

# **Imaging of the Cervical Spine: Craniocervical Junction**

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# Imaging of the Cervical Spine: Craniocervical Junction

## Objectives

- Axis Fx's -Dens fracture, Hangman's fracture
- Atlanto-occipital dissociation (AOD)
- Normal anatomy

# DENS FRACTURE

**TABLE 2 Distribution and Pattern of Injuries in the Upper Cervical Spine**

Level	No. of Injuries	Categories	No.	%
<b>TABLE 1 Clinical and Radiologic Variables</b>				
	Category	Variable	Patients (n = 149)	%
Sex	Men		77	52
	Women		72	48
Age	65–75 years		59	40
	>75 years		90	60
Mechanism	Falls from standing or seated height		45	30
	Falls from greater than standing height		28	19
	Motor vehicle crashes		72	48
	Others <sup>a</sup>		4	3
Location of injury	Upper cervical spine (C0–C2)		95	64
	Lower cervical spine (C3–C7)		54	36
	Hyperextension teardrop fracture		4	4

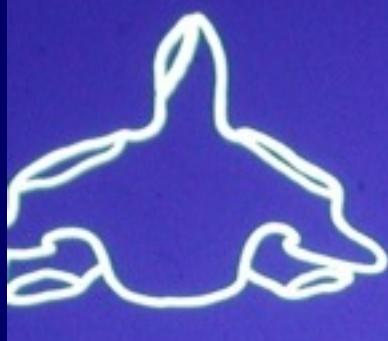
**Cervical Spine Injuries in Patients 65 Years Old and Older:** Epidemiologic Analysis Regarding the Effects of Age and Injury Mechanism on Distribution, Type, and Stability of Injuries

AJR 2002;178:573–577

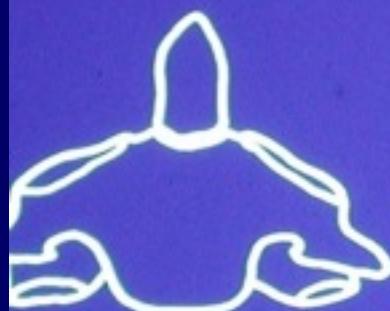
# DENS FRACTURE

- Subtle on lateral radiographs & axial CT
- Step off or disruption – cortex or C2 ring

Type I



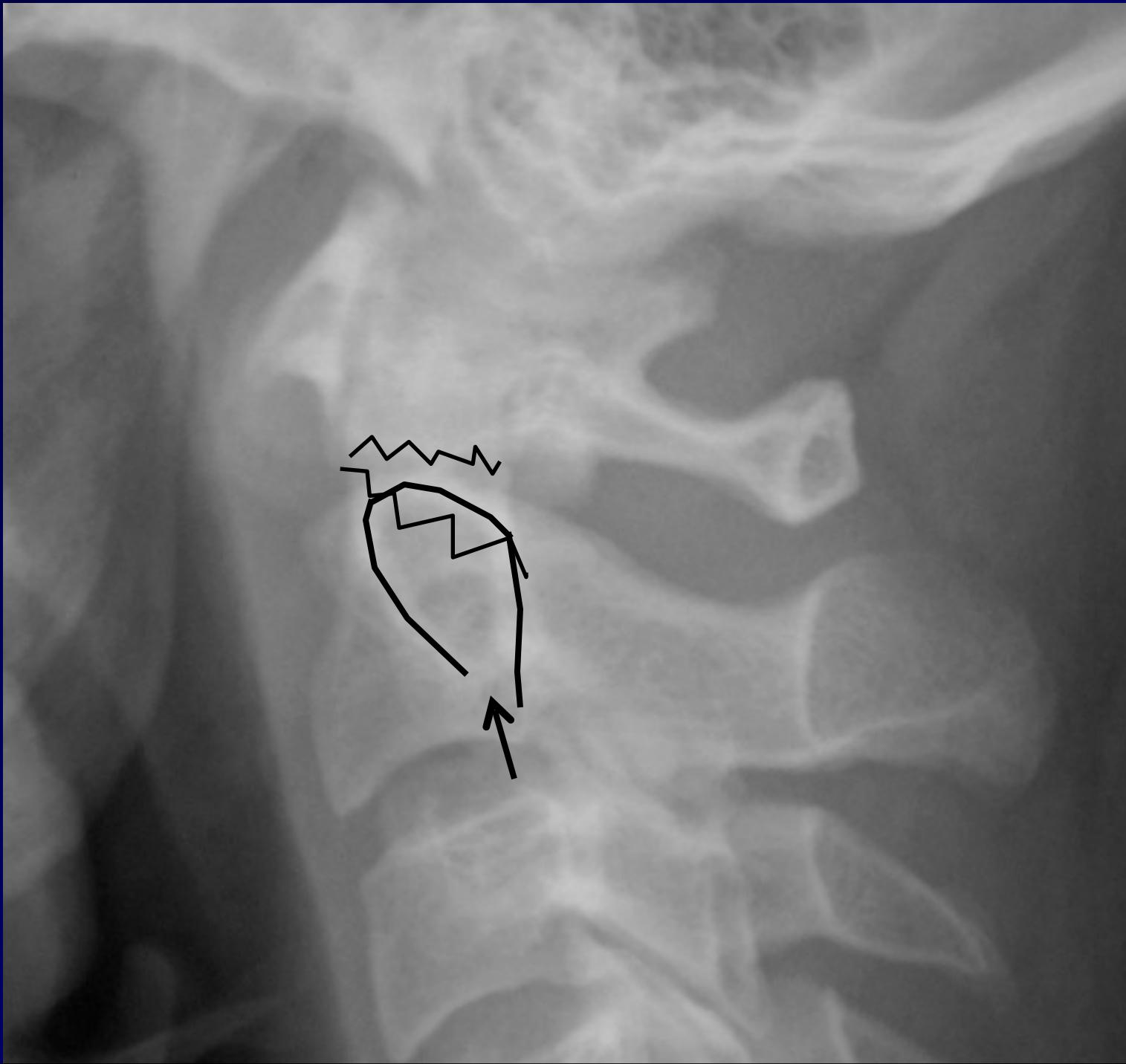
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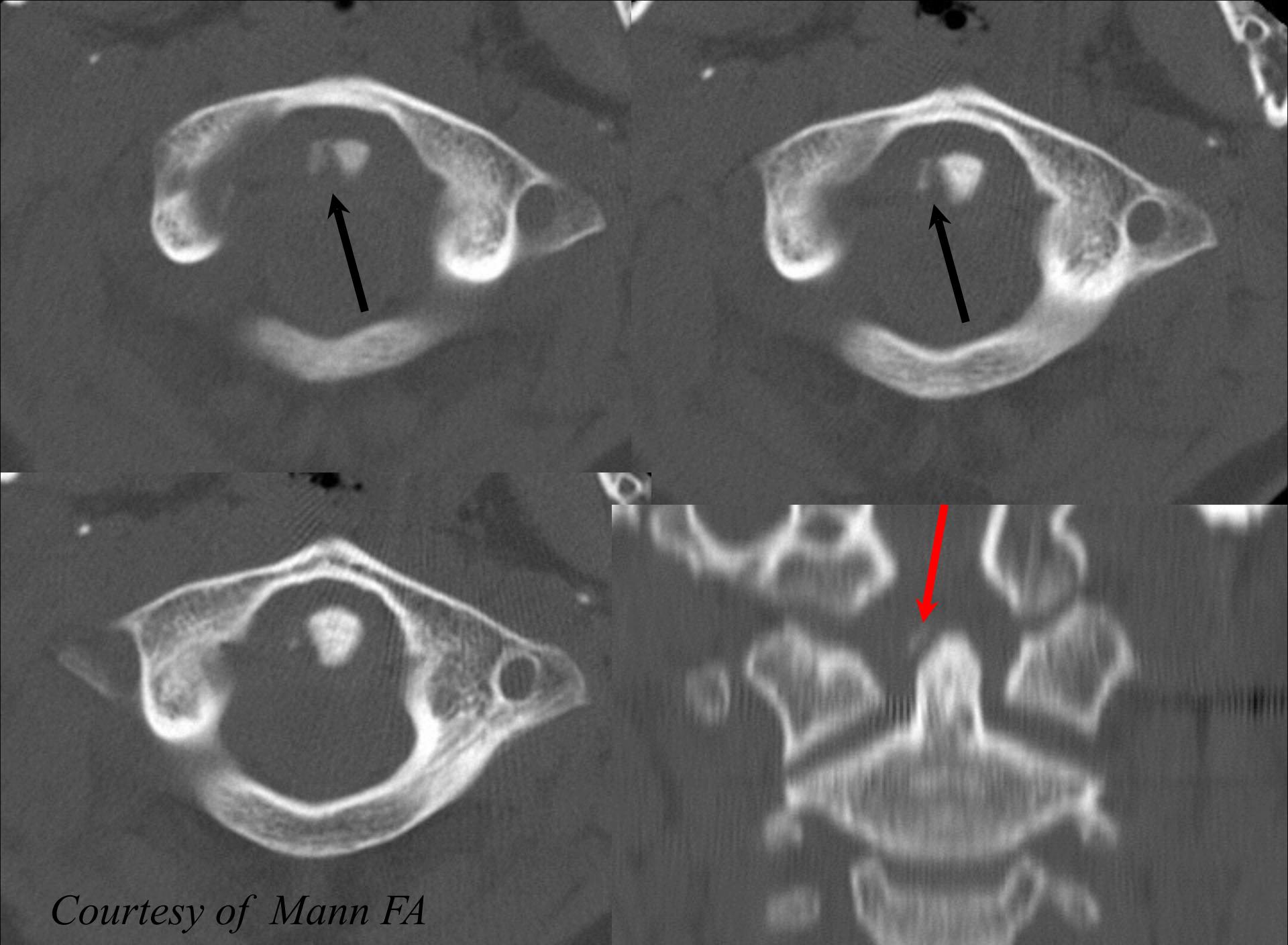


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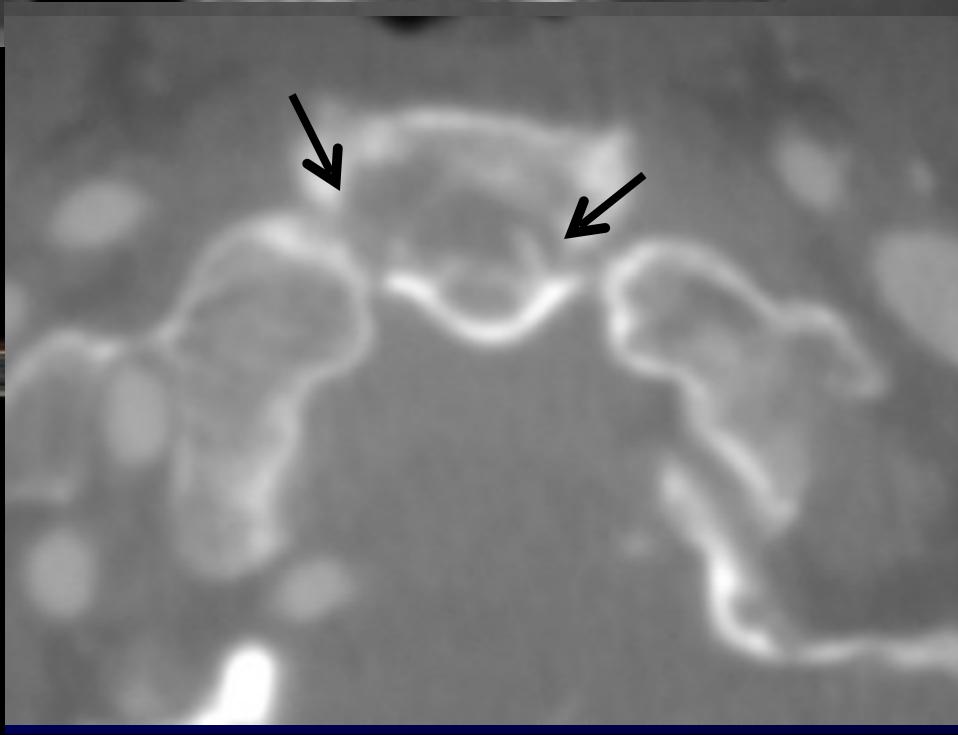
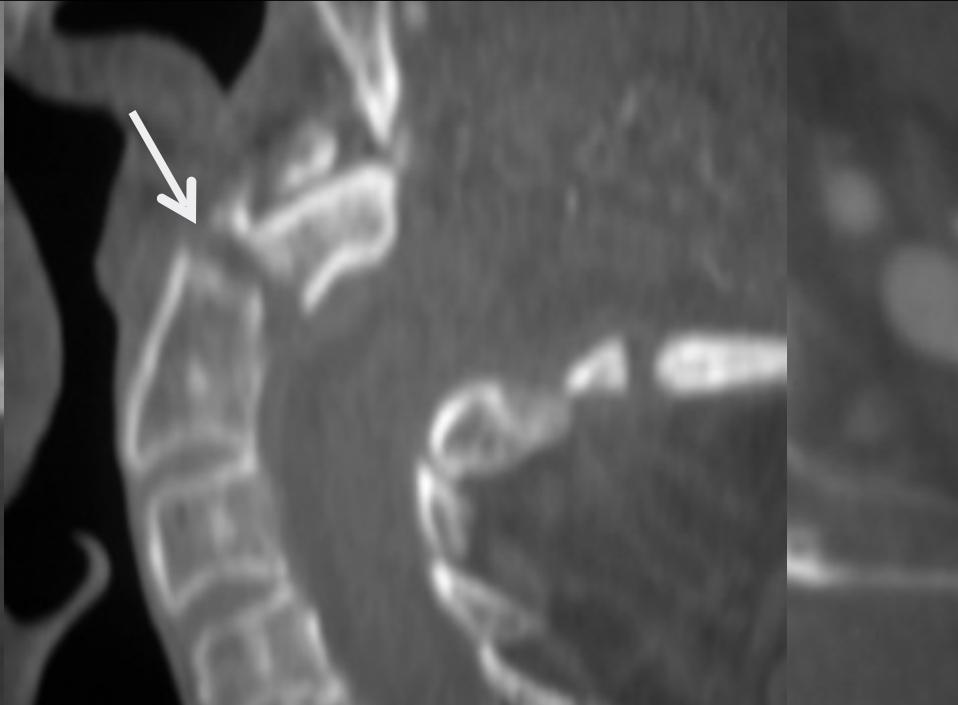
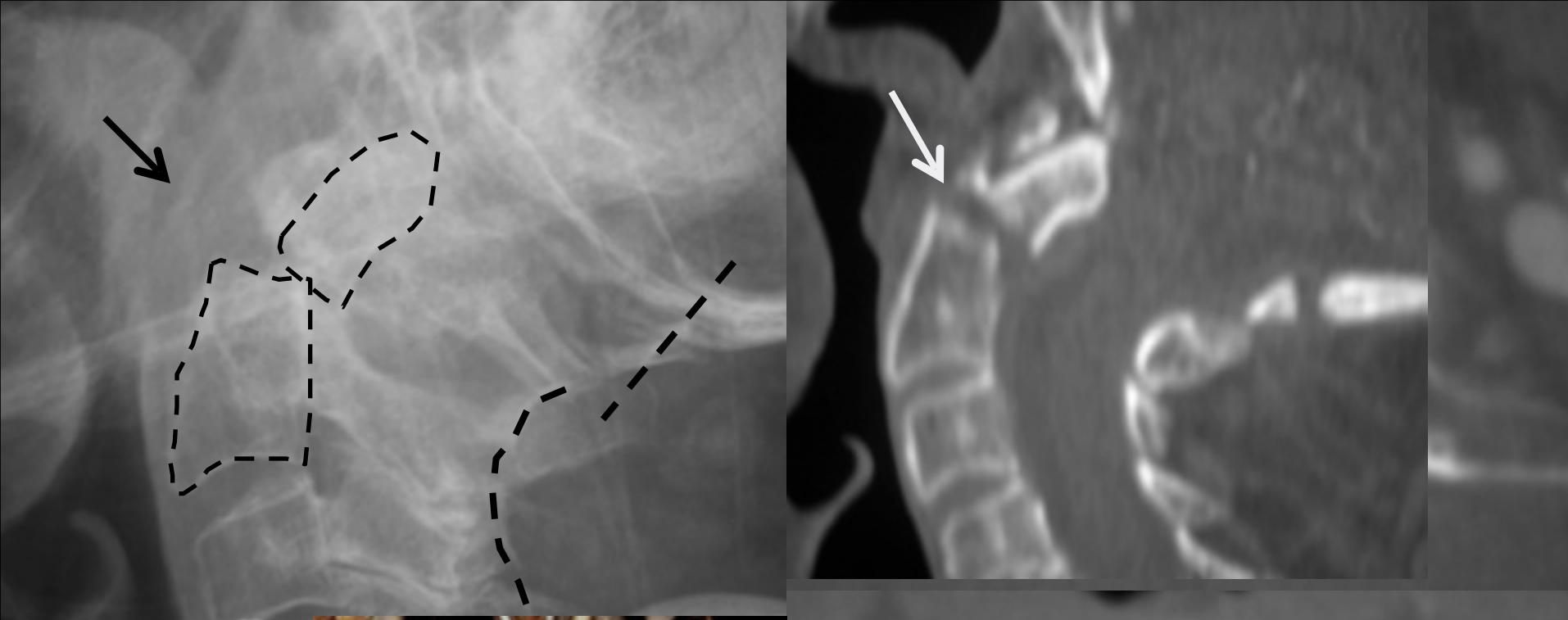


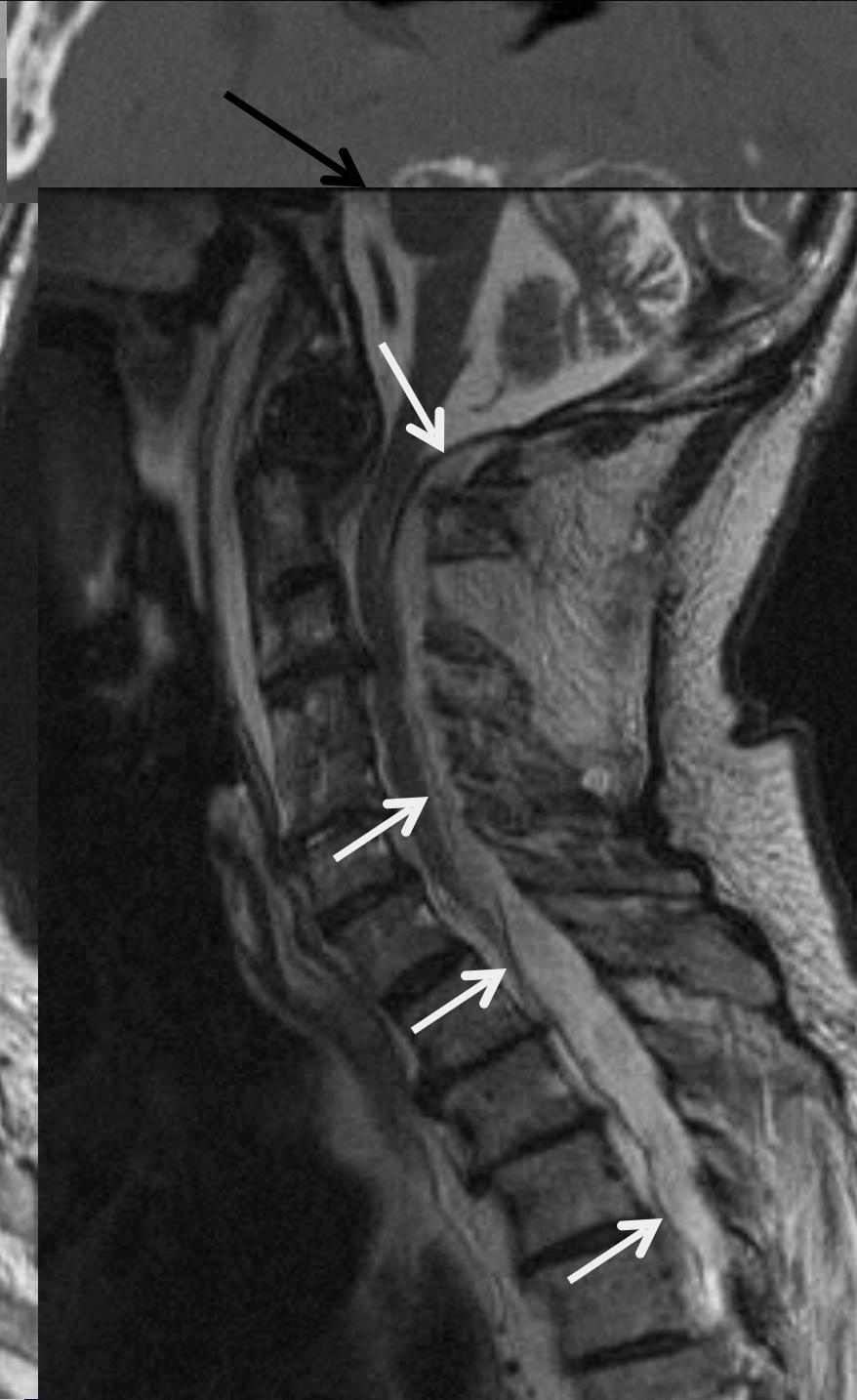
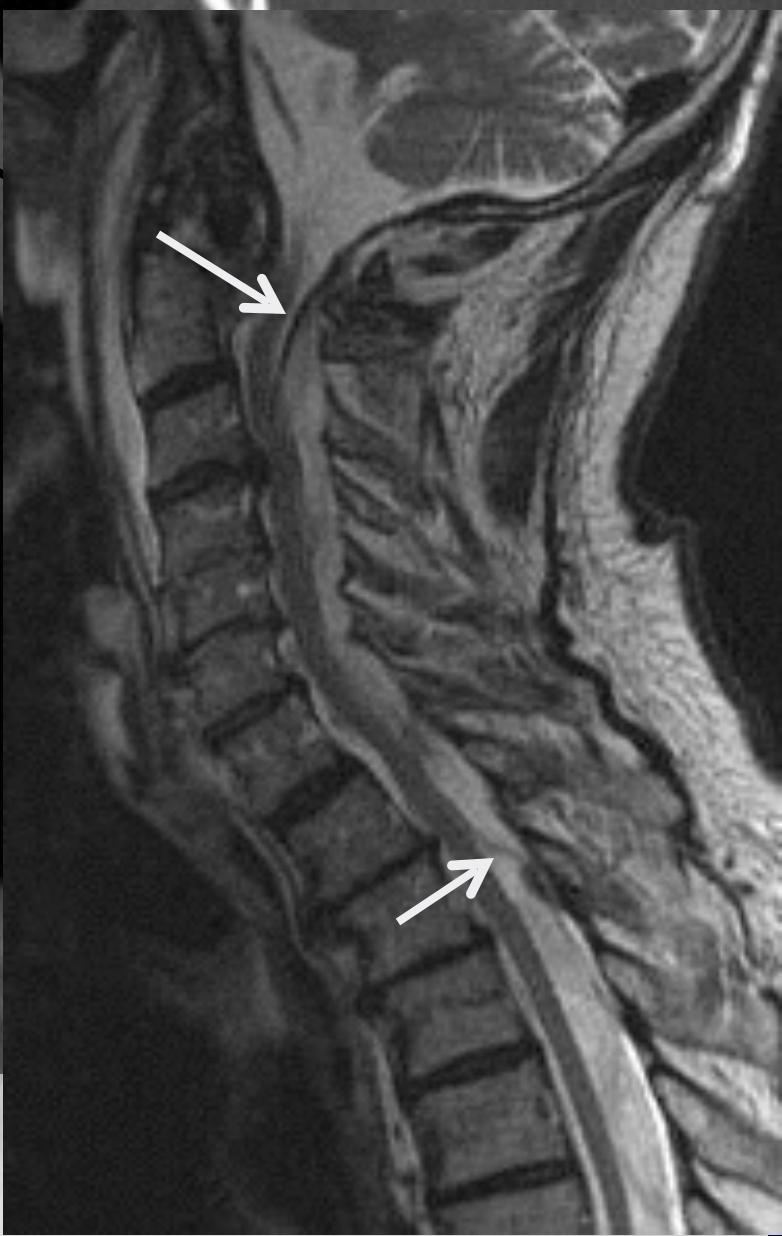
Anderso &  
D'Alonzo in: The  
Radiology of  
Acute Cervical  
Spine Trauma  
Harris JH , Mirvis  
SE

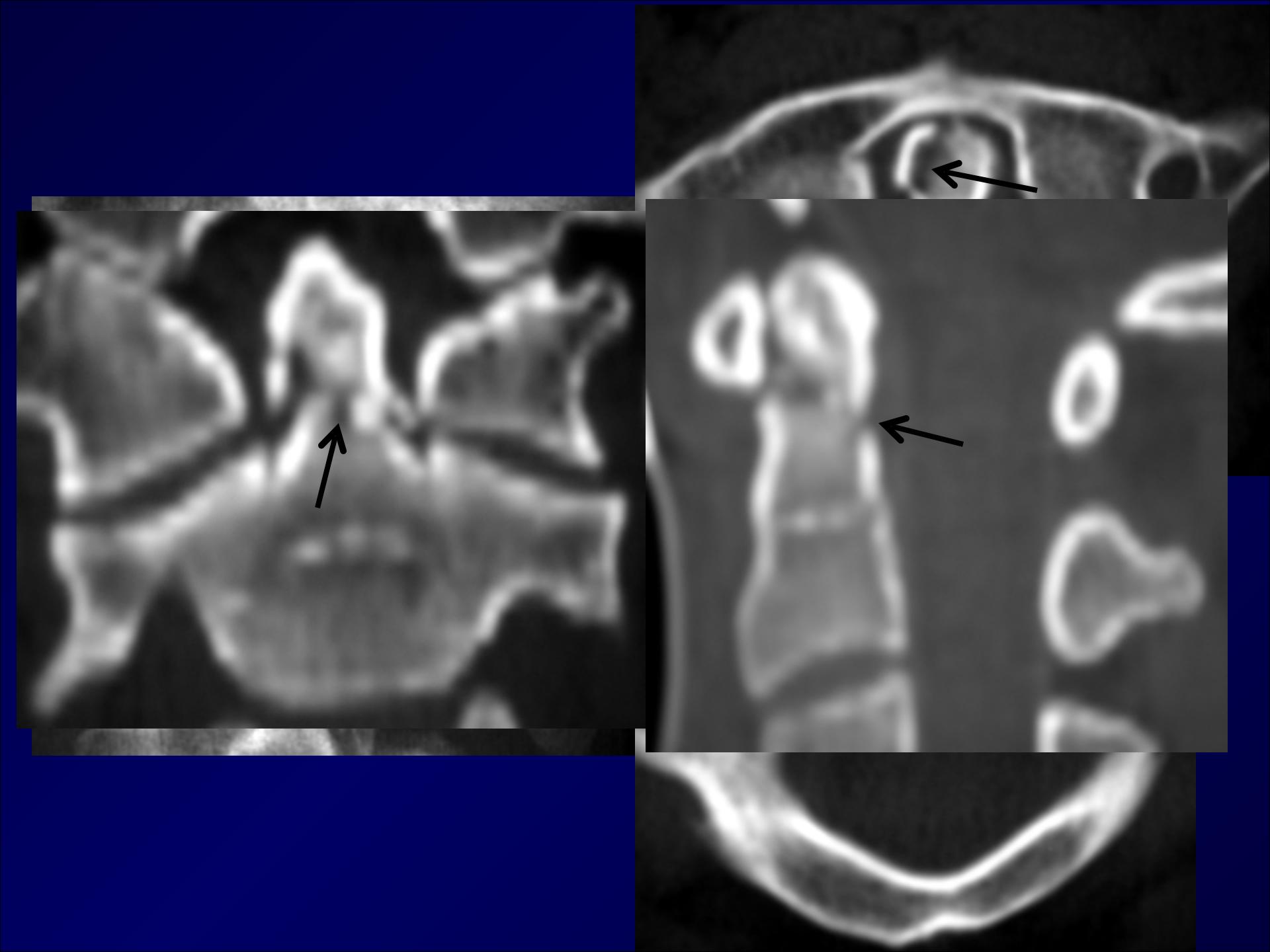




*Courtesy of Mann FA*

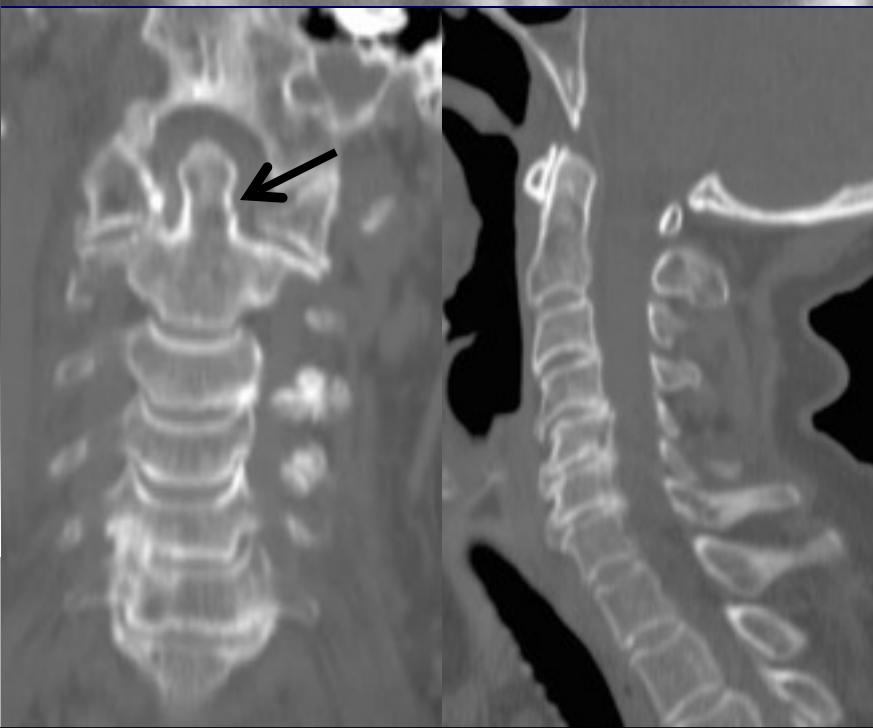
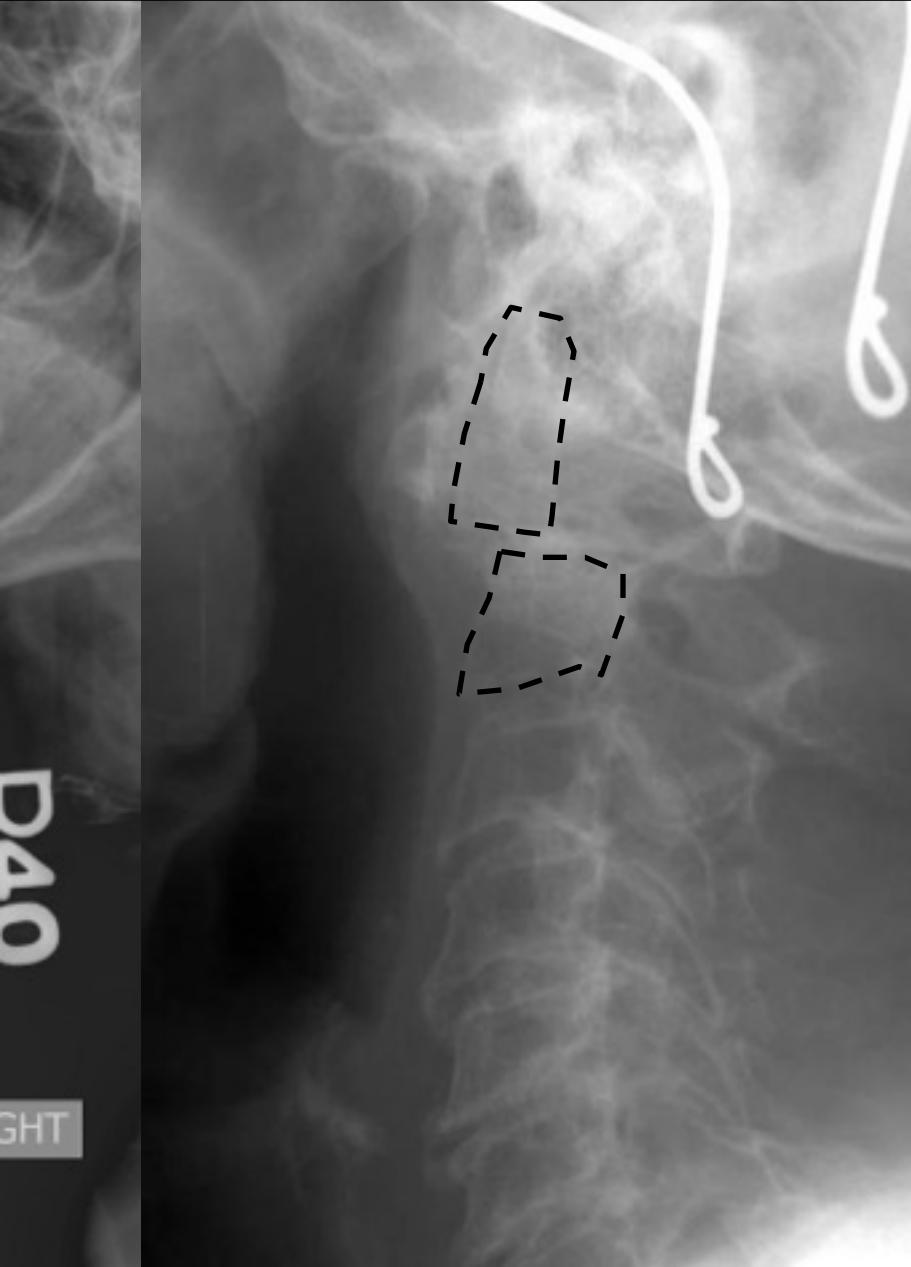


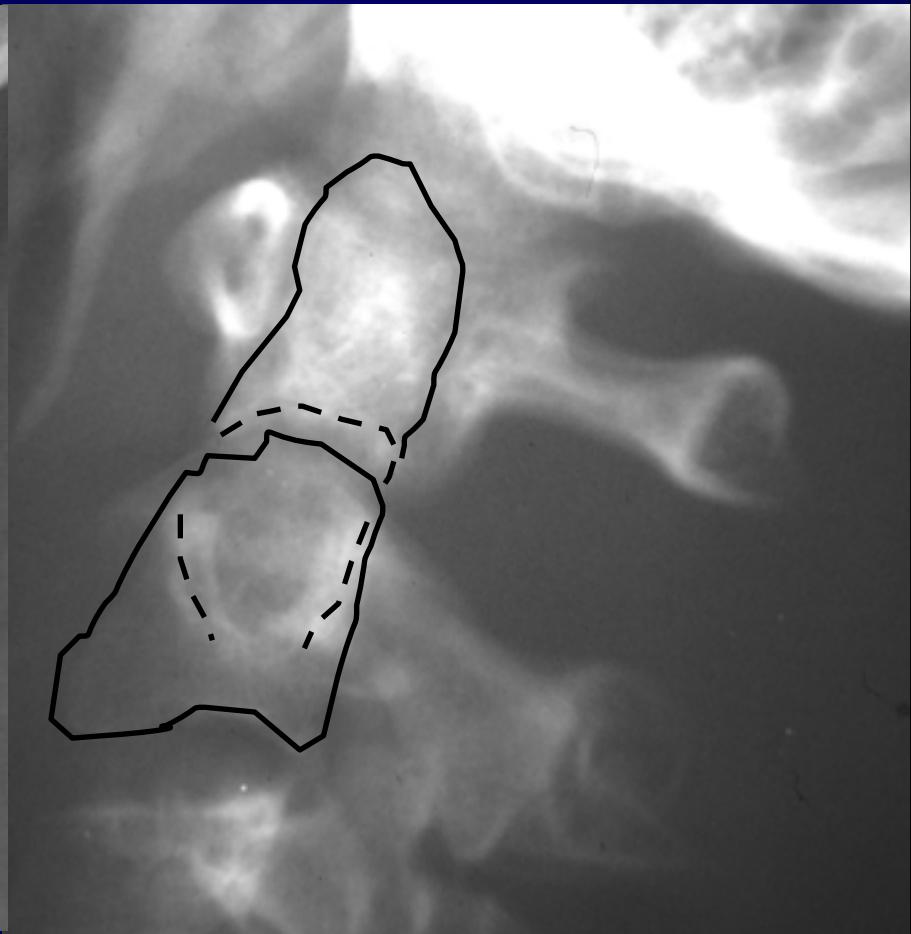
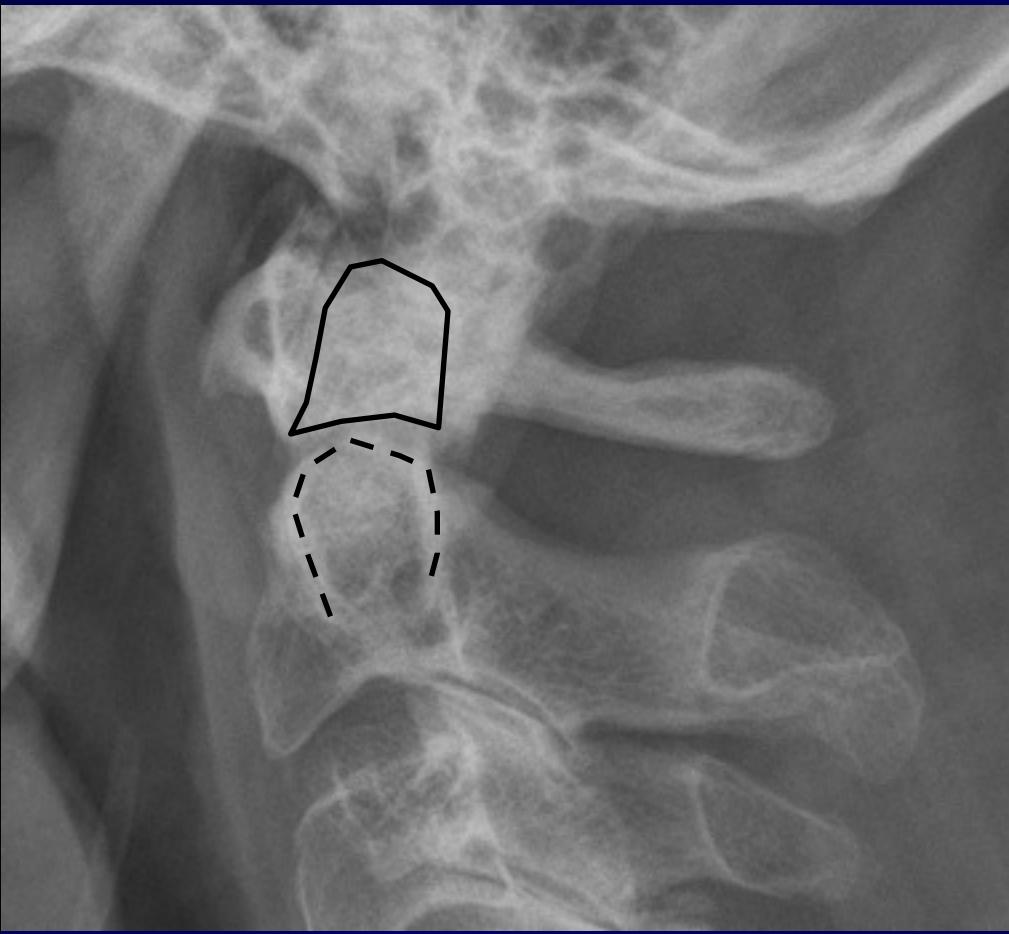


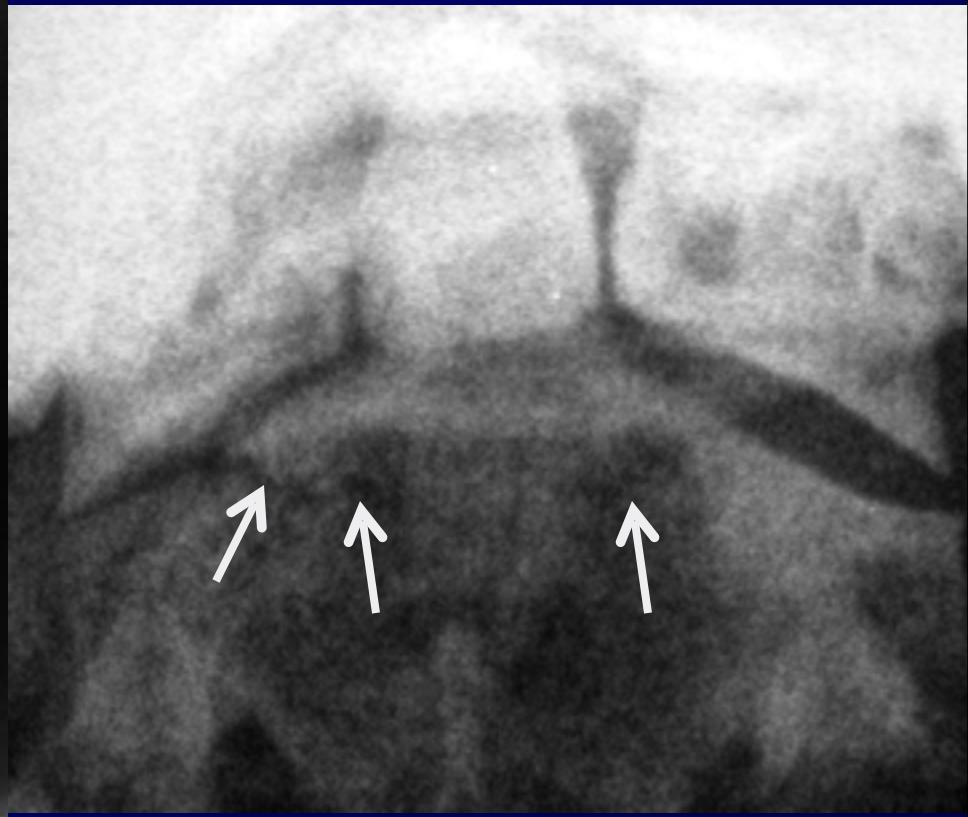
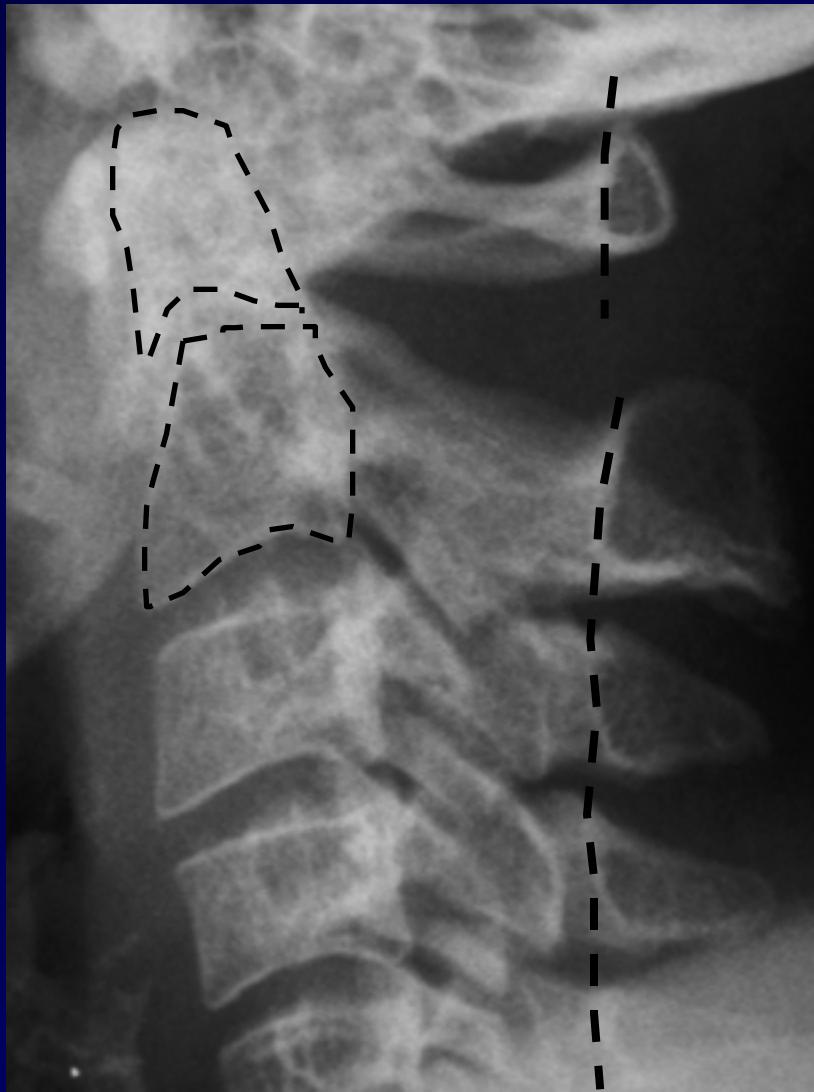


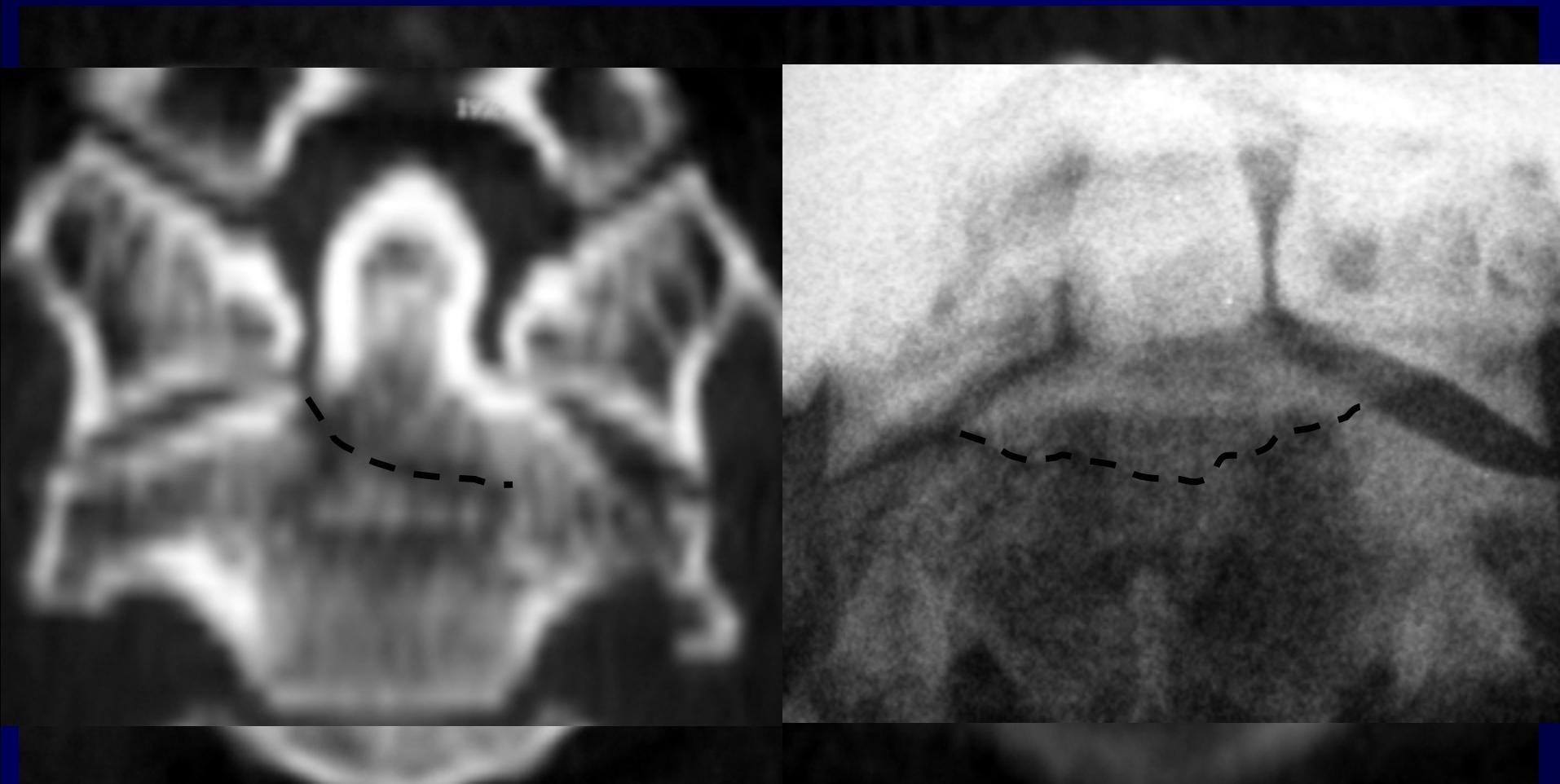
DAO

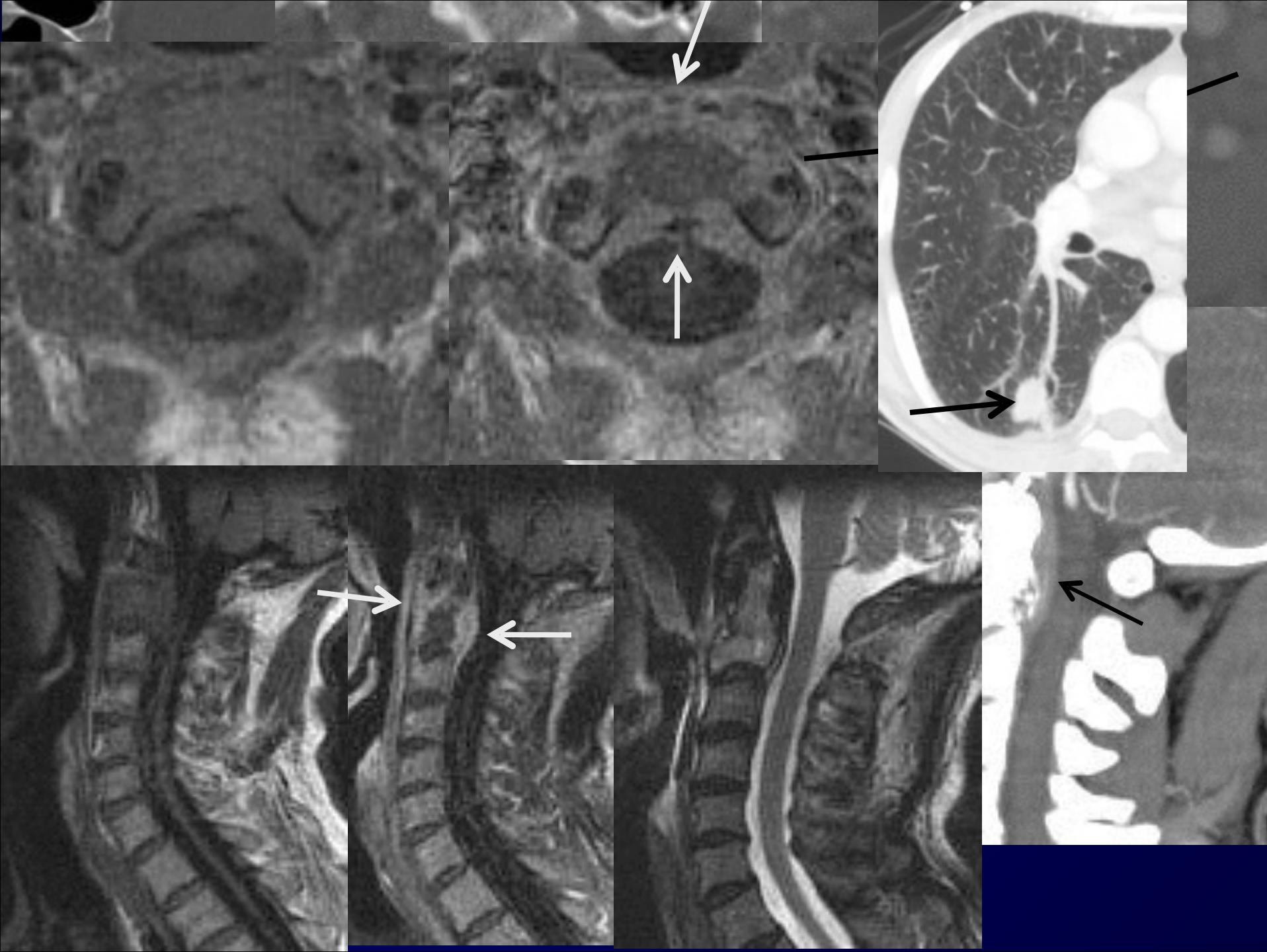
GHT







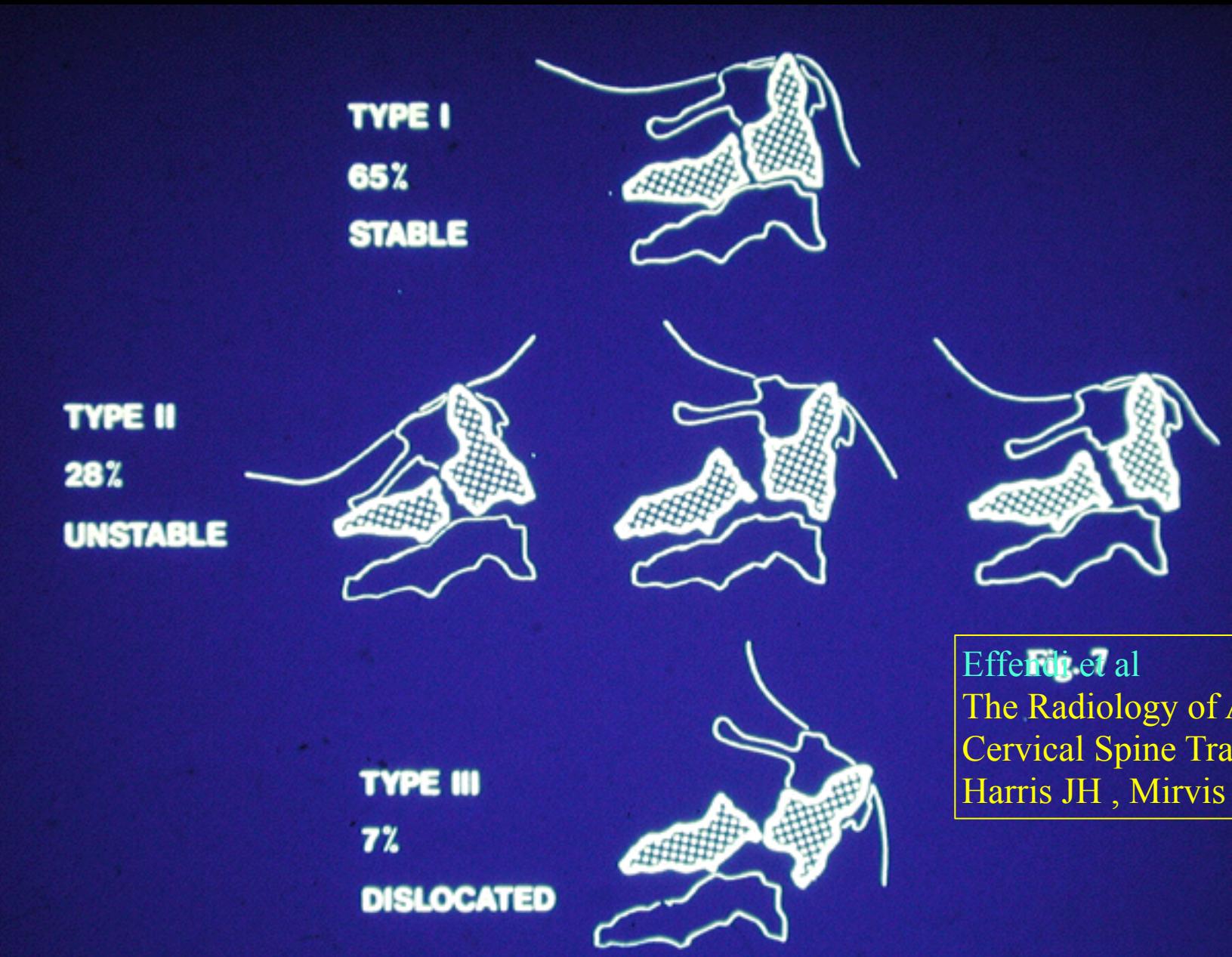




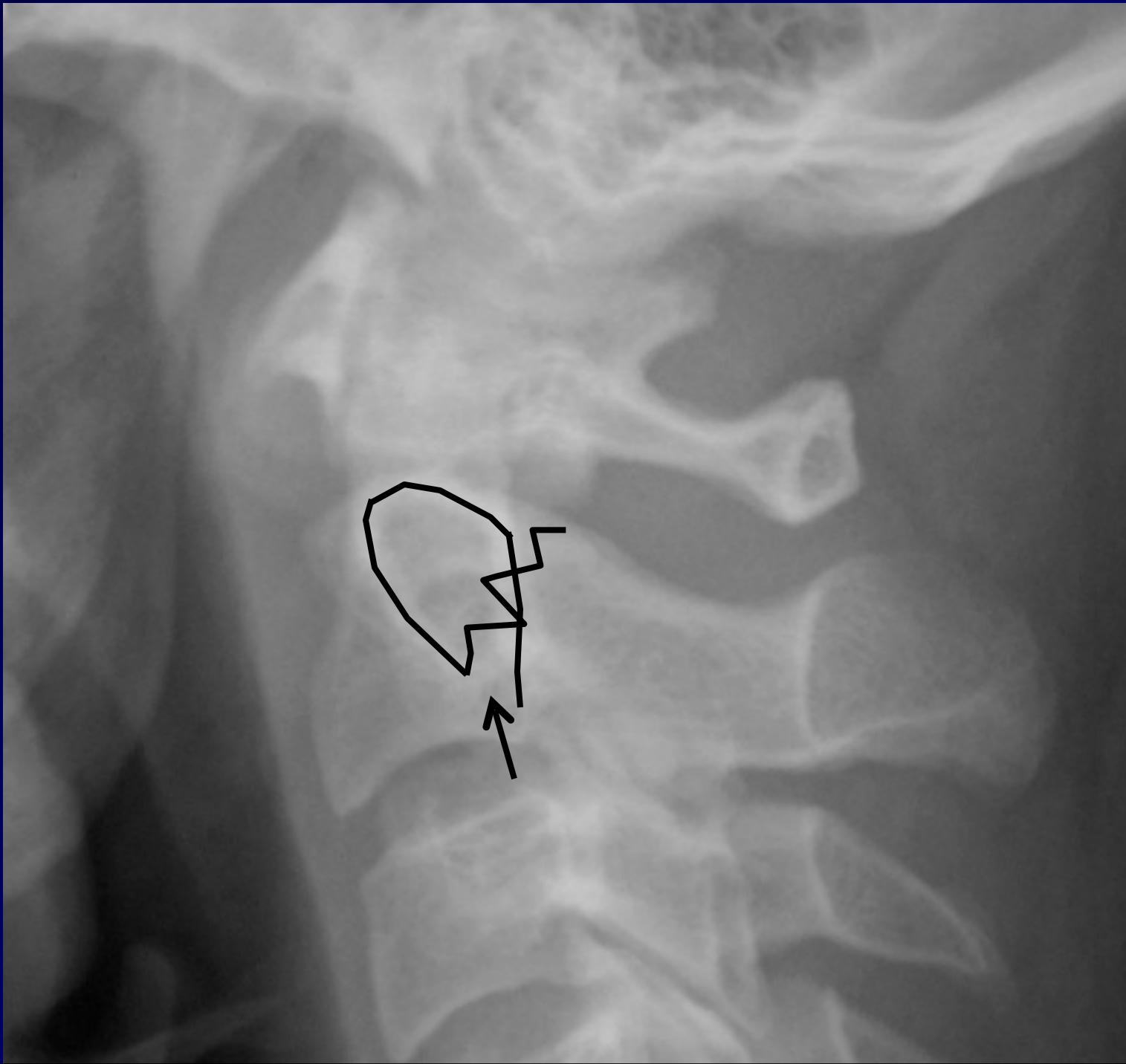
# TRAUMATIC SPONDYLOLISTHESIS

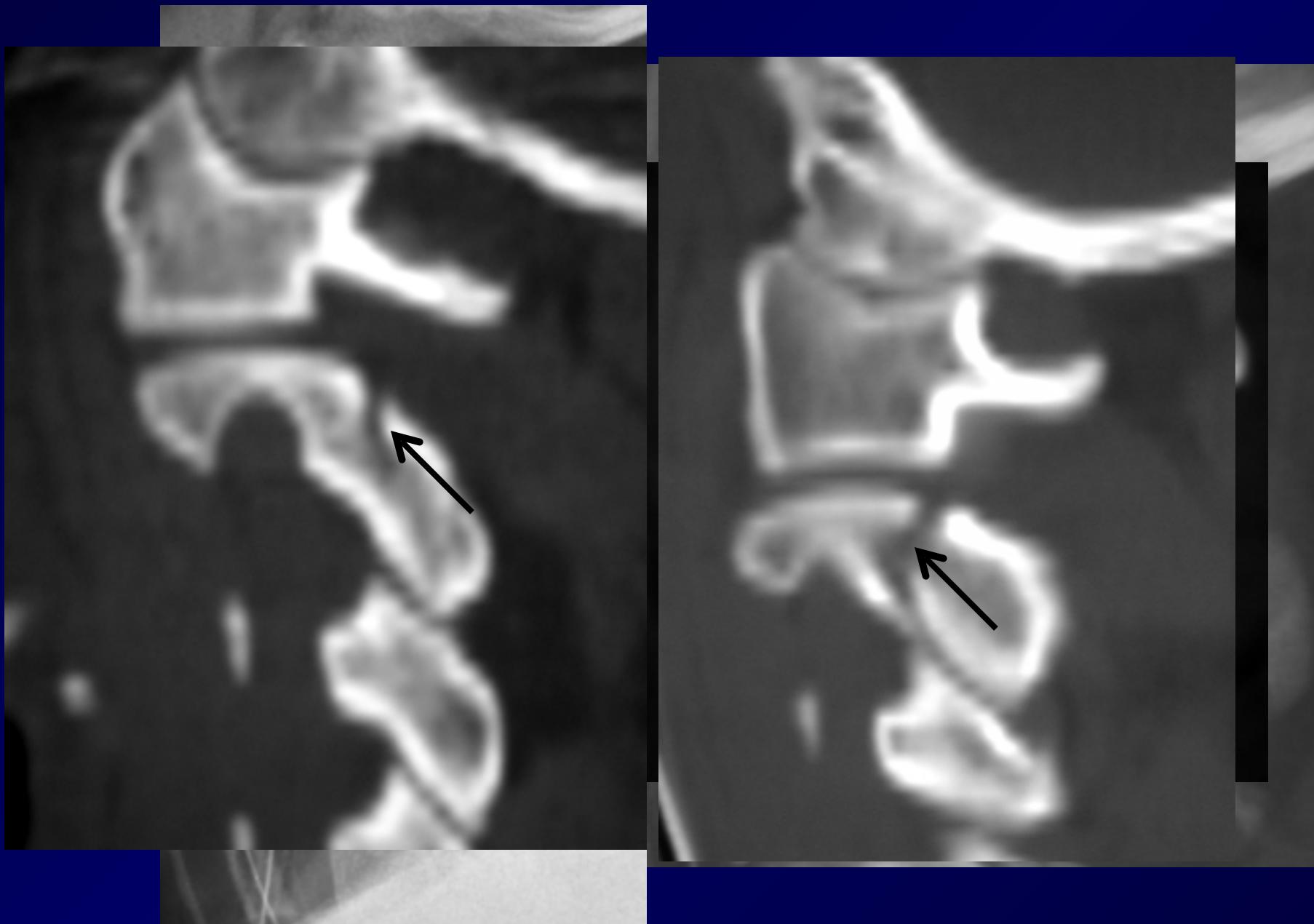
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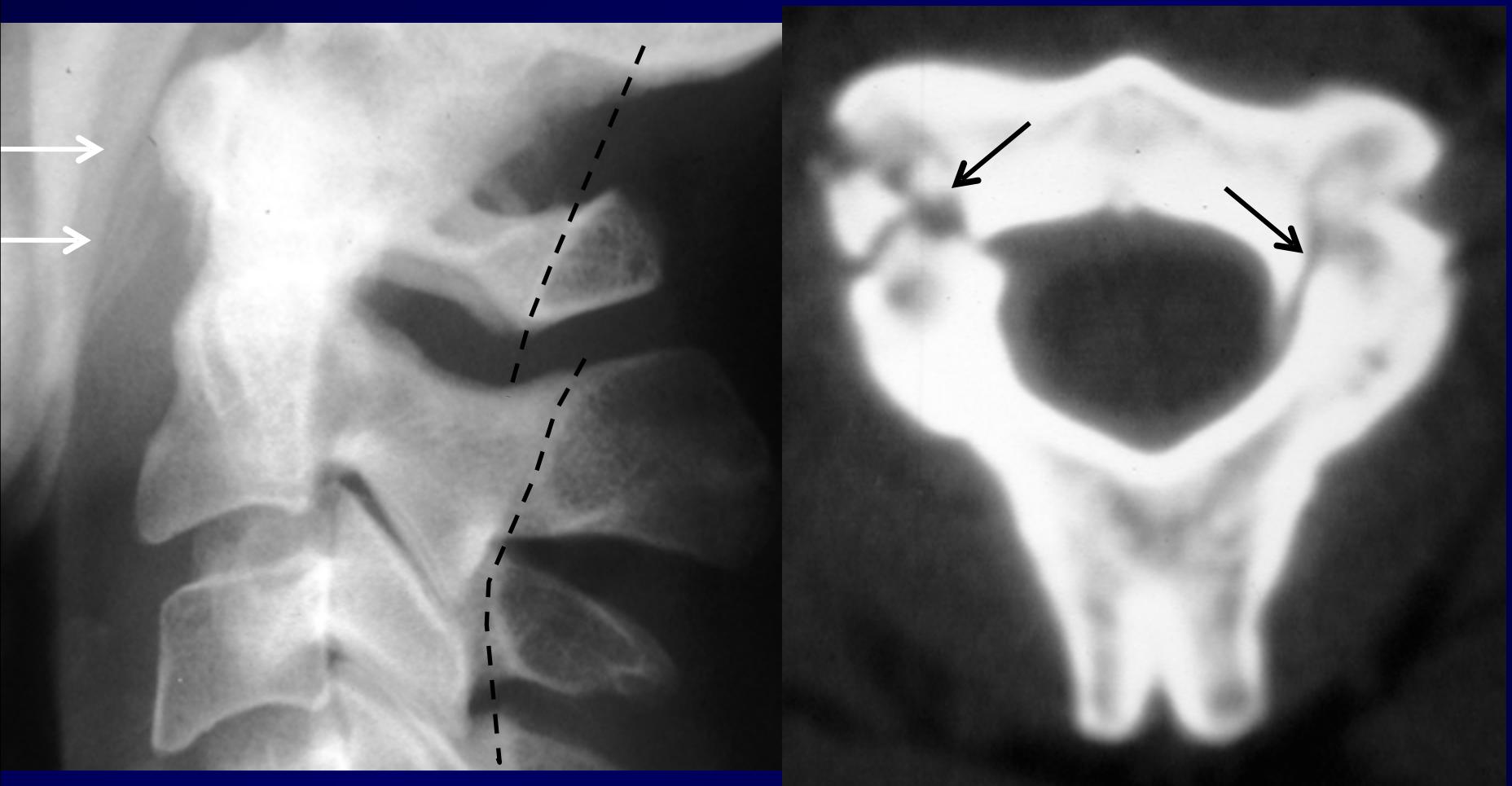
- Hyperextension & axial loading
- Pars interarticularis
- MVC

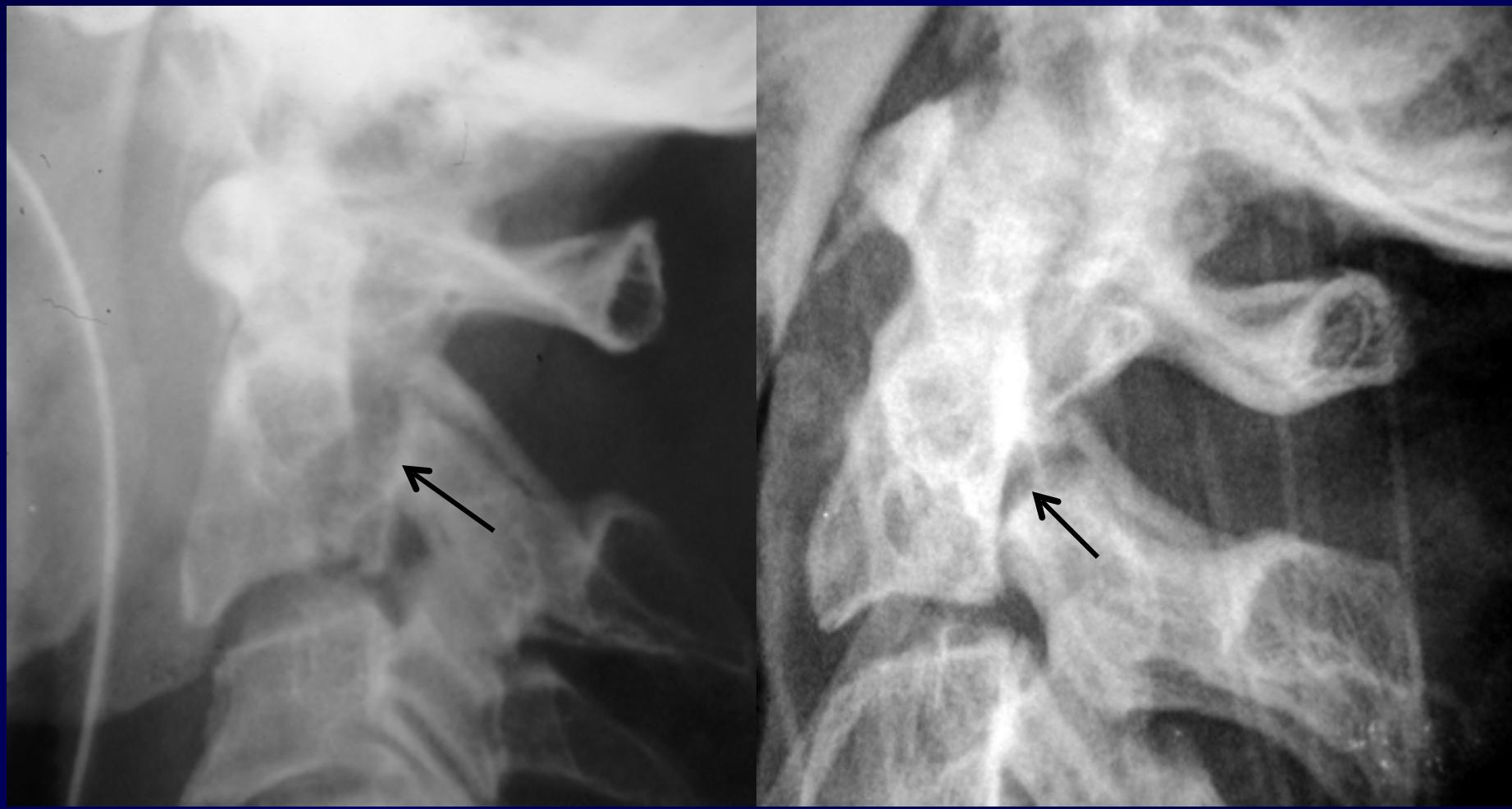


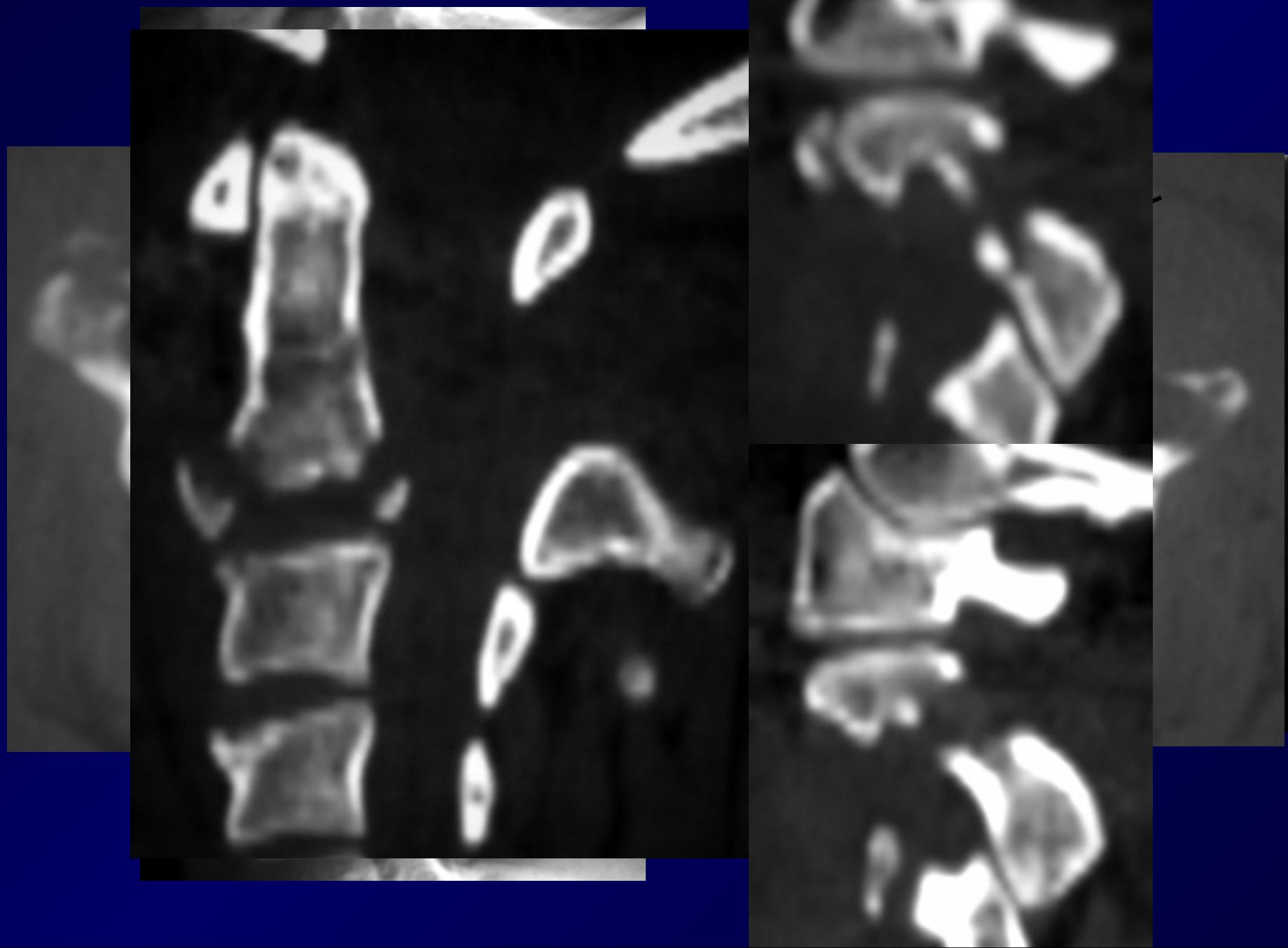
**Fig. 7**  
Effendi et al  
The Radiology of Acute  
Cervical Spine Trauma  
Harris JH , Mirvis SE

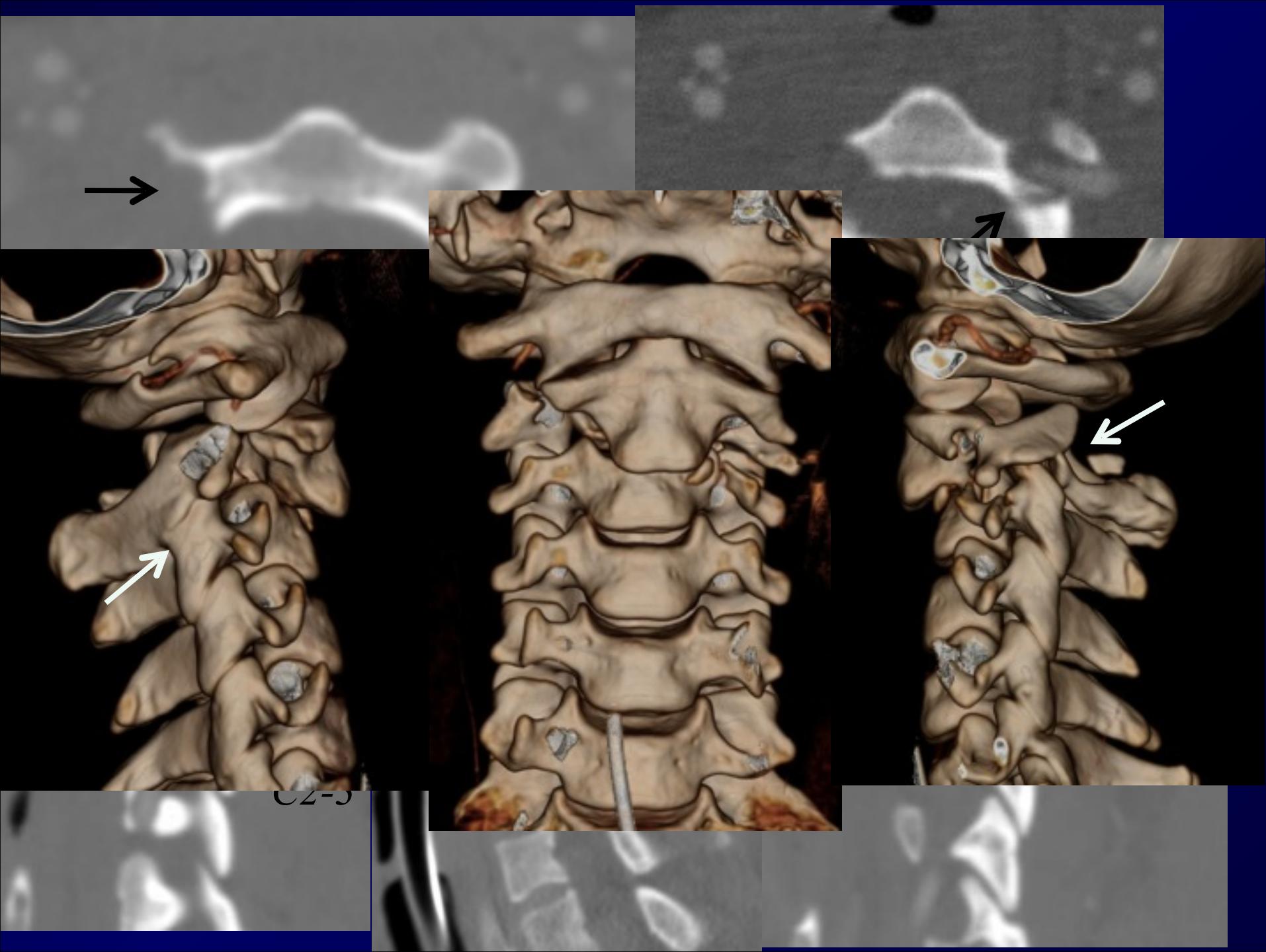










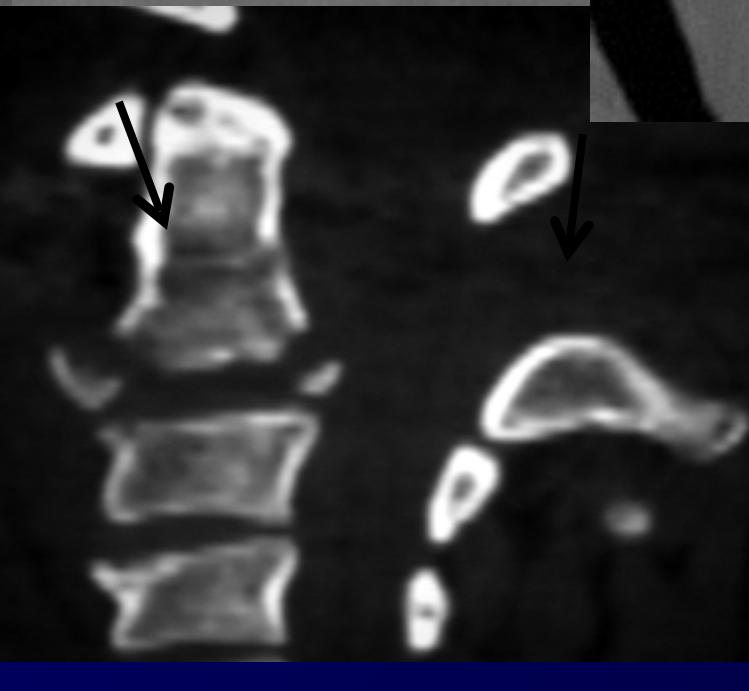
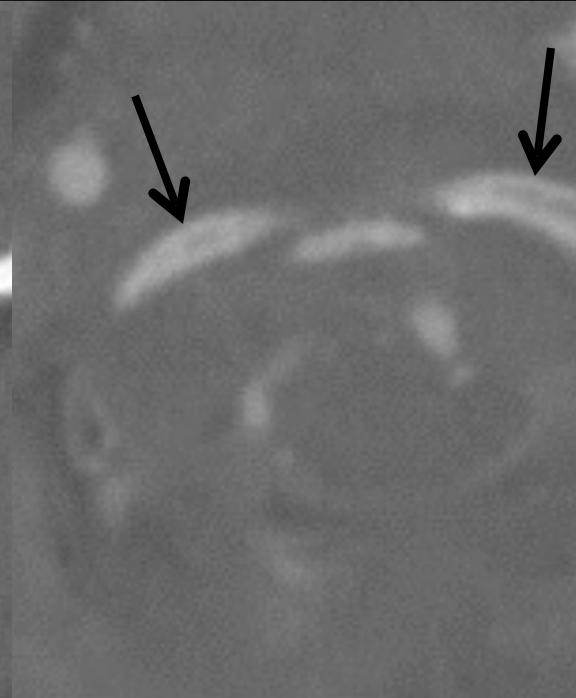




# ATLANTO-OCCIPITAL DISSOCIATION

# ATLANTO-OCCIPITAL DISSOCIATION

- Uncommon injury
- Three types – direction the skull displaces
  - Anterior, Posterior, Vertical
- Subtle – radiographs, CT, MRI



# ATLANTO-OCCIPITAL DISSOCIATION

- X- line method
- Powers ratio  $\geq 12 \text{ mm}$
- Basion-dental interval (BDI)

Basion-axial interval (BAI)

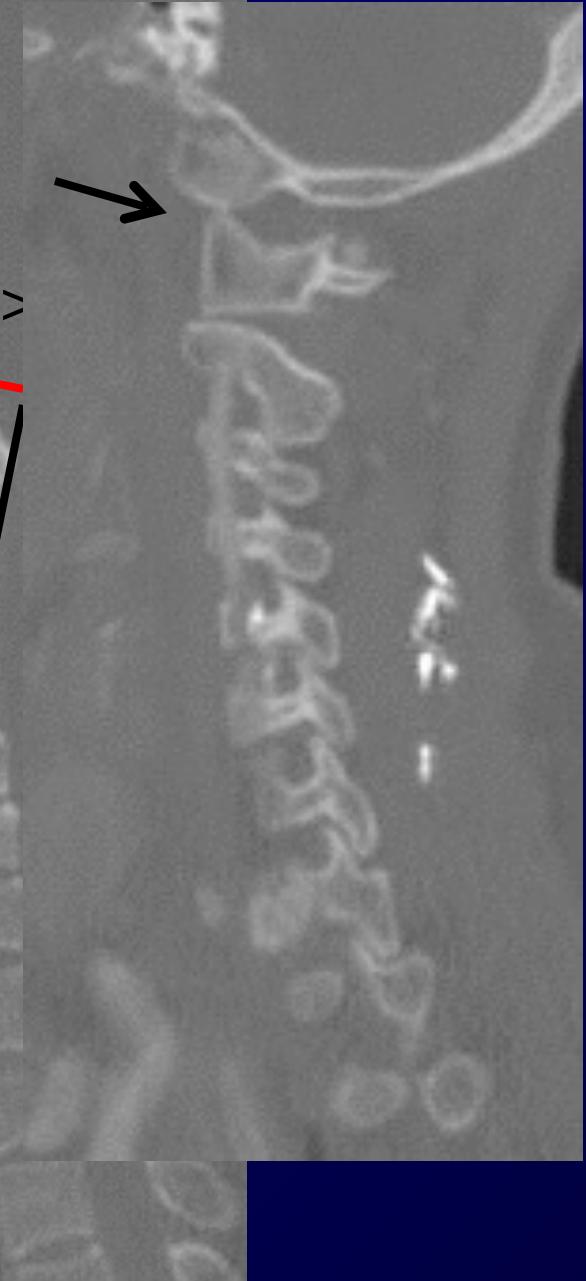


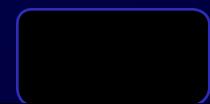
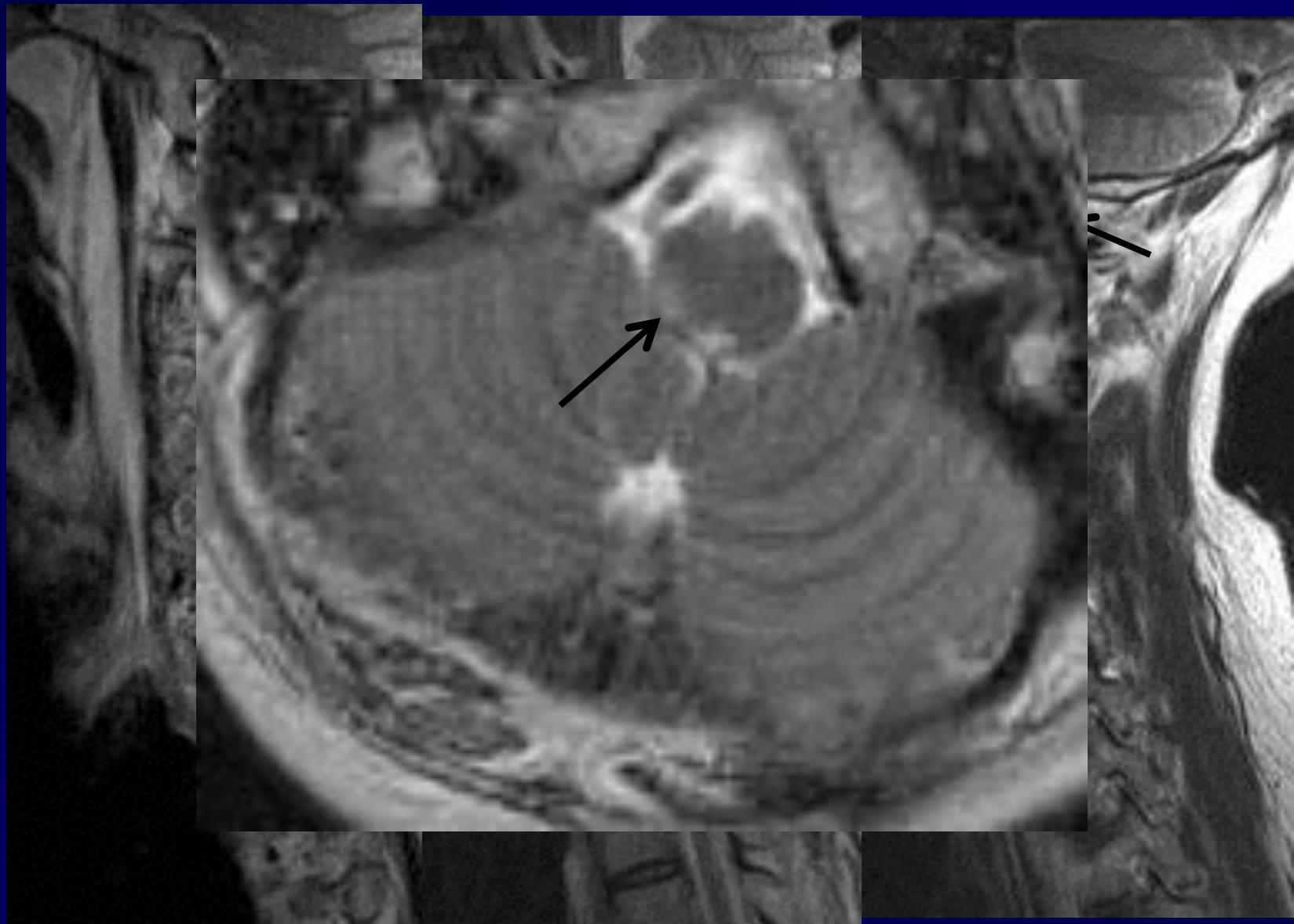
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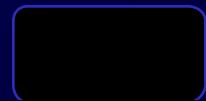
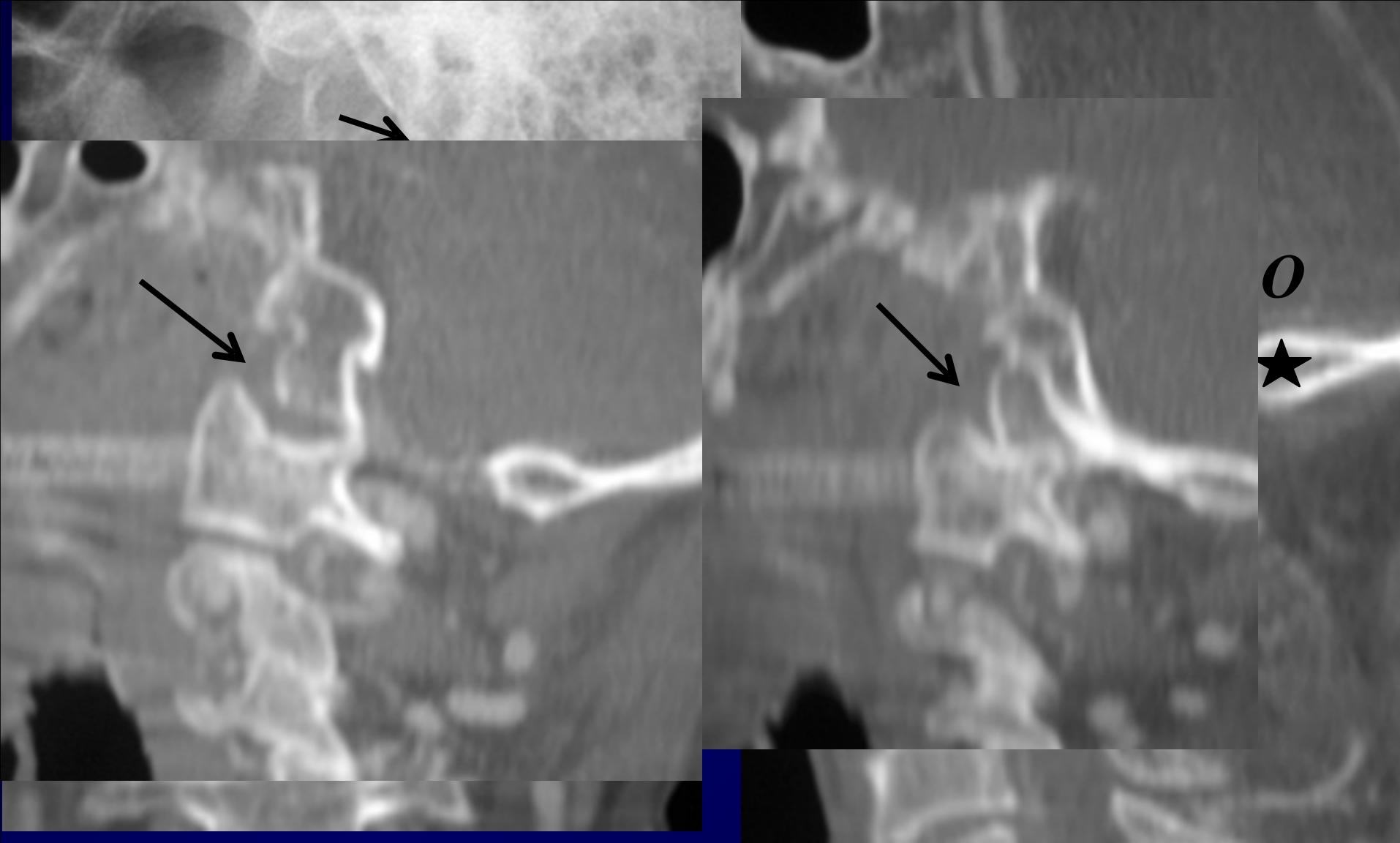
TABLE I: Name and definition of the measurements

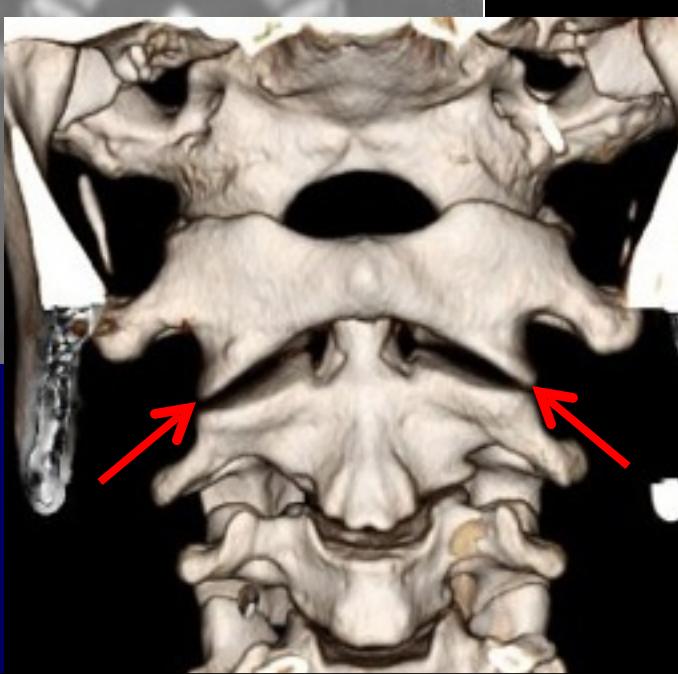
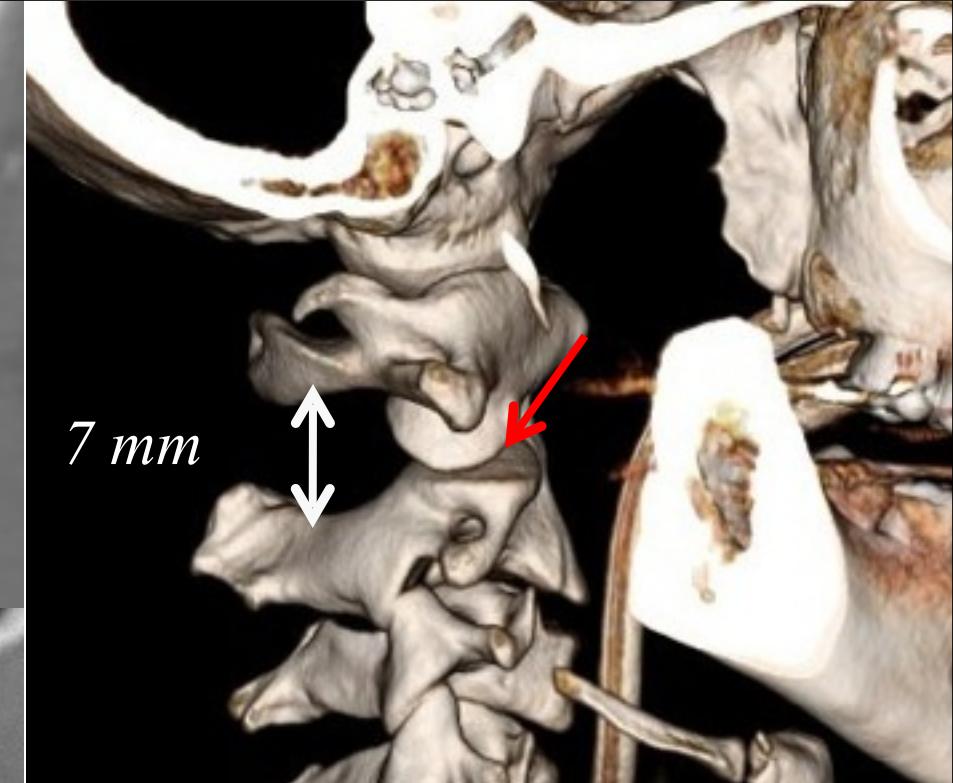
Measurement	Radiograph	MDCT
Midline occiput-C1 spine interval	Distance from the posterior surface of the occiput to the midpoint of the posterior surface of the C1 spine measured on the midline sagittal MPR [4]	Distance from the posterior surface of the occiput to the midpoint of the posterior surface of the C1 spine measured on the midline sagittal MPR [4]
Basion-dens interval	Distance from the basion to the midpoint of the posterior surface of the dens measured on a midline sagittal MPR [5]	Distance from the basion to the midpoint of the posterior surface of the dens measured on a midline sagittal MPR [5]
Condylar displacement	Distance between the articular surfaces of the lateral and fossa of the atlas measured on the sagittal MPR [6]	Distance between the articular surfaces of the lateral and fossa of the atlas measured on the sagittal MPR [6]
Midline C1-C2 spinolateral interval	Distance from the posterior surface of the C1 spine to the top of the arch of C2 measured on the midline sagittal MPR [7]	Distance from the posterior surface of the C1 spine to the top of the arch of C2 measured on the midline sagittal MPR [7]
Measurement	Radiograph	MDCT
Atlantodens interval	BDI	9.5 mm
V-sign	BAI/PAL	5.4 mm
Vertical atlantodens distance	Condylar sum	6.2 mm
Posterior axial line	Length of a perpendicular line drawn from the basion to a line tangential to the posterior cortical surface of the axis [5]	
C1-C2 distraction	Qualitative evaluation of the distance between the atlas and the axis in the coronal MPR plane at the level of the root of the transverse process	
Soft-tissue edema (mid C1)	Thickness in millimeters of the soft tissues anterior to the C2 vertebral body in the midline sagittal projection	

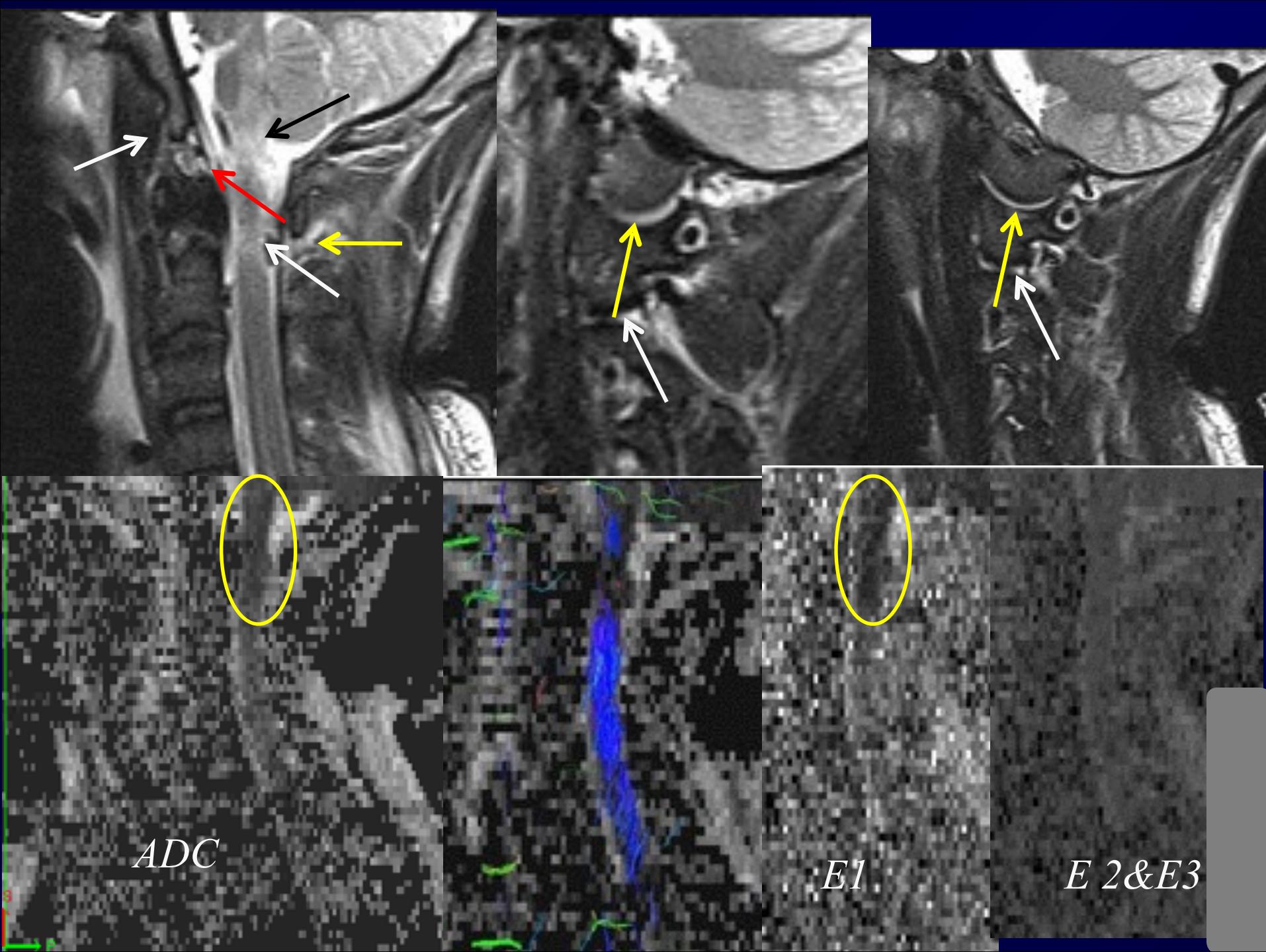
Note—MPR = multiplanar reformation.











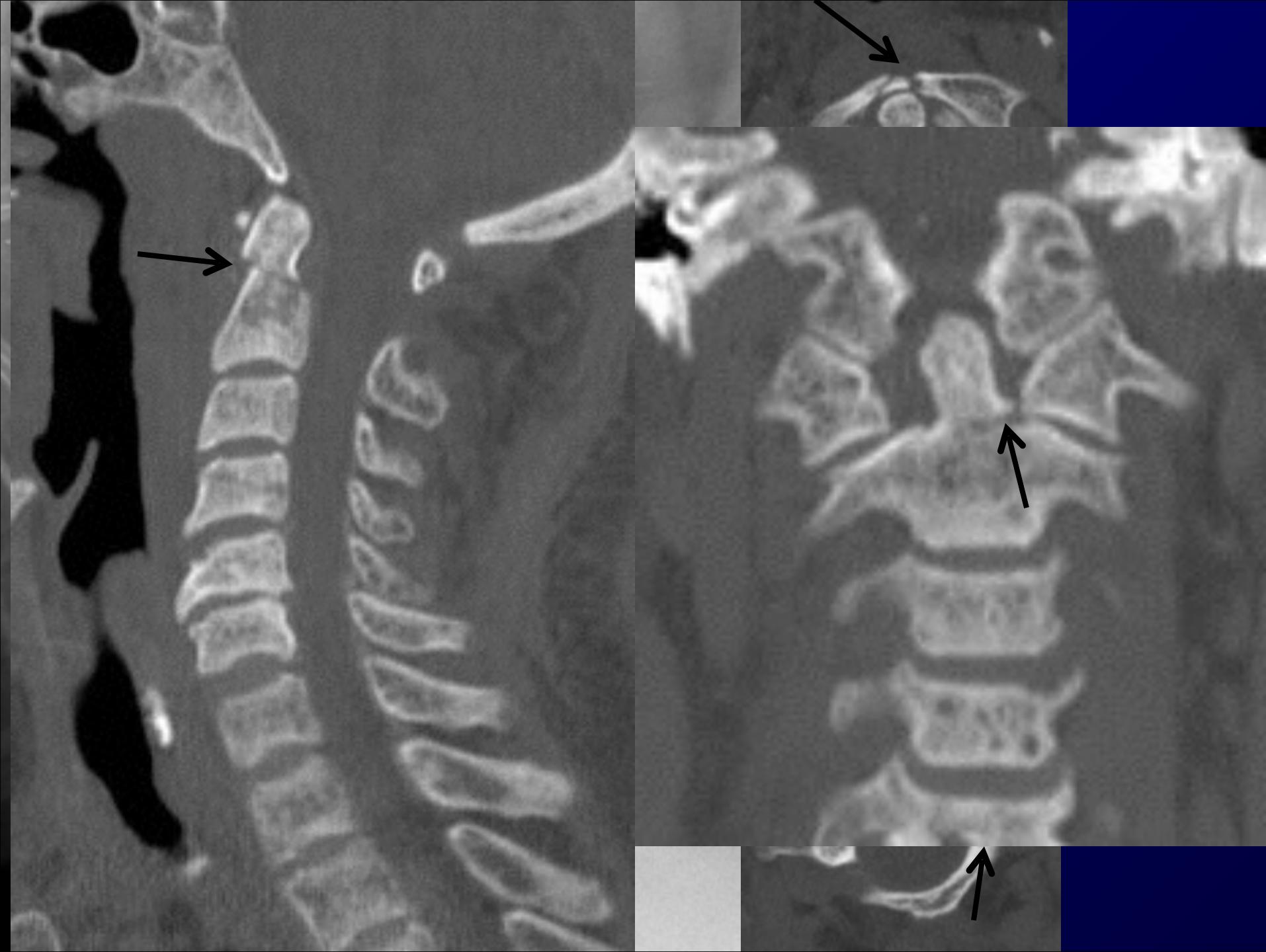


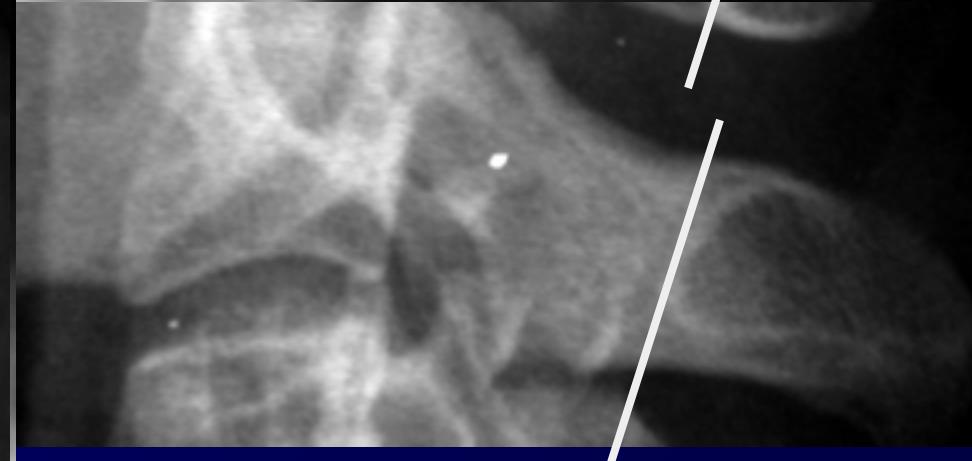
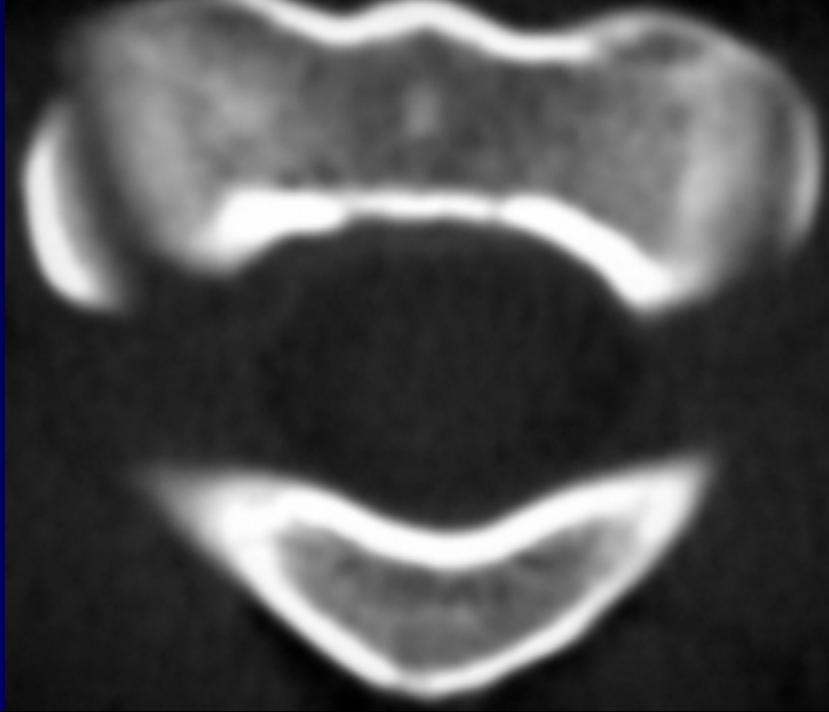
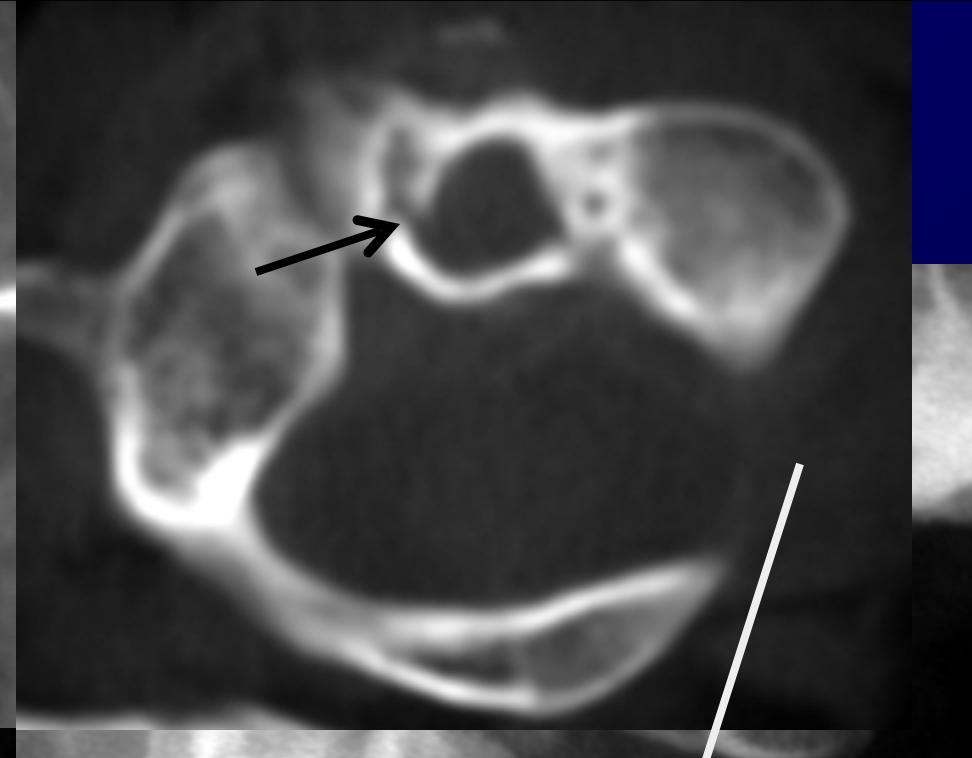
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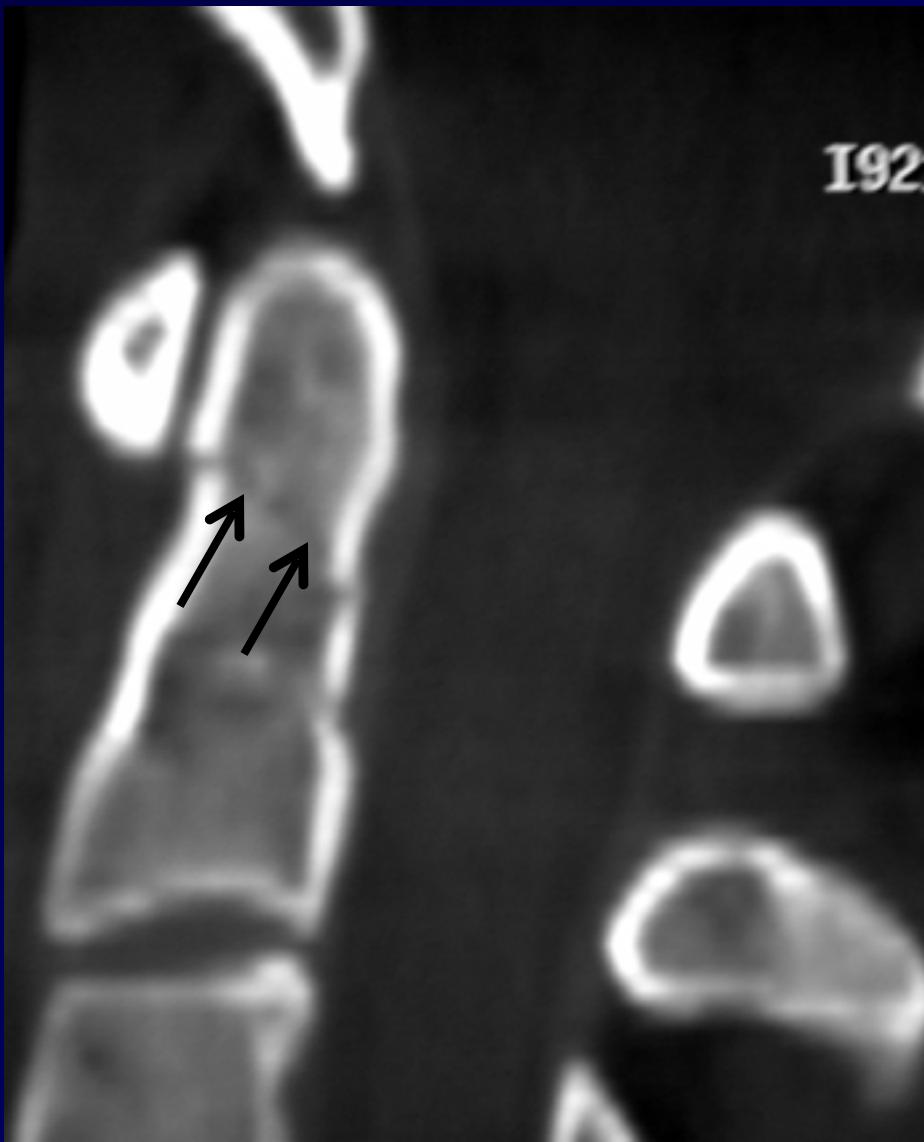
- X- line method
- Powers ratio  $\geq 12 \text{ mm}$
- Basion-dental interval (BDI)

Basion-axial interval (BAI)

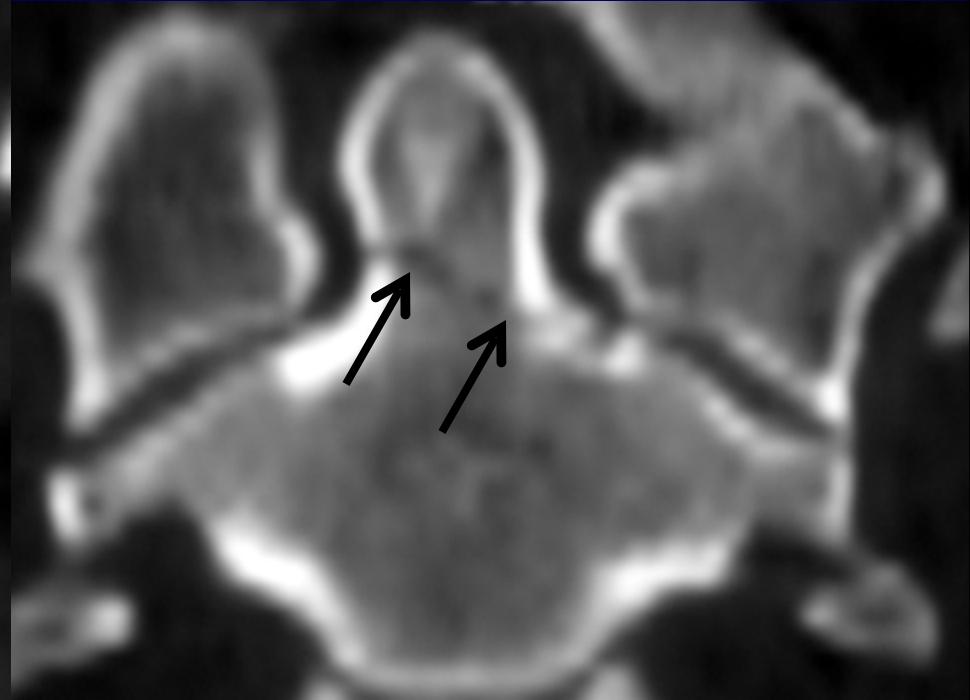


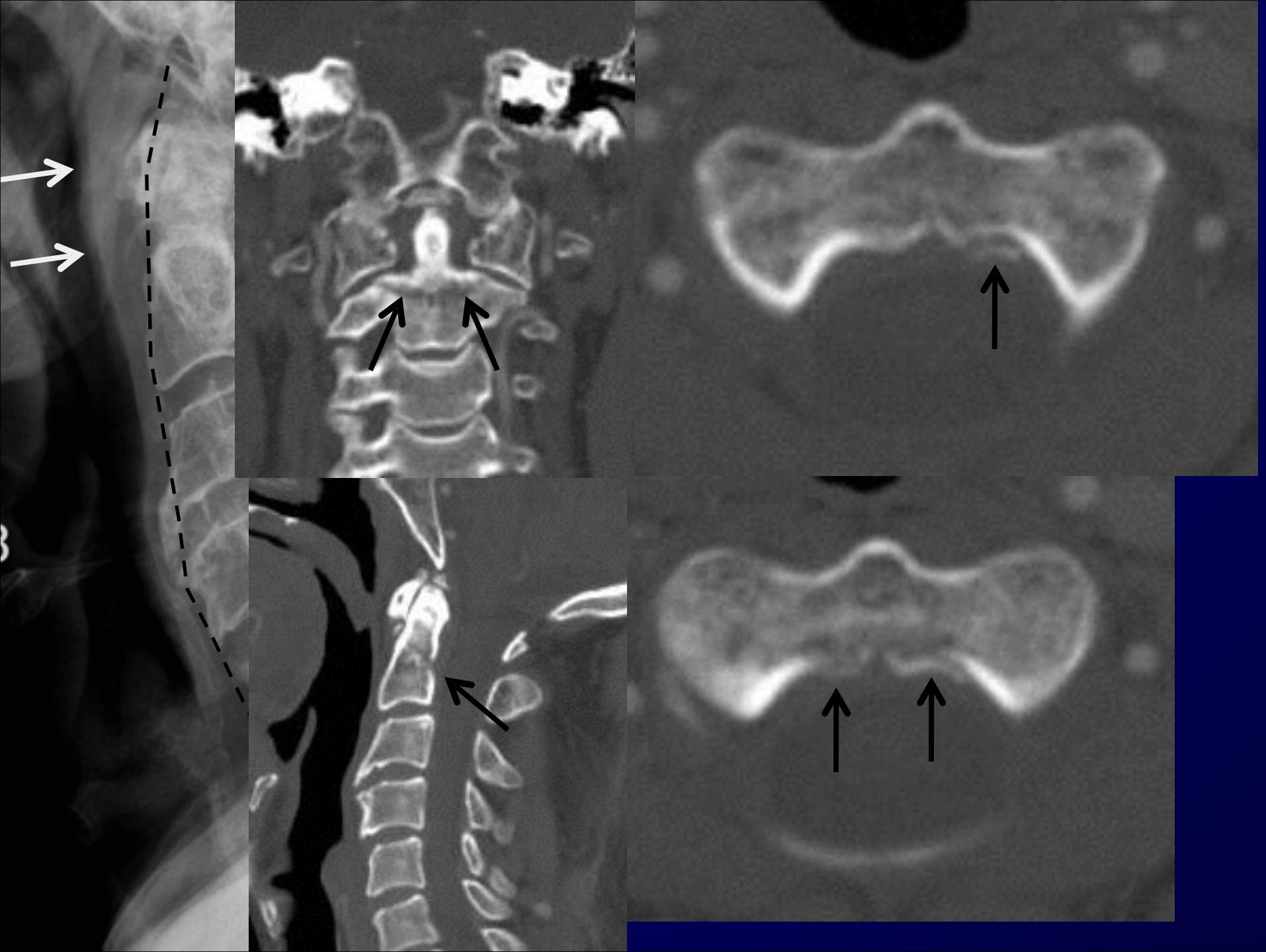






1921





# ATLANTO-OCCIPITAL DISSOCIATION

- X- line method
- Powers ratio     $BC / OA \leq 1$
- Basion-dental interval (BDI)

Basion-axial interval (BAI)

