

The Impact of Presentation in Concurrent Atlanto-Occipital and Atlanto-Axial Dislocations on Outcomes: A Case Series of Two Young Females

Sabrina Elliott, MD, MSc PGY-1; Martin Tafazoli, MD PGY-2; Frederick Stephens, MD; & Matthew Yanoff, MD FASC
MWH Department of Trauma Surgery & Department of Neurosurgery

PATIENT A—SURVIVOR

28F, MVC vs Tractor Tractor
Delayed diagnosis, EtOH, Driver

Coronal CT with CCI

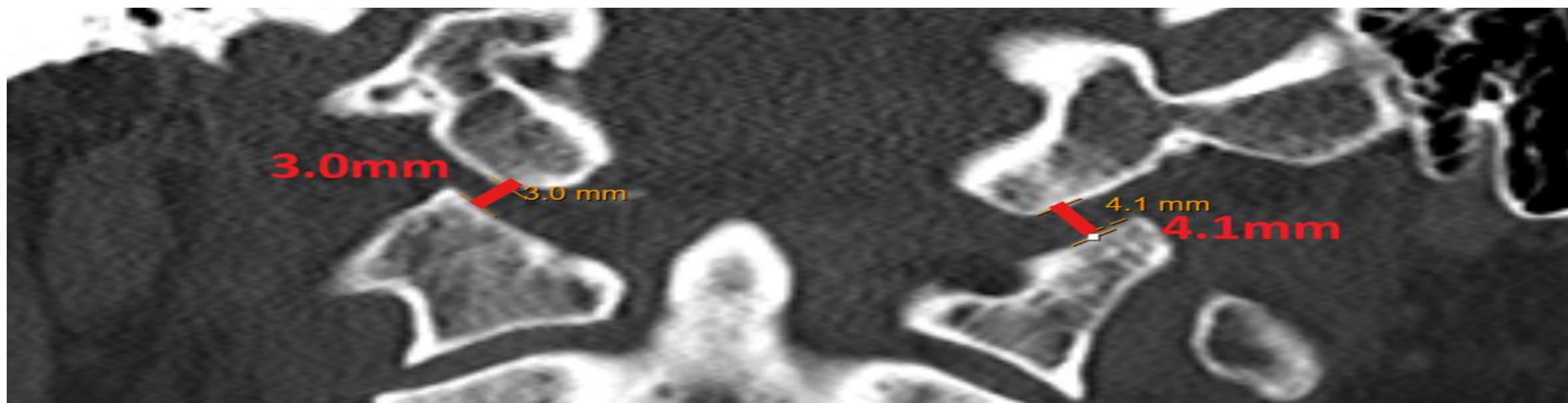


Figure 1. Coronal CT of craniocervical junction widening of occipital condyle-C1 interval (CCI) consistent with a Meyers AAD Type I or III and Traynelis Type II AOD or Meyers Type III AOD.

Key Clinical Features

- Delayed diagnosis due to severe polytrauma
- Multiple distracting injuries requiring emergent damage control laparotomy and orthopedic fixation
- Compression of cervical cord with edema
- No vertebral artery injury
- Delayed spinal fixation
- Preserved neurologic function
- Discharged to rehab HD15

Sagittal MRI w/ BDI

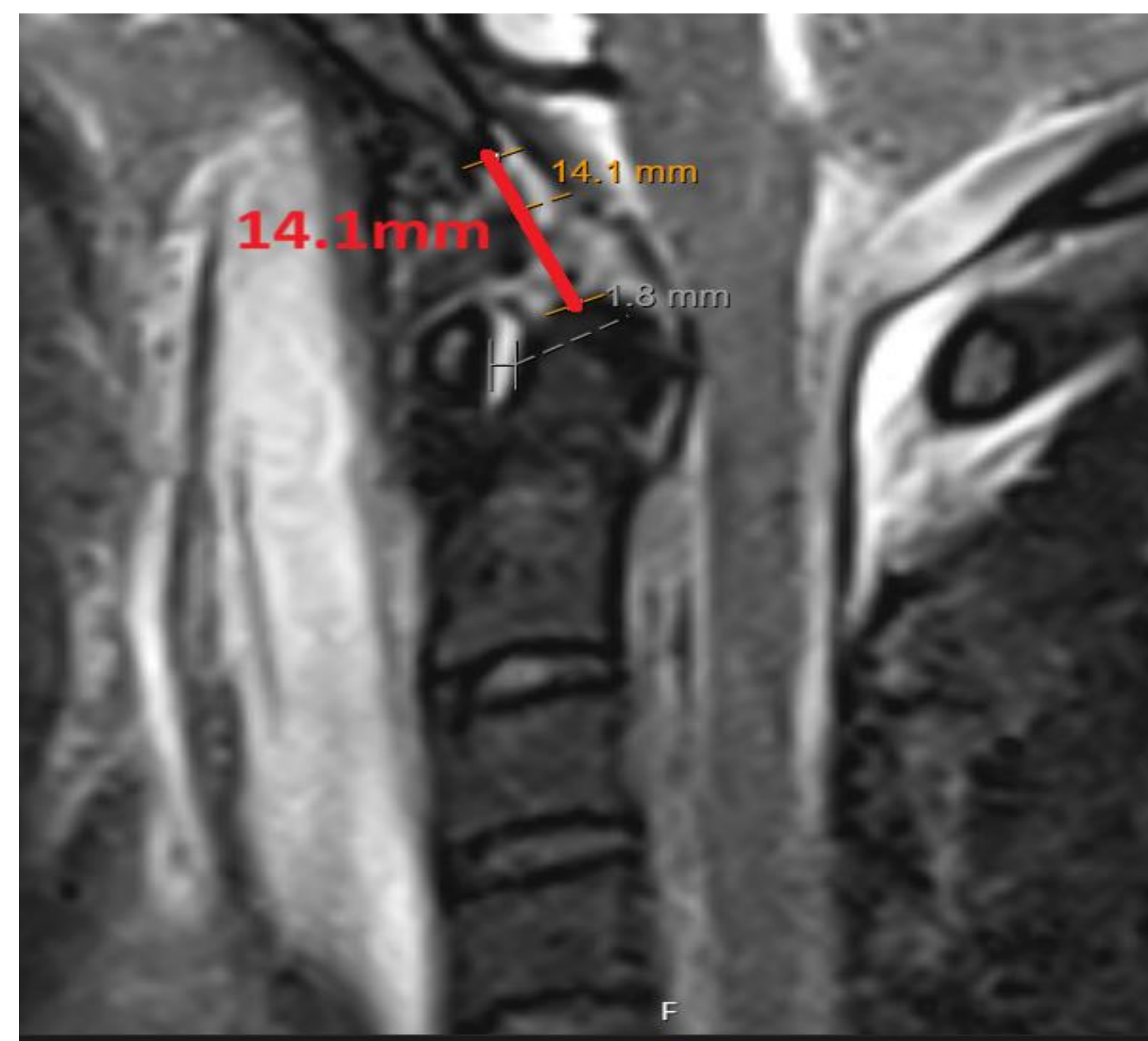


Figure 2. Sagittal T2 MRI showing BDI with extensive disruption of alar, tentorial, and transverse ligaments and distraction AAD Type III and longitudinal Type II AOD.

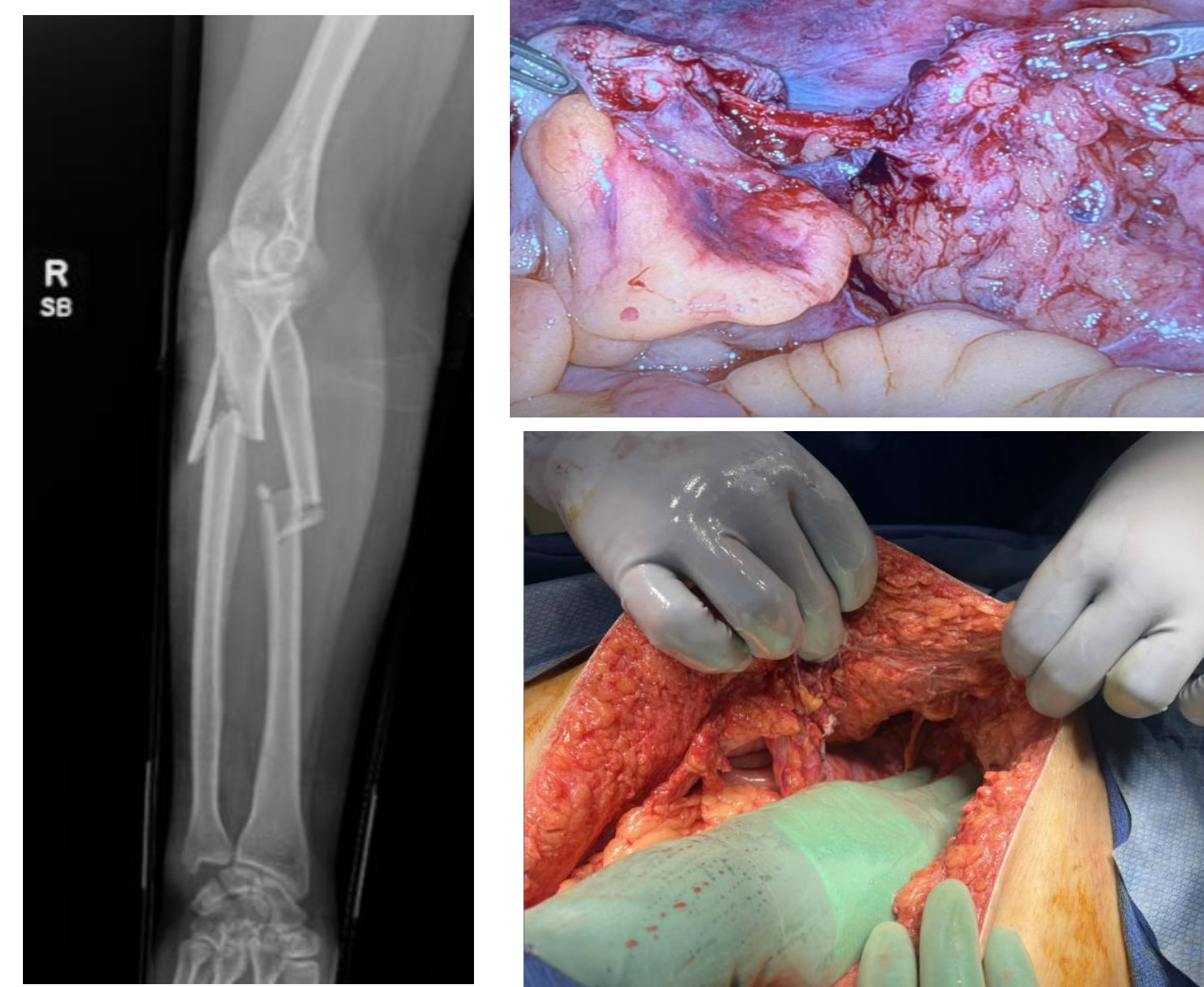
Post-Instrumentation



Figure 3. Postop imaging following occiput-C4 posterior fusion

Distracting Injuries

Figure 4. Associated polytrauma requiring emergent operative management including traumatic abdominal wall disruption, forearm fractures, and Grade V mesenteric injuries



Introduction

Craniocervical dissociation, including atlanto-occipital dislocation (AOD) and atlantoaxial dislocation (AAD), are rare and highly unstable upper cervical spine injury associated with high-energy trauma. Although CT-based measurements such as the condyle-C1 interval (CCI) and basion-dens interval (BDI) are highly sensitive, radiographic displacement alone may not predict neurologic outcome. We present two patients with similar radiographic instability but markedly different clinical outcomes, highlighting the prognostic importance of concomitant injuries and physiologic insult over static craniometric measurements alone.

THE PROGNOSTIC PARADOX

Patients had an **equivalent** BDI producing opposite outcomes
Radiographic severity ≠ Physiologic Severity

KEY COMPARISONS

Detail (Normal, unit)	Patient 1	Patient 2
Age/Sex	28F	21F
Field Presentation	Ambulatory, AMS, LOC,	Arrest with ROSC
CCI (<1.5, mm)	4.1mm	7.9mm
BDI (>12 or >10 w/ MRI, mm)	14.1 mm	14.3mm
Cord Injury	Compression	Laceration
Vertebral Artery Injury	No	Dissection
MEP/SSEP	Yes	No
Surgery	Occiput to C4	Occiput to C2
Outcome	Rehab on HD15	Brain Death

WHAT PREDICTS OUTCOMES?

Prognostic Factors

- GCS, cord injury, BCVI, brainstem injury
- Cardiac arrest
- MEP/SSEP status

Diagnostic Factors

- BDI
- CCI
- Condylar sum

Conclusions

- Craniometric measurements can be misleading or not performed especially in polytrauma.
- Presence of cervical cord injury and admitting neurological status are the strongest determinants of survival, not measurements.
- MRI can be confirmatory in borderline BDI.
- Delayed diagnosis does not preclude favorable outcome if spinal cord integrity is preserved

PATIENT B—DECEASED

21F, MVC, Field Cardiac Arrest
8 min CPR--> ROSC

Coronal CT with CCI

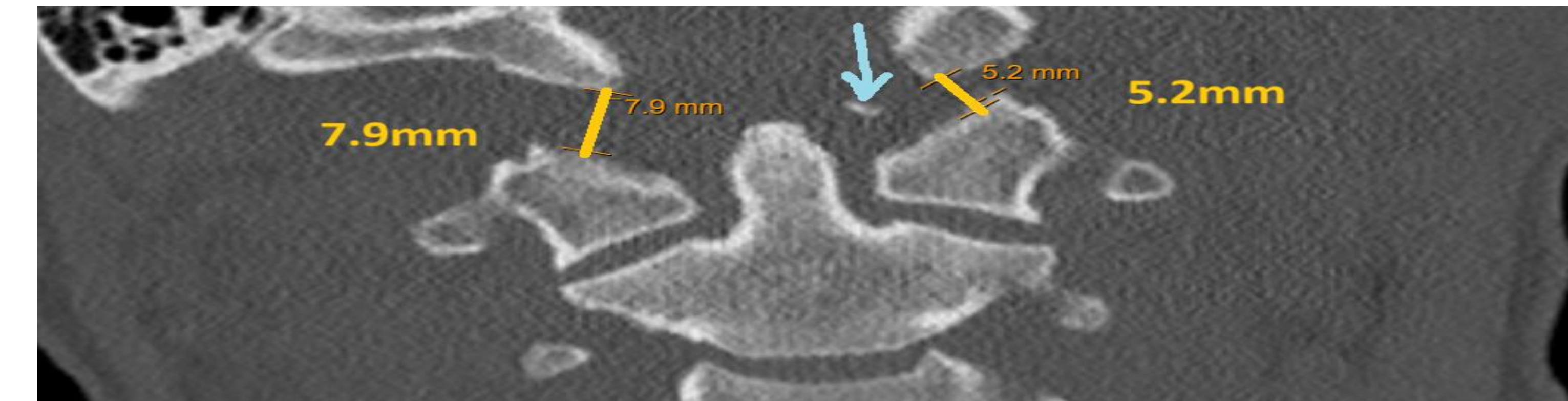


Figure 1 (top) CT cervical spine showing combined Meyers Type II translational and possible Type III distraction AAD

CT Head w/o IV Contrast

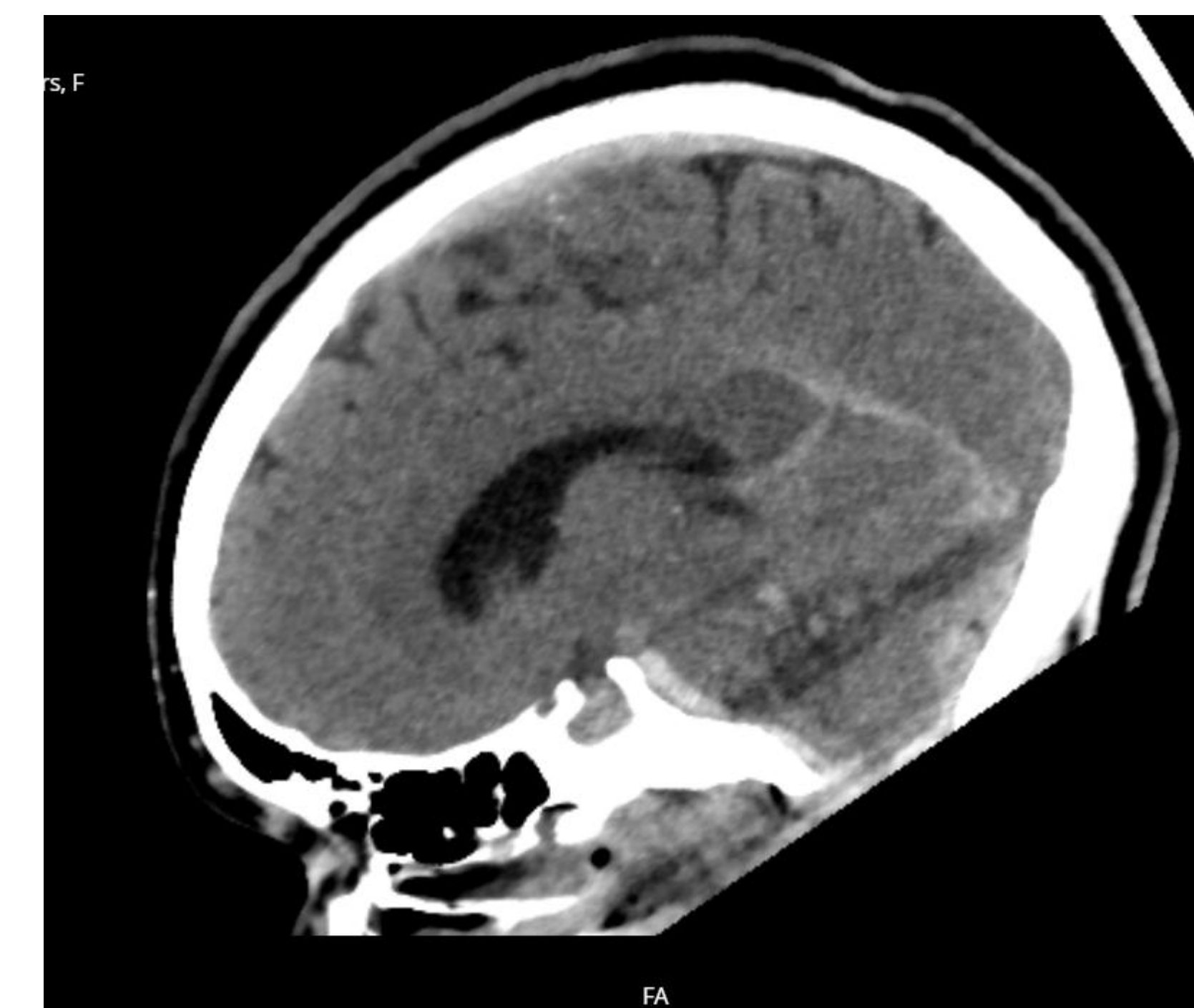


Figure 2. CT head sagittal view showing posterior fossa hemorrhage, hyper density along tentorium, and brainstem hemorrhage.

Sagittal CT with BDI

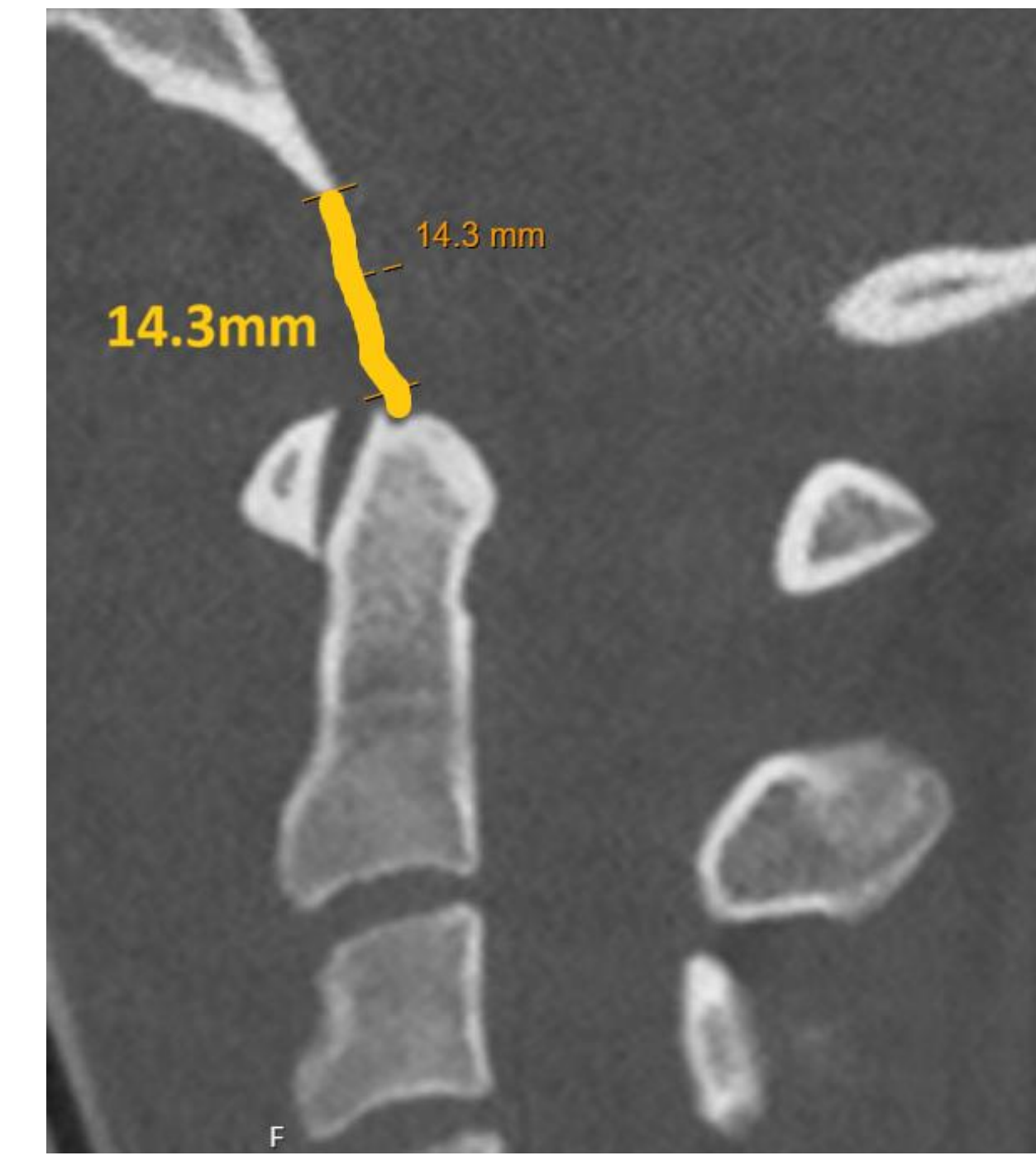


Figure 3. CT cervical spine with BDI 14mm showing combined Type I and Type II Traynelis AOD combined anterior displacement and longitudinal distraction

Post-instrumentation

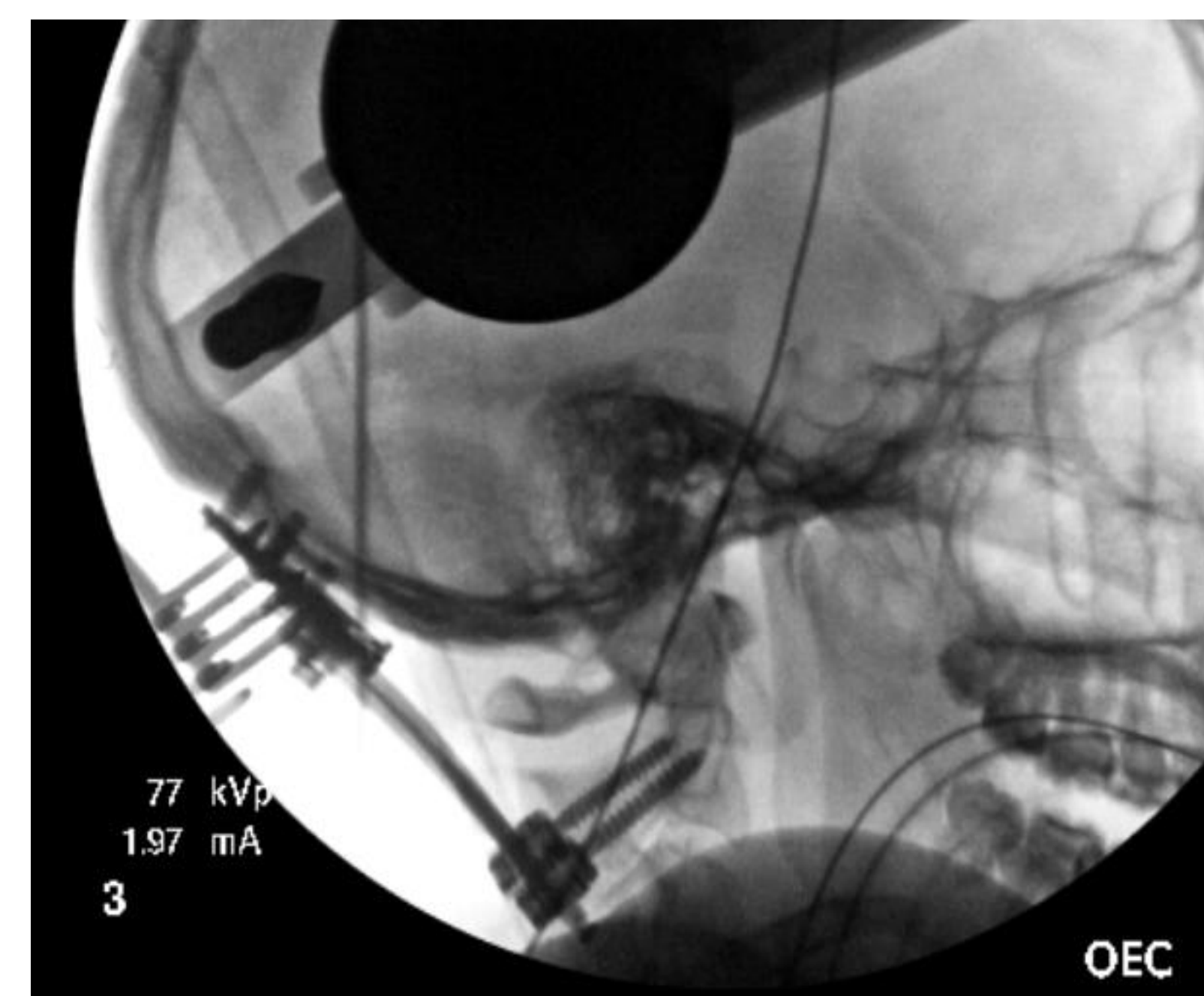


Figure 4. Intraoperative fluoroscopy of bilateral occiput to C2 posterior lateral fusion.

Key Clinical Features

- Field cardiac arrest with 8 minutes CPR to ROSC
- Cervical cord contusion & laceration
- Brainstem injury and multi compartment hemorrhage
- Left vertebral artery dissection
- Absent intraoperative MEPs/SSEPs
- Progression to brain death despite surgical stabilization

References

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