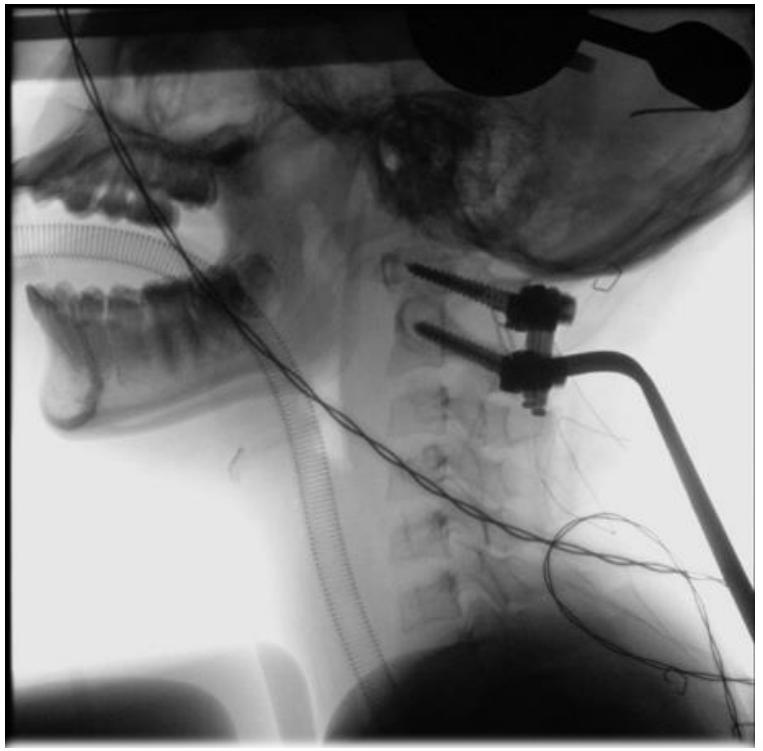
- Attempted via Mayfield skull clamp under general anesthesia.
- C1 remained anteriorly displaced and irreducible

Step 2 : Unilateral Fixation



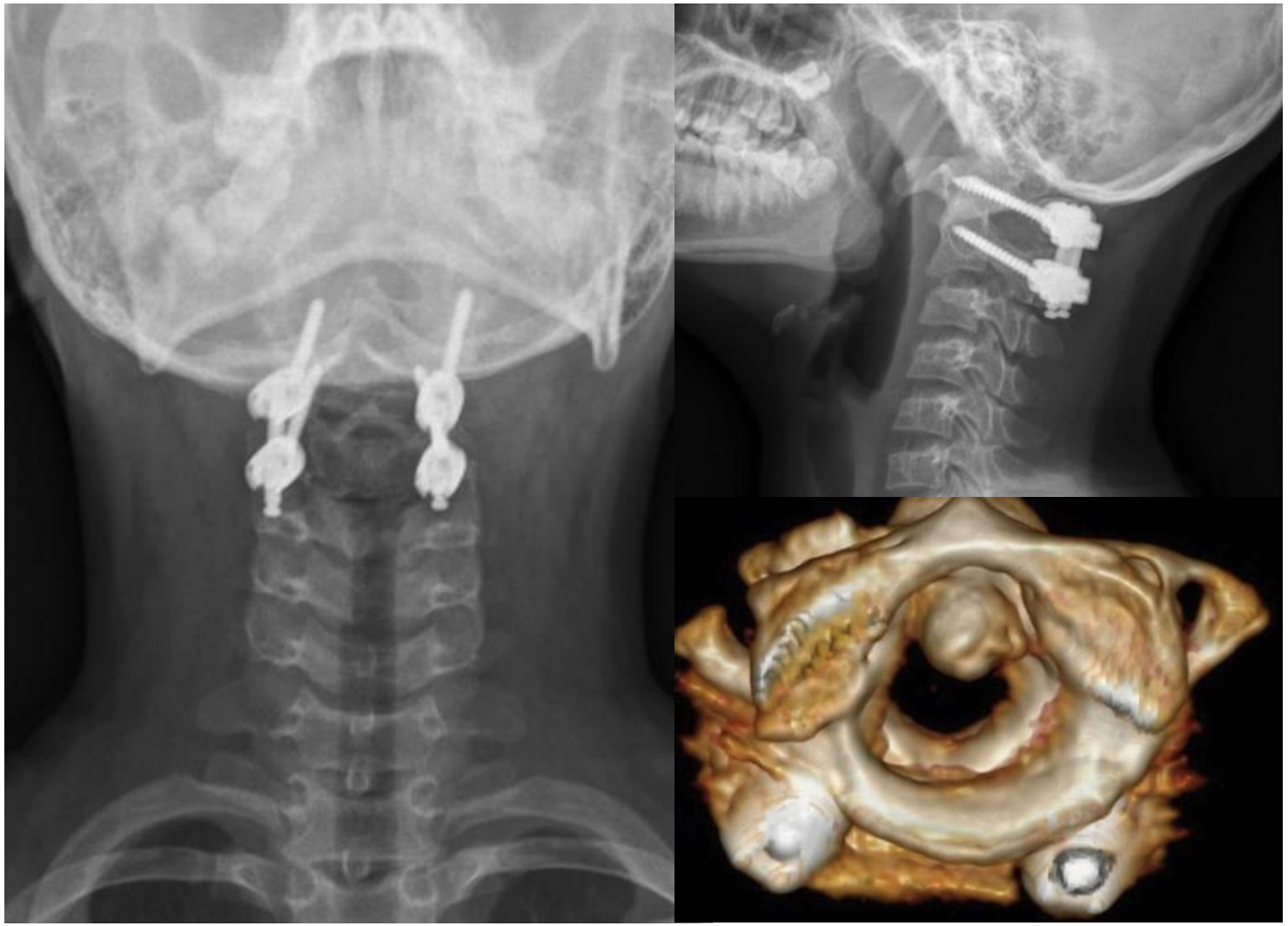
- Posterior C1-C2 fusion.
- Initial fixation: Right C1 lateral mass & C2 pedicle
- Partial reduction achieved

Step 3 : Complete Reduction



- Partial reduction enabled contralateral screw insertion.
- Stable C1-C2 alignment via final rod assembly

Post-Operative Outcome (1Year Follow-up)



Radiologic outcome

- Stable C1-C2 fixation
- Normalized ADI
- No recurrence of AARS

Neurological status

- Complete neurological recovery
- Independent ambulation
- No residual deficits

Functional status

- Mild rotation limit (expected post-fusion)
- Daily activities unaffected
- Normal functional status

Conclusion : key clinical takeaways

- **The Diagnostic pitfall** : Persistent torticollis after a pediatric clavicle fracture is a major RED FLAG. IT must not be dismissed as protective posturing, hardware irritation of benign muscle spasm.

- **A High index of suspicion** : Early recognition (<4 weeks) allows for successful conservative management. Diagnostic delays lead to ligamentous stretching, progression to highly unstable Type III AARS, and devastating myelopathy.

- **Imaging imperative** : Timely cervical imaging (AP, open-mouth, lateral X-ray and CT/MRI) is mandatory for pediatric patients presenting with unexplained or persistent neck tilt post-trauma.

- **Conclusion** : Awareness of the rare coexistence of clavicular fractures and AARS is essential to prevent delayed diagnosis, invasive cervical fusions and irreversible neurological complications.