

Cervical Total Disc Replacement Common Pitfalls

COA Annual Meeting
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Disclosures

Fellowship support: AOA, AOSpine, Nuvasive
Consultant: Nuvasive, Cerapedics

Cervical disc arthroplasty is approved in the U.S. for one and two level use from C3-C7

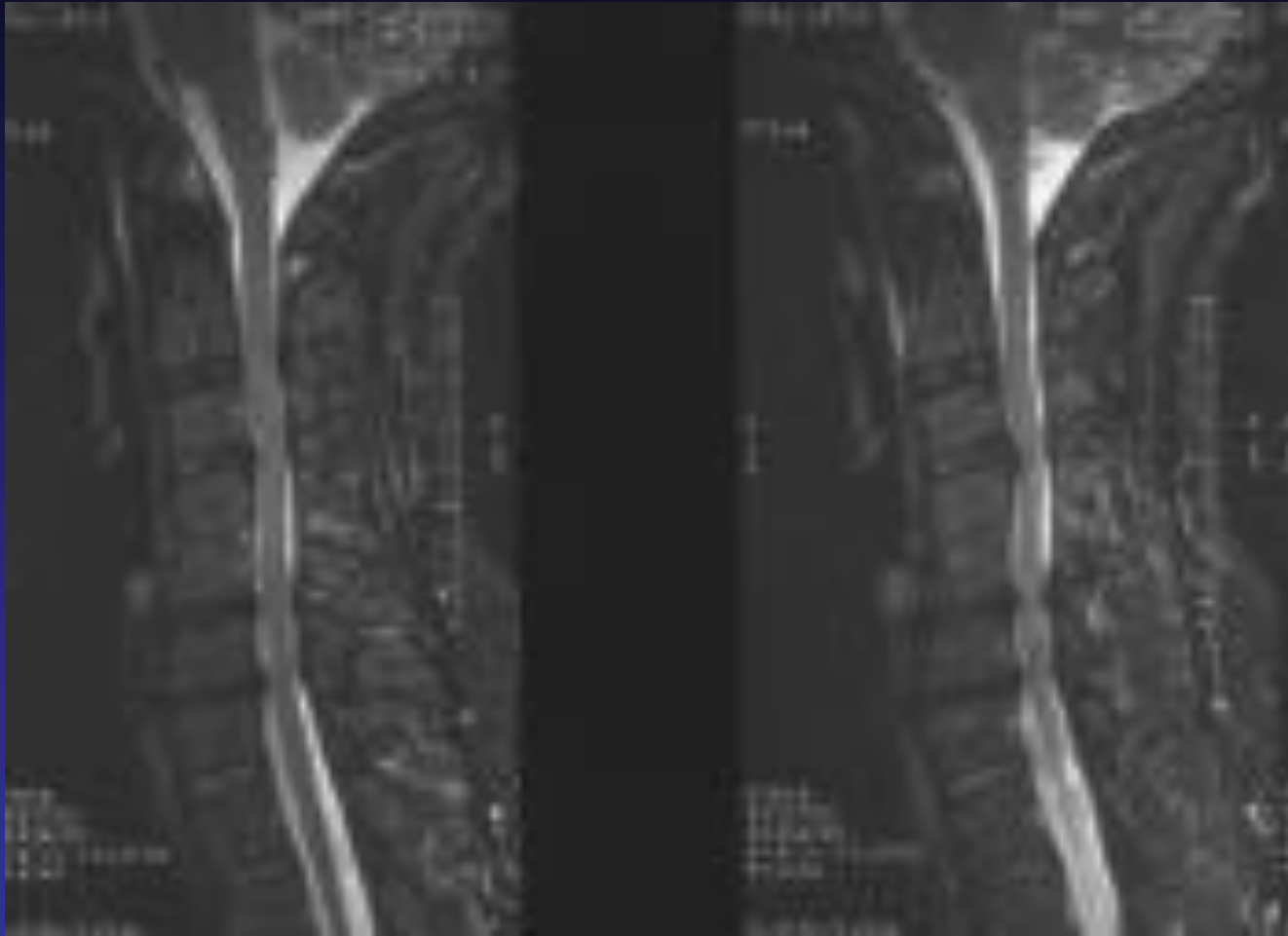


41-year-old reports two years of worsening neck and right shoulder complaints. The patient also complains of right intermittent pain and numbness in the C7 distribution.



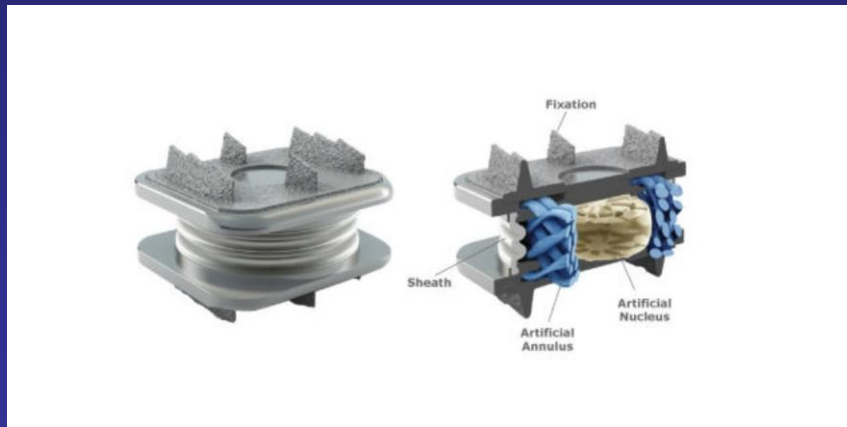
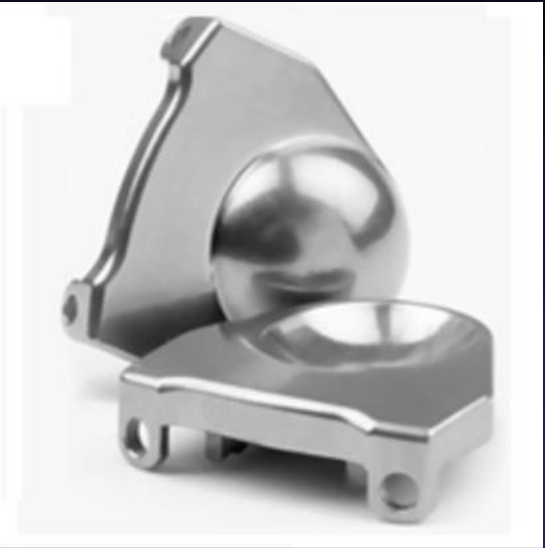


50 y.o neck and bilateral arm pain

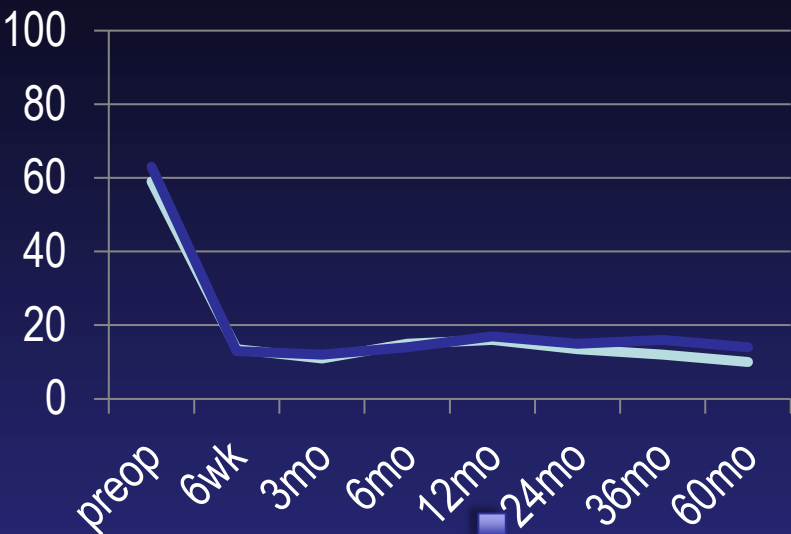




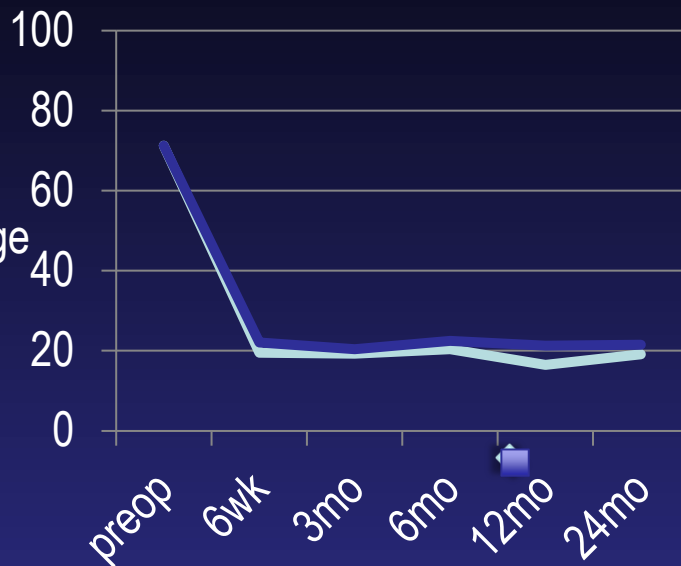




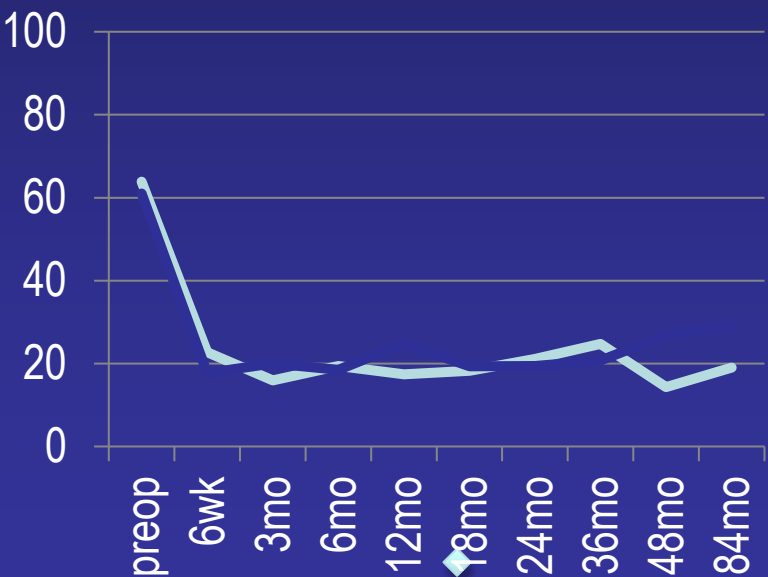
RCT VAS Arm Pain



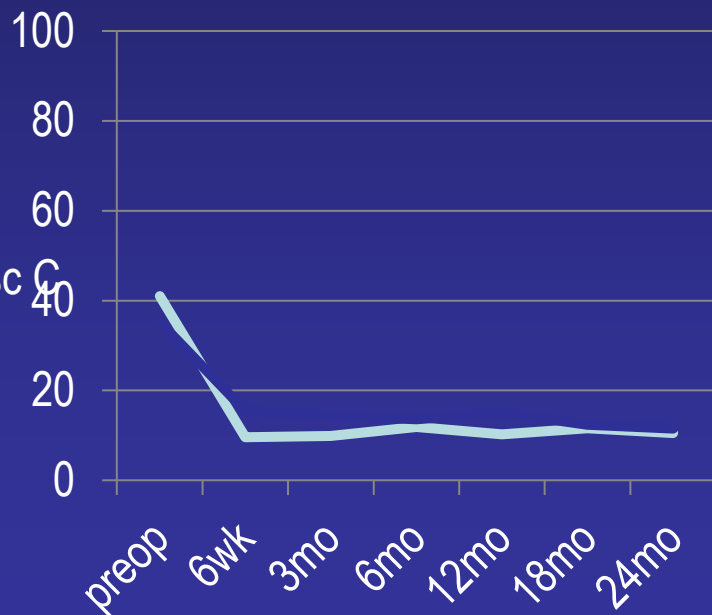
◆ prestige
■ ACDF



◆ Bryan
■ ACDF

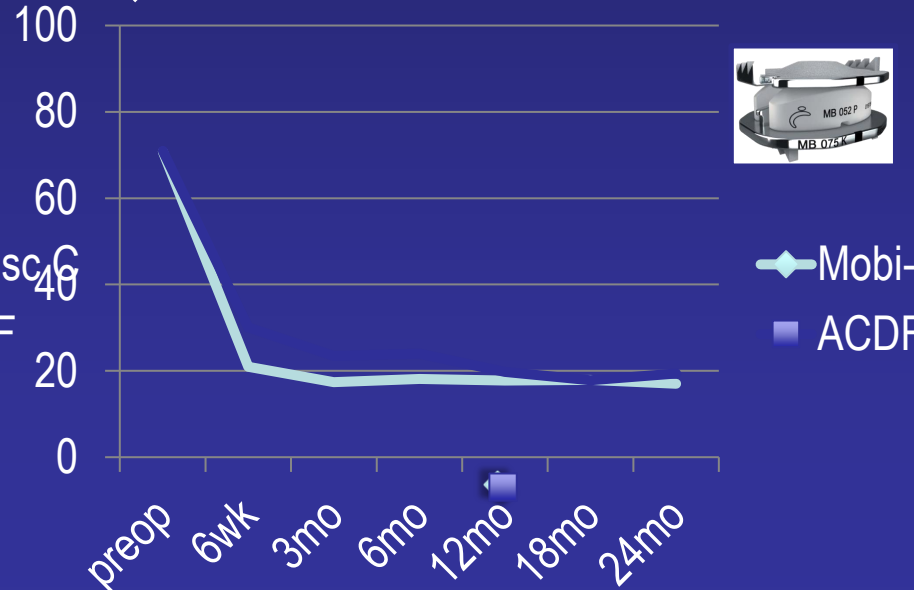
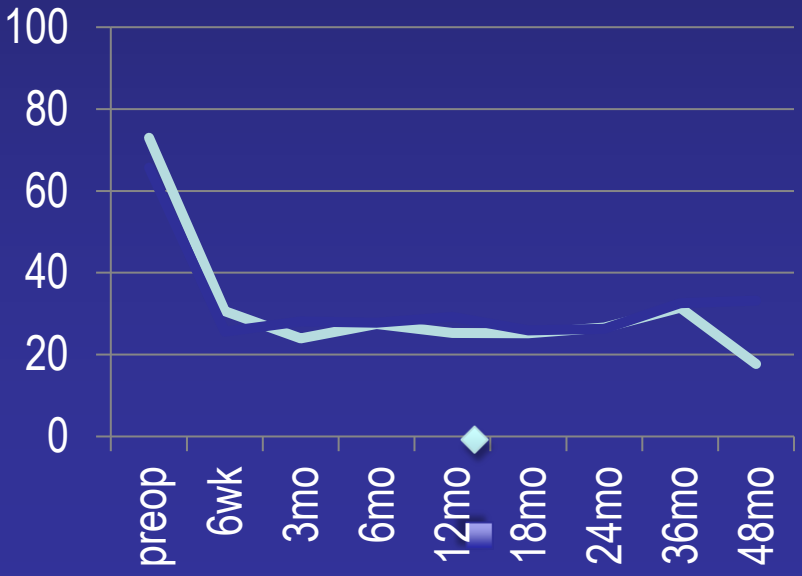
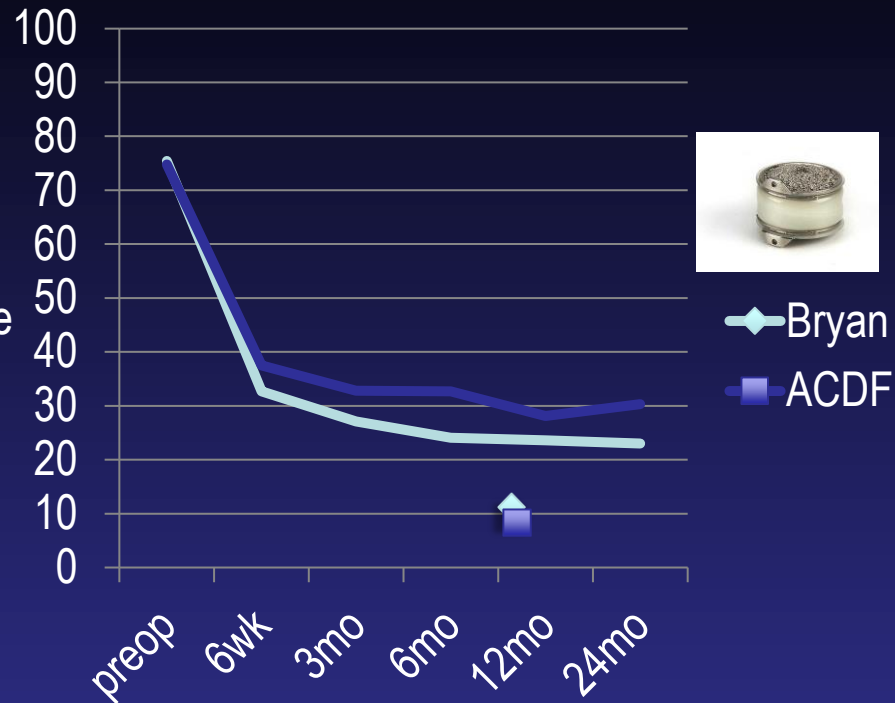
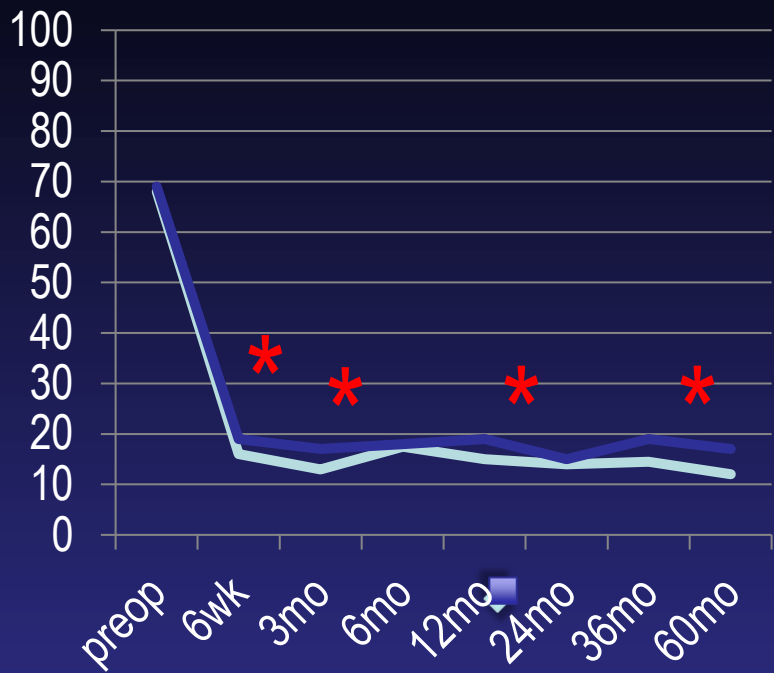


◆ prodisc C
■ ACDF

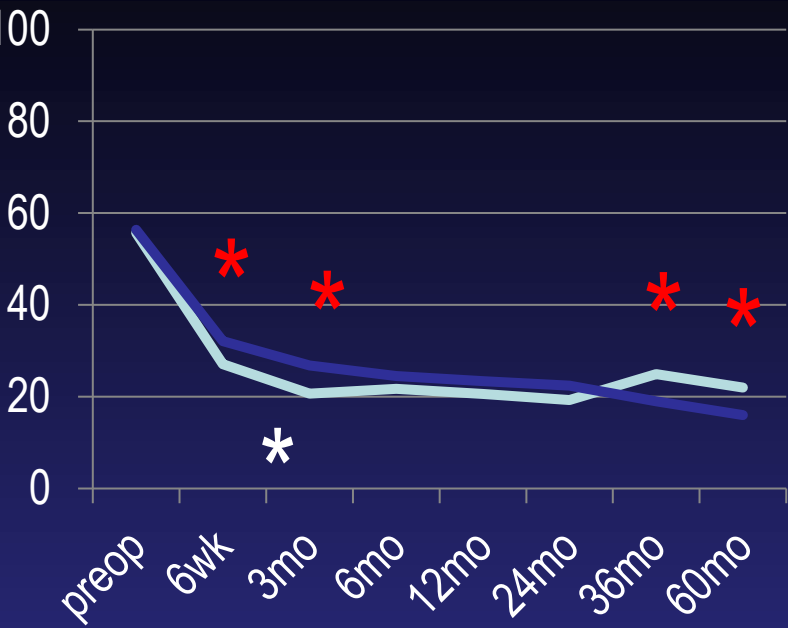


◆ Mobi-C
■ ACDF

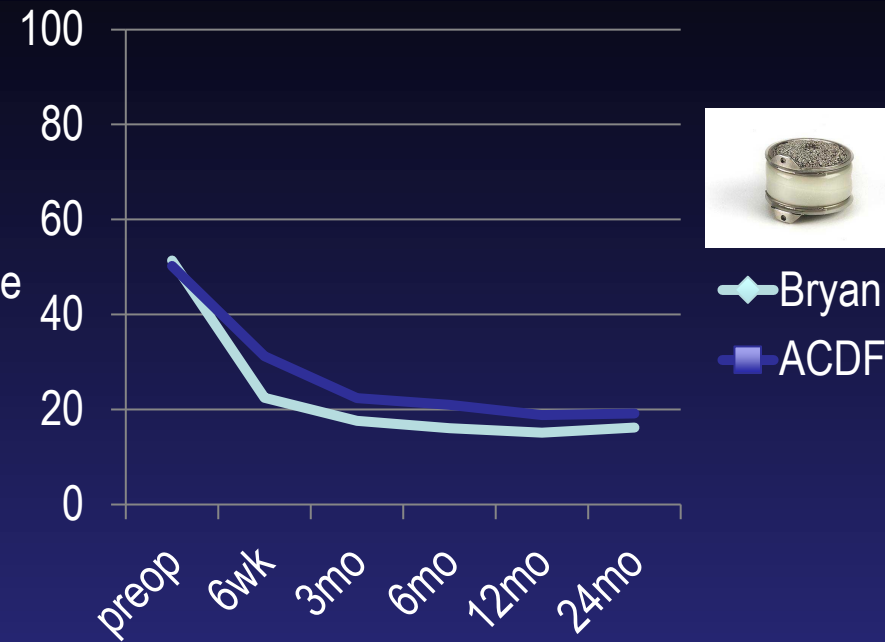
CTDR RCT VAS Neck Pain



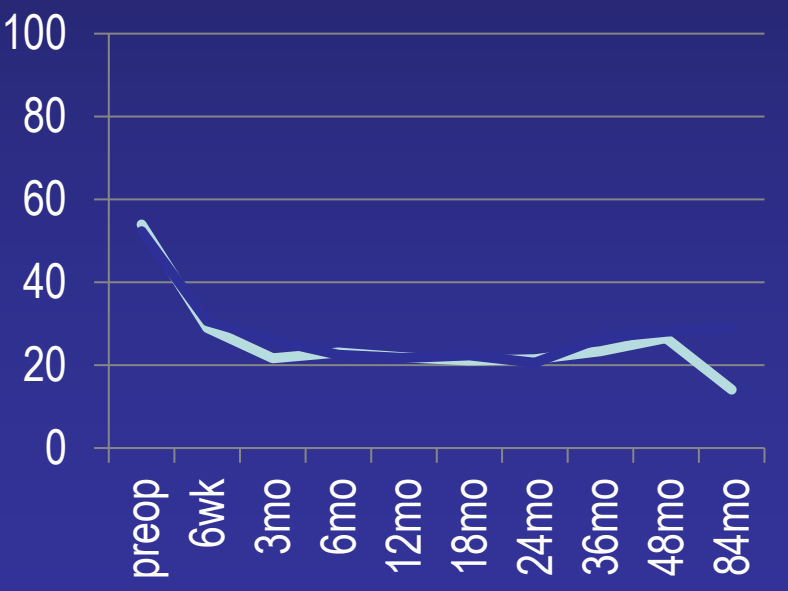
Cervical TDR RCT NDI



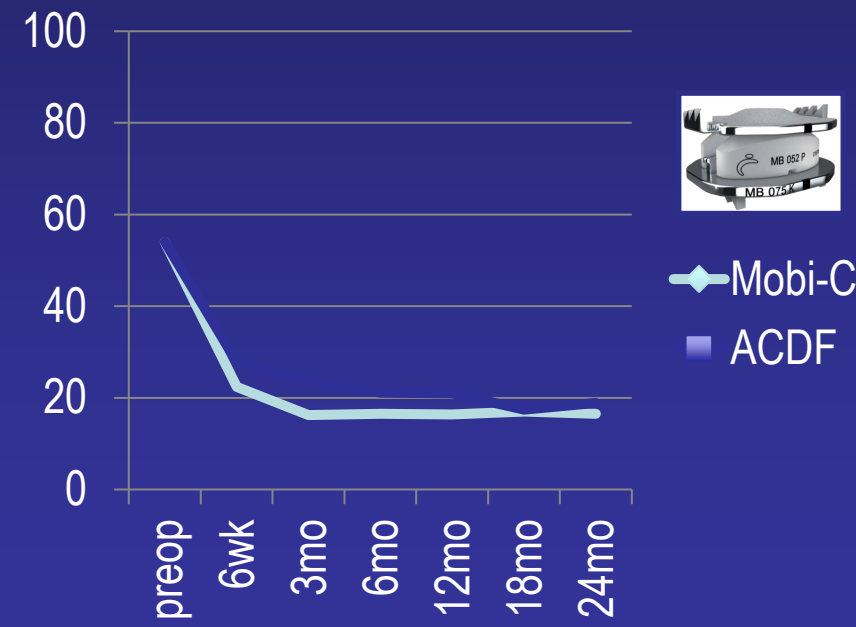
◆ Prestige
■ ACDF



◆ Bryan
■ ACDF



◆ prodisc C
■ ACDF

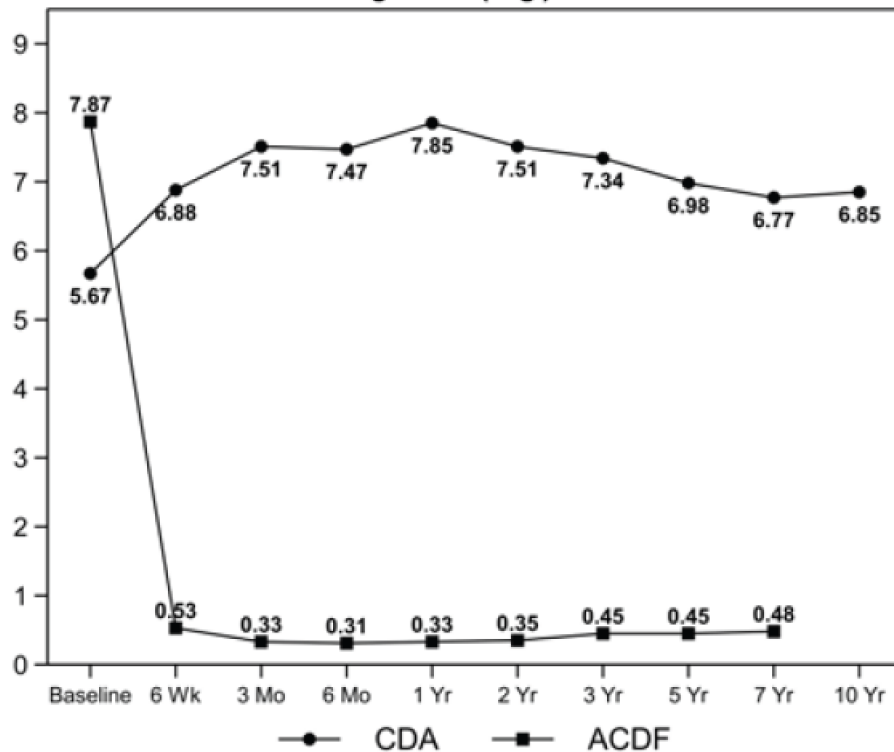


◆ Mobi-C
■ ACDF

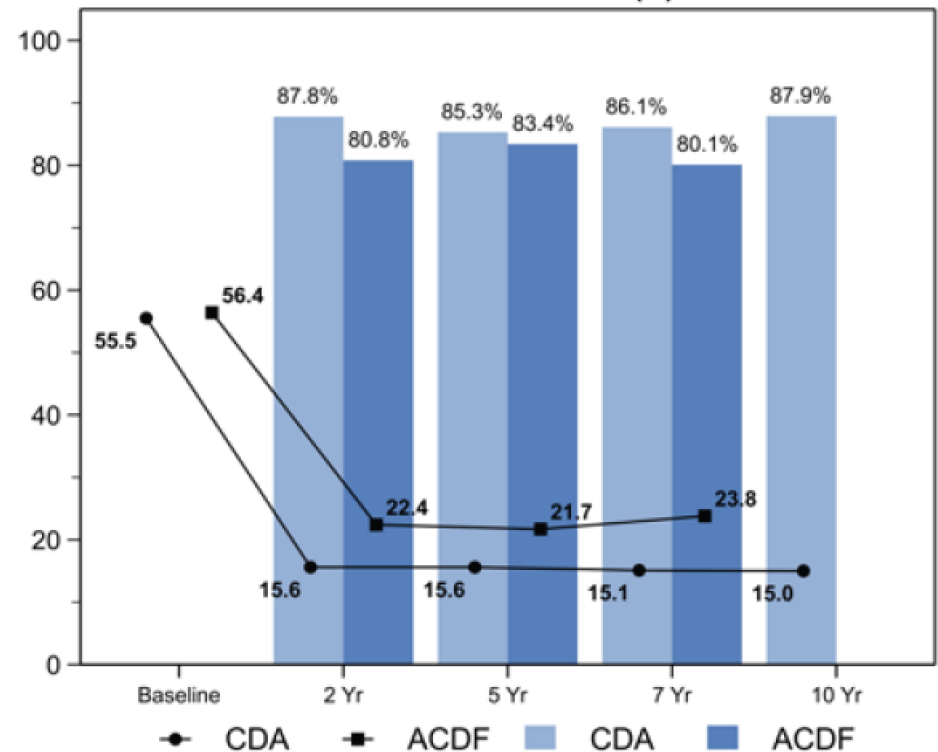
Prestige LP 10 year followup

Gornet et. al JNS 2019

Mean Angulation (deg.) Over Time



Mean NDI Score and NDI Success (%) Over Time

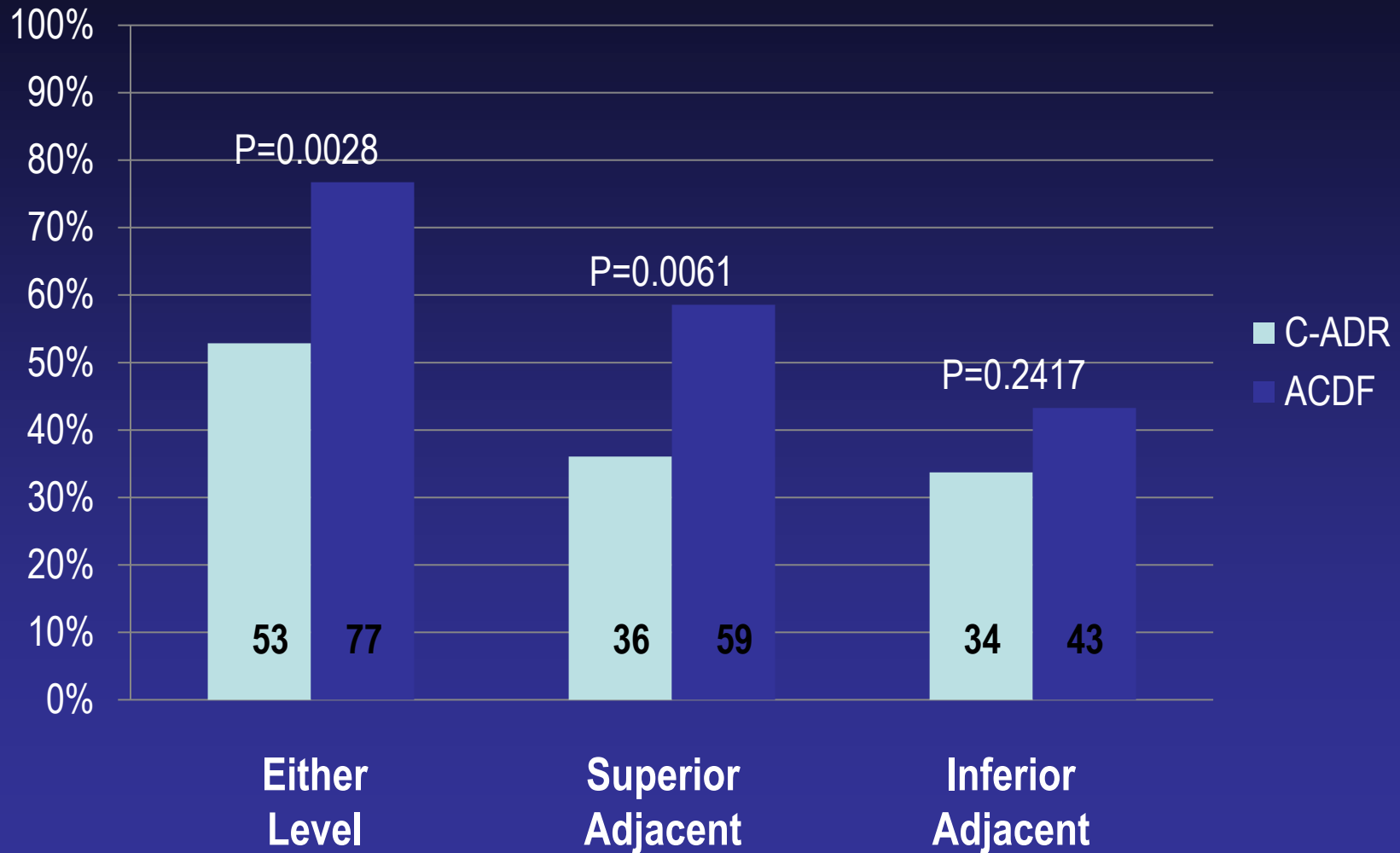


REOPERATION RATES

2^o surgery rates in all studies favor ADR

Disc	Years Reported	Author	ADR	ACDF
Prestige	7	Burkus	4.8%	13.7%
PDC	7	Delamarter	5.8%	17.0%
MobiC(1L)	5	Hisey	3.0%	11.1%
MobiC(2L)	4	Davis	4.0%	15.2%
SecureC	2	Vaccaro	2.5%	9.7%
Bryan	4	Sasso	3.7%	4.5%
PCM	2	Phillips	5.2%	5.4%

Any Progression of R-ALD* at 7 Year Follow Up



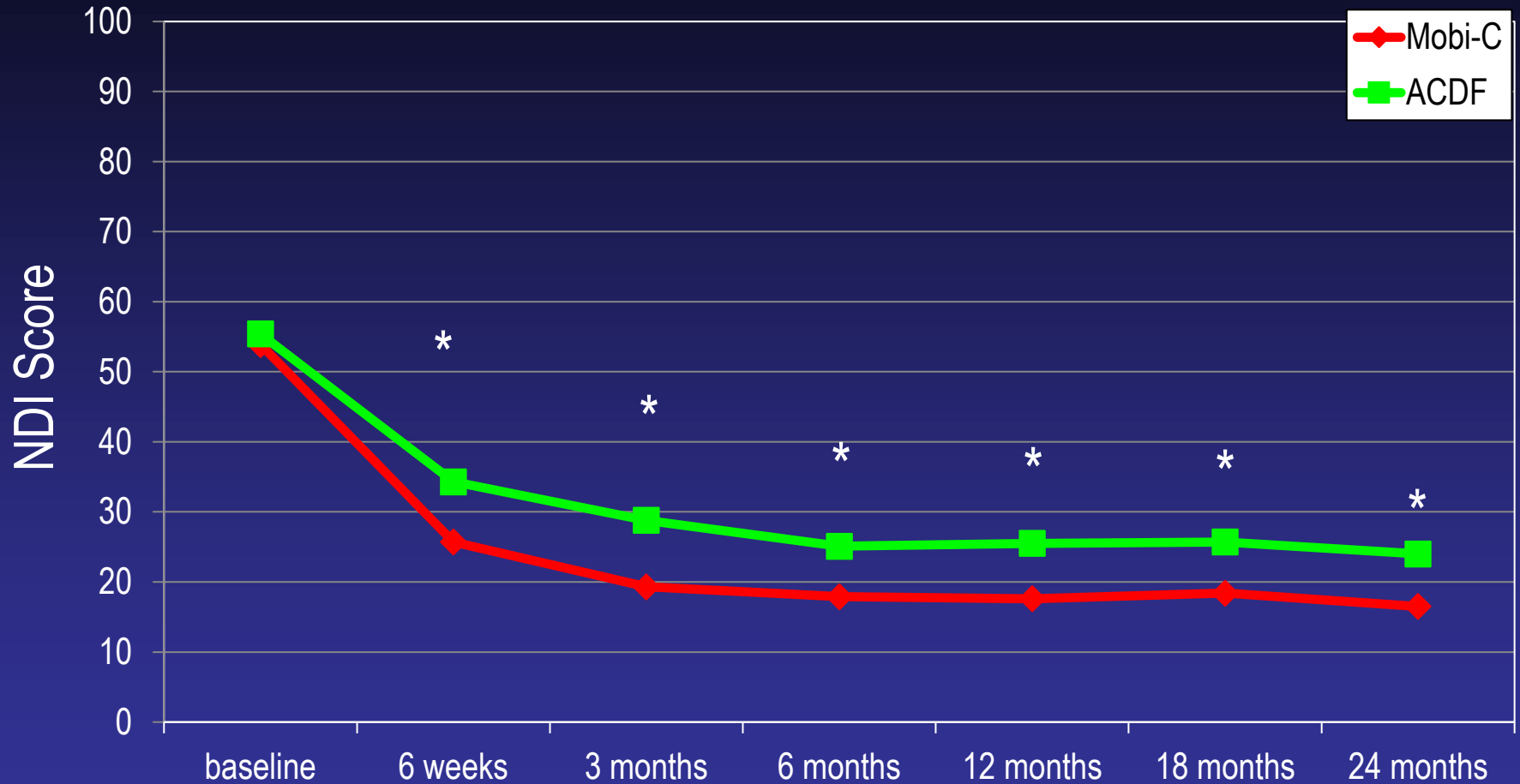
* Radiographic adjacent level degeneration

Mobi-C Patient Groups

- ▶ 105 patients were randomized to the control group and treated with ACDF
 - Anterior cervical plate and allograft bone
- ▶ 225 patients were randomized to the investigational group and treated with Mobi-C

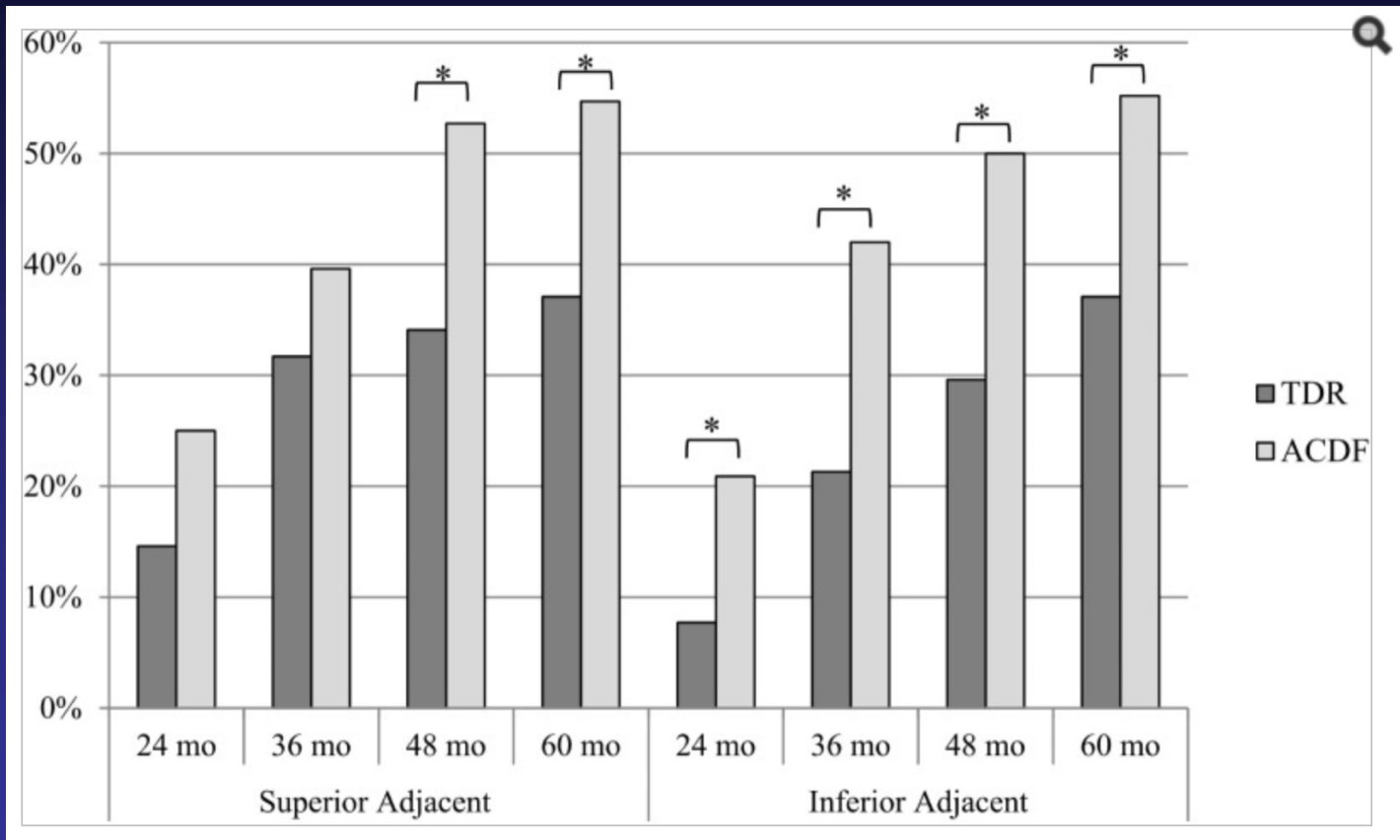


Mean NDI Scores 2 Level Mobi-C



* - significant improvement from baseline in favor of Mobi-C ($p < 0.05$)

Adjacent Segment Disease Mobi-C 5y



Radcliff et. al IJSS 2017: Mobi-C 7y f/u

Table 3. Overall success and components of success for 2-level TDR and ACDF.

	TDR	ACDF	Difference
Composite success	60.8%	34.6%	26.2%*
NDI success	79.0%	58.0%	21.0%†
Subsequent Surgery	4.4%	16.2%	11.8%†
Neurologic failure	6.4%	17.1%	10.7%†
Adverse events	5.3%	8.6%	3.3%
Radiographic failure	10.1%	9.1%	1.0%

* Superiority of TDR vs. ACDF established with 95% lower confidence bound of difference > 0%. † p < 0.05; Fisher's exact test.

Pitfalls/Complications

- ▶ Complications are few but are unique to motion preserving devices
- ▶ Most complications are due to stretching indications

Inclusion Criteria

- ▶ Has cervical degenerative disc disease as defined as:
 - intractable radiculopathy and/or myelopathy with at least one of the following items producing symptomatic nerve root and/or spinal cord compression that is documented by patient history:
 - a) herniated disc;
 - b) osteophyte formation
- ▶ One level requiring surgical treatment
- ▶ C3-C4 disc to C6-C7 disc level involvement
- ▶ Unresponsive to non-operative treatment for six weeks or presence of progressive symptoms or signs of cord compression
- ▶ No previous surgical procedures at the involved level or any planned surgical procedure at the involved or adjacent level.
- ▶ Preop Neck Disability index score ≥ 30
- ▶ Preop Neck Pain score of ≥ 20 based on the Preop Neck & Arm Pain Questionnaire
- ▶ Not pregnant at time of surgery
- ▶ Willing and able to comply with study plan and able to understand and sign patient informed consent

Exclusion Criteria

- ▶ Any other cervical spinal condition requiring surgical treatment at the involved level
- ▶ Documented or diagnosed cervical instability defined by radiographs showing
 - Sagittal plane translation > 3.5mm or
 - Sagittal plane angulation > 20 degrees.
- ▶ More than one cervical level requiring surgery
- ▶ A fused level adjacent to the level to be treated
- ▶ Severe pathology of the facet joint of involved bodies
- ▶ Previous surgery at the involved level
- ▶ Previously diagnosed osteopenia or osteomalacia
- ▶ Any of the following that may be associated with an osteoporosis diagnosis (if "Yes" to any of these, a DEXA Scan will be required to determine eligibility)
 - Postmenopausal non-Black female over 60 years of age and weighs less than 140 pounds
 - Postmenopausal female that has sustained a non-traumatic hip, spine, or wrist fracture
 - Male over the age of 70
 - Male over the age of 60 that has sustained a non-traumatic hip or spine fracture.

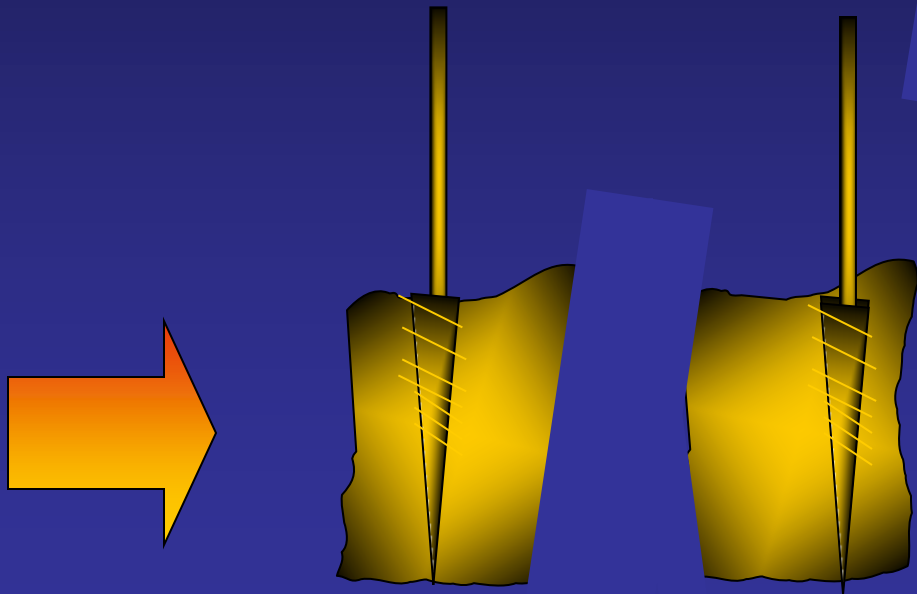
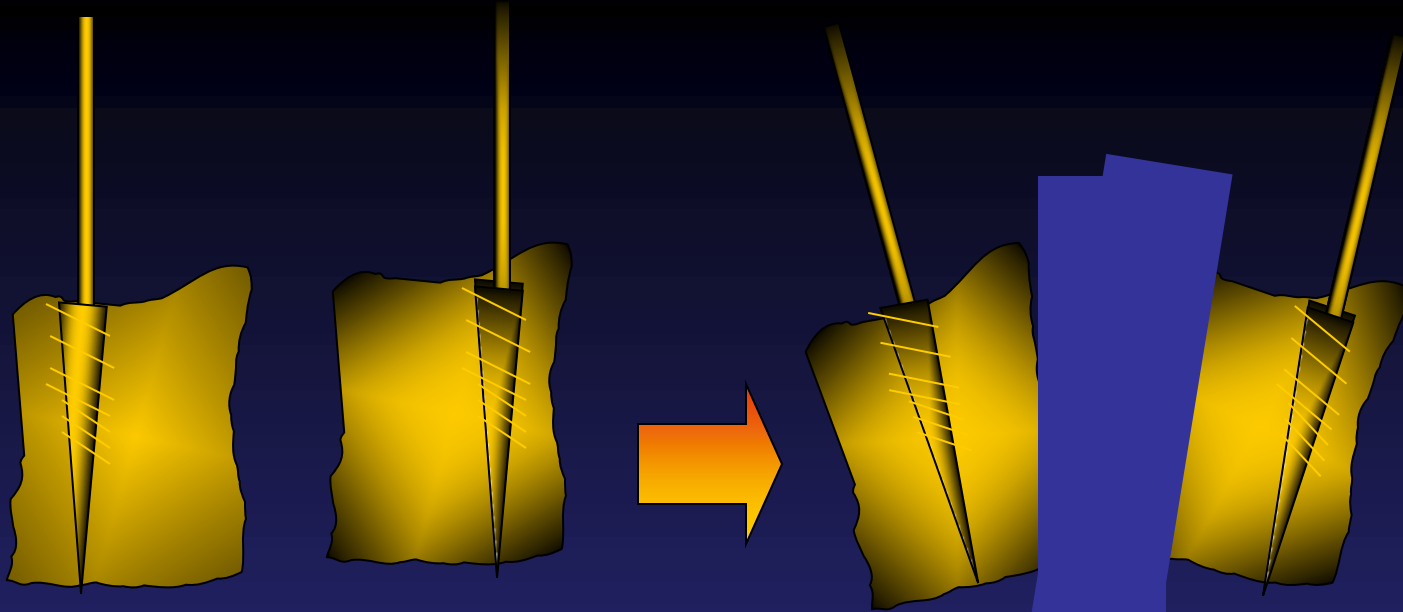
Exclusion Criteria

- ▶ If the level of Bone Mineral Density is a T score of -3.5 or lower or a T score of -2.5 or lower with the vertebral crush fracture, then the patient is excluded.
- ▶ Presence of spinal metastases
- ▶ Overt or active bacterial infection, either local or systemic
- ▶ Severe insulin dependent diabetes
- ▶ Chronic or acute renal failure or history of renal disease
- ▶ Temperature > 101° F oral at surgery
- ▶ Documented allergy to stainless steel, titanium or a titanium alloy
- ▶ Mentally incompetent
- ▶ Is a prisoner
- ▶ Is pregnant
- ▶ Is an alcohol and/or drug abuser
- ▶ Has received drugs which may interfere with bone metabolism within 2 weeks prior to the planned surgery date (steroids, methotrexate), excluding routine preop anti-inflammatories)
- ▶ A history of endocrine or metabolic disorder known to affect osteogenesis
- ▶ A condition that requires postop medications that interfere with the stability of the implant (steroids). This does not include low dose aspirin therapy.
- ▶ Received treatment with an investigational therapy within 28 days prior to surgery or planned for 16 weeks following implantation.



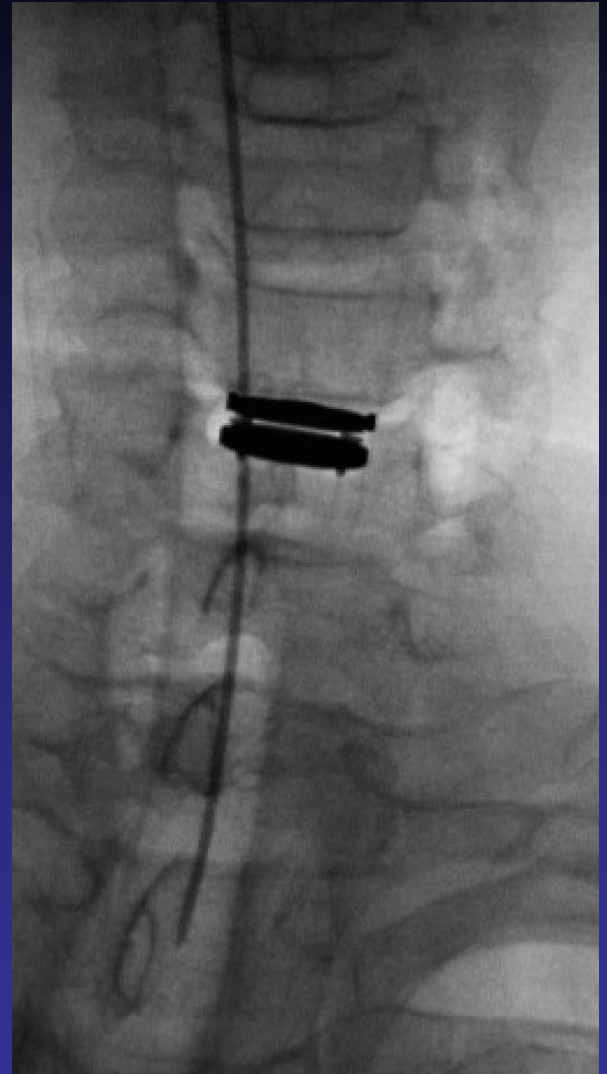
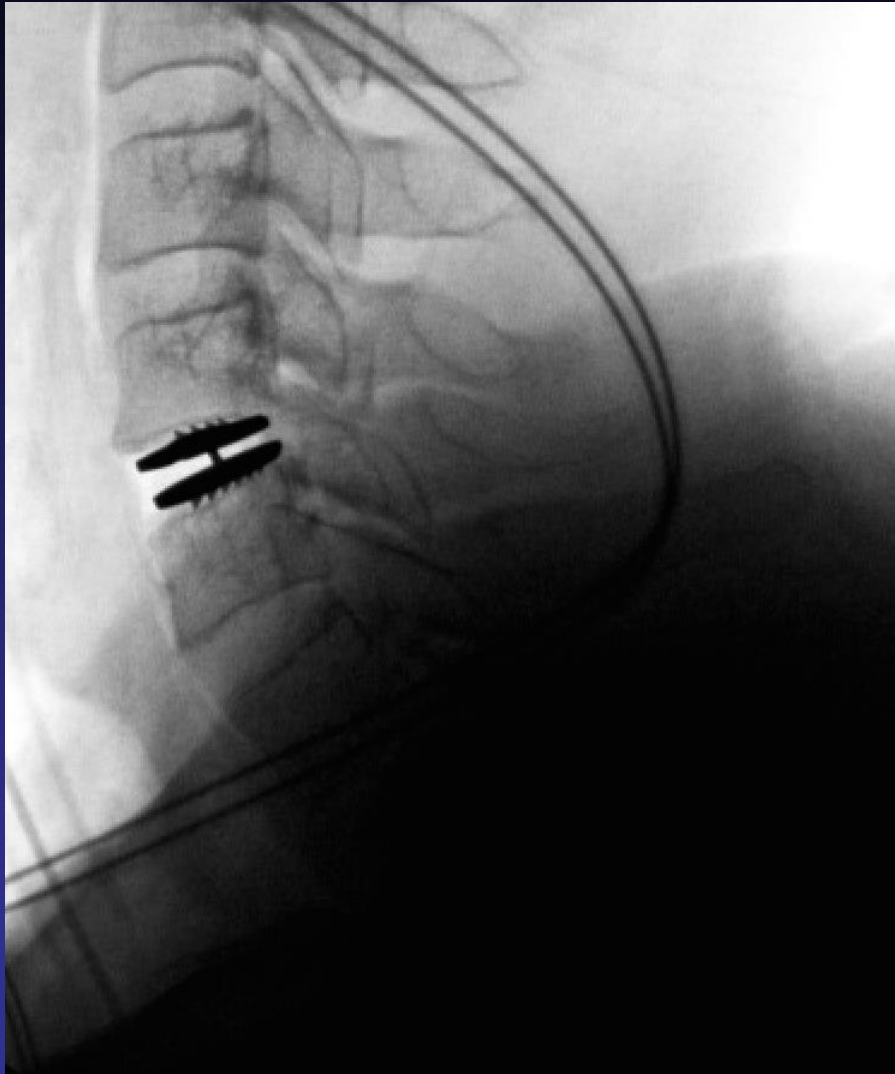






Aseptic loosening

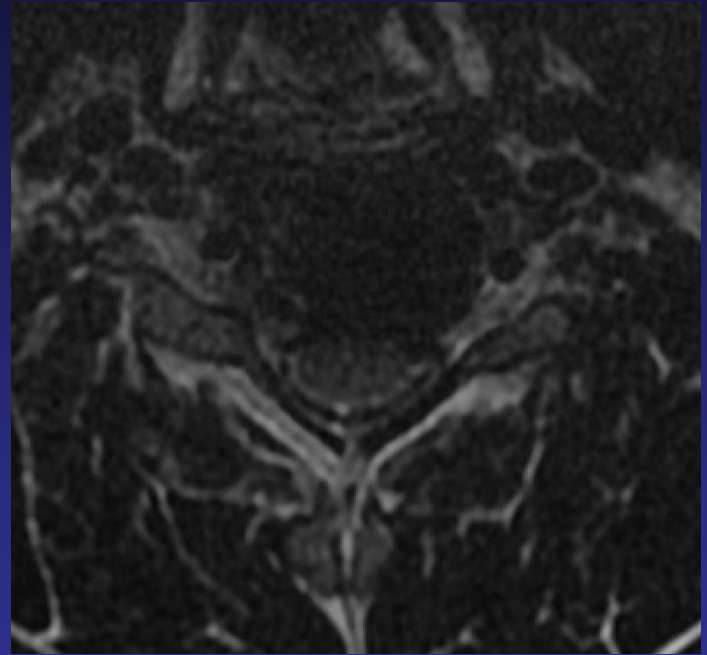
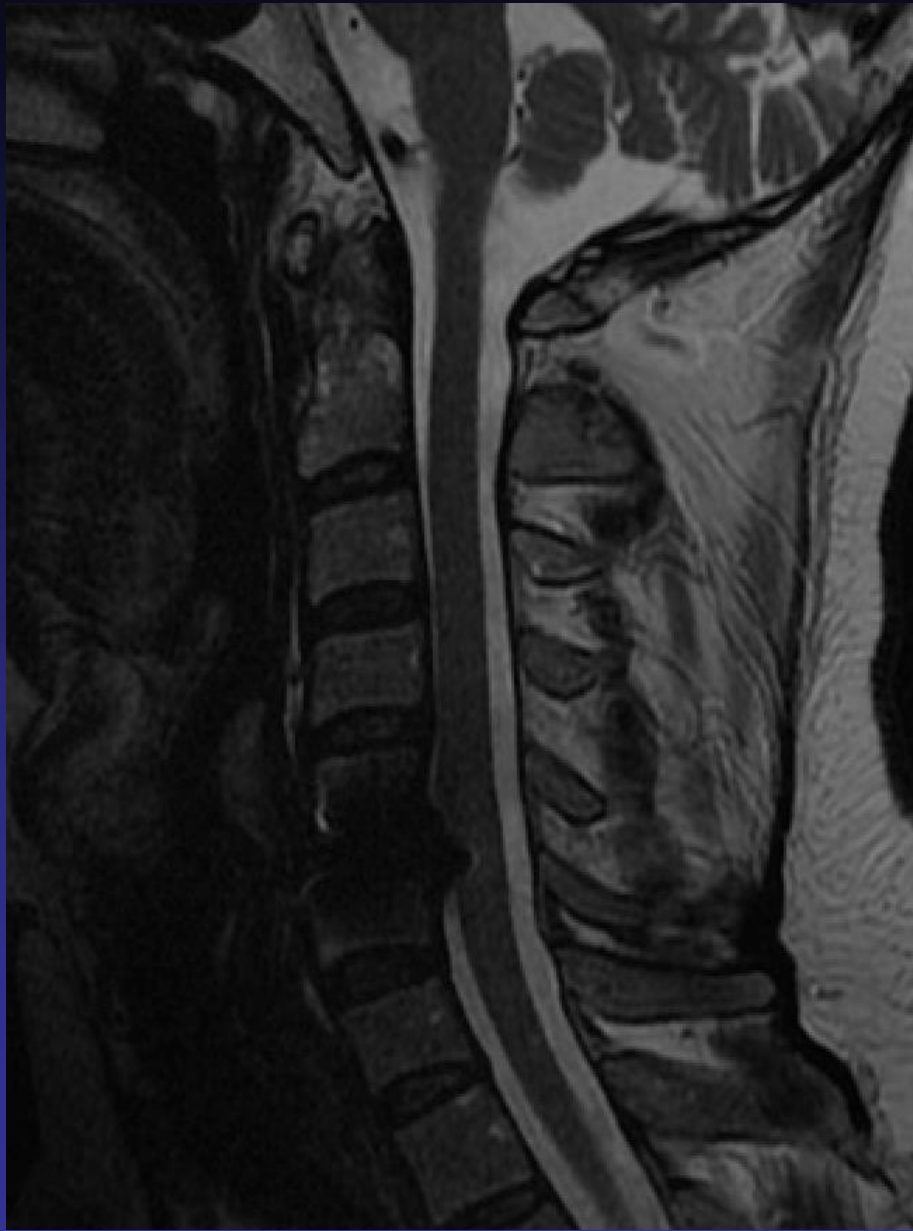


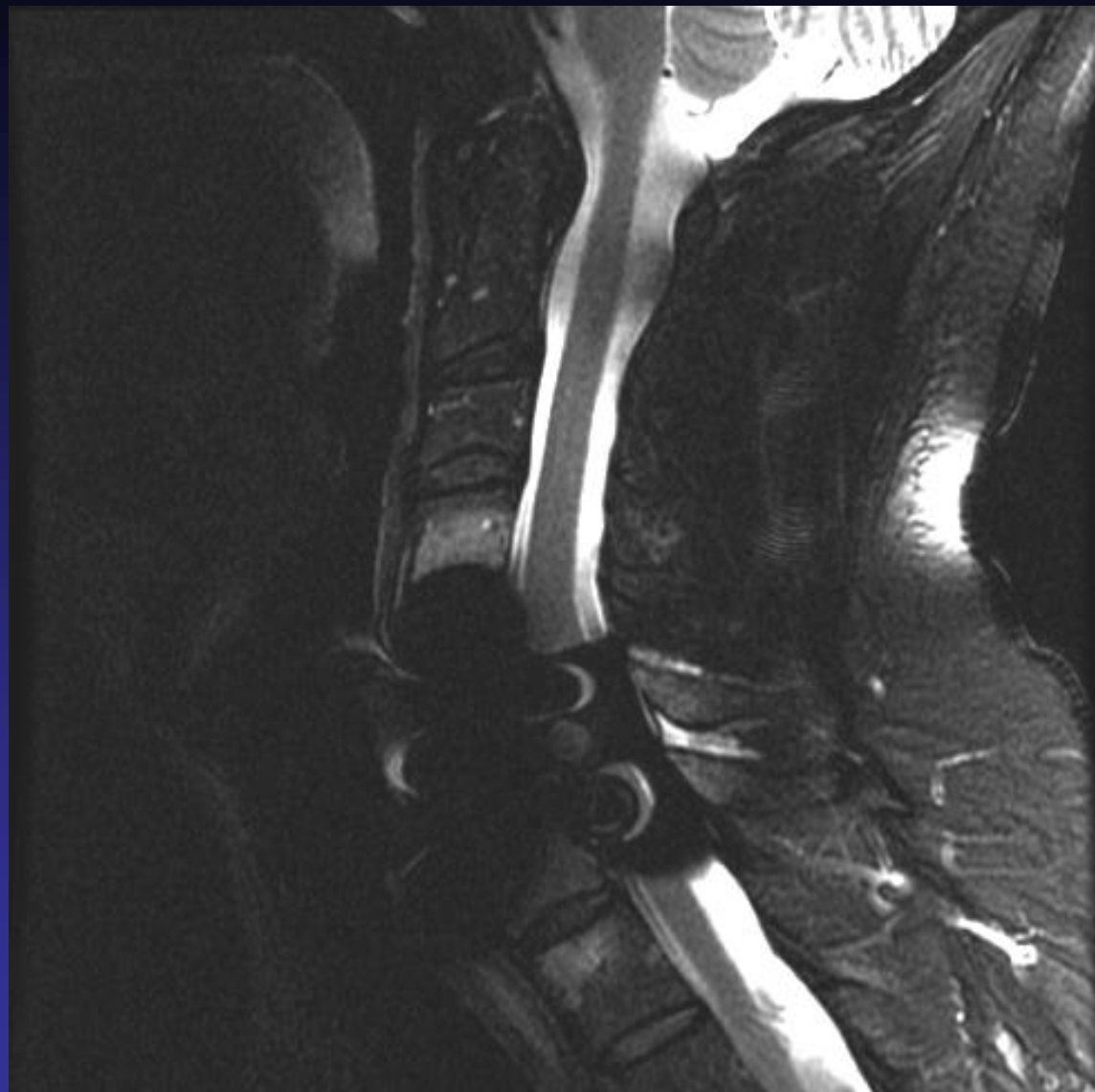




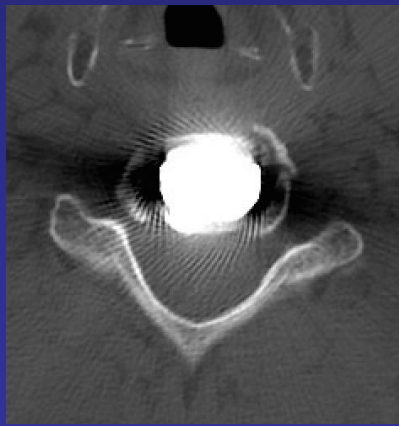
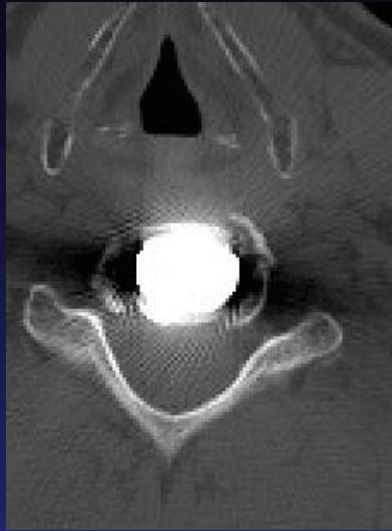
Be aware of Creating Coronal Plane Deformity

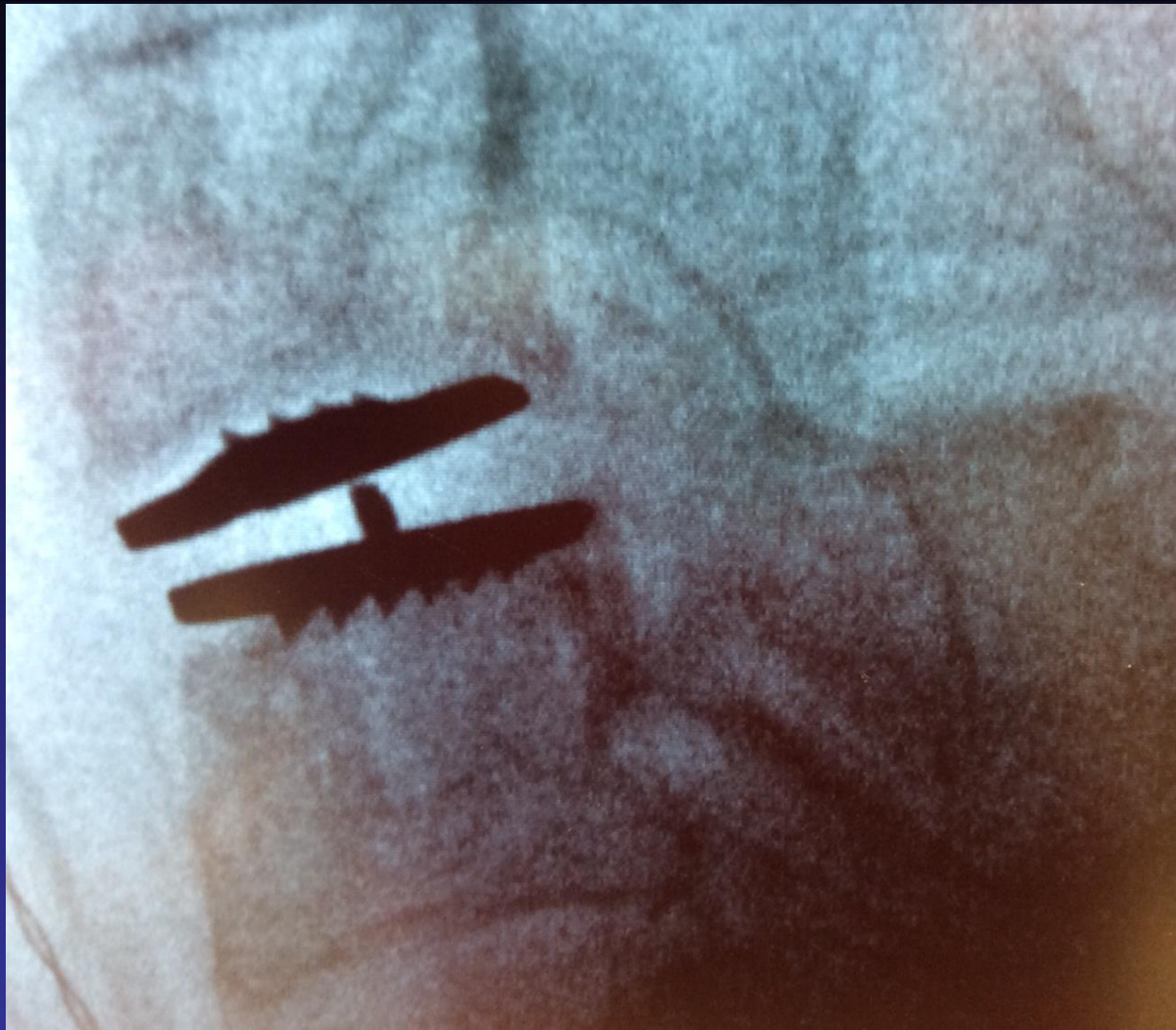








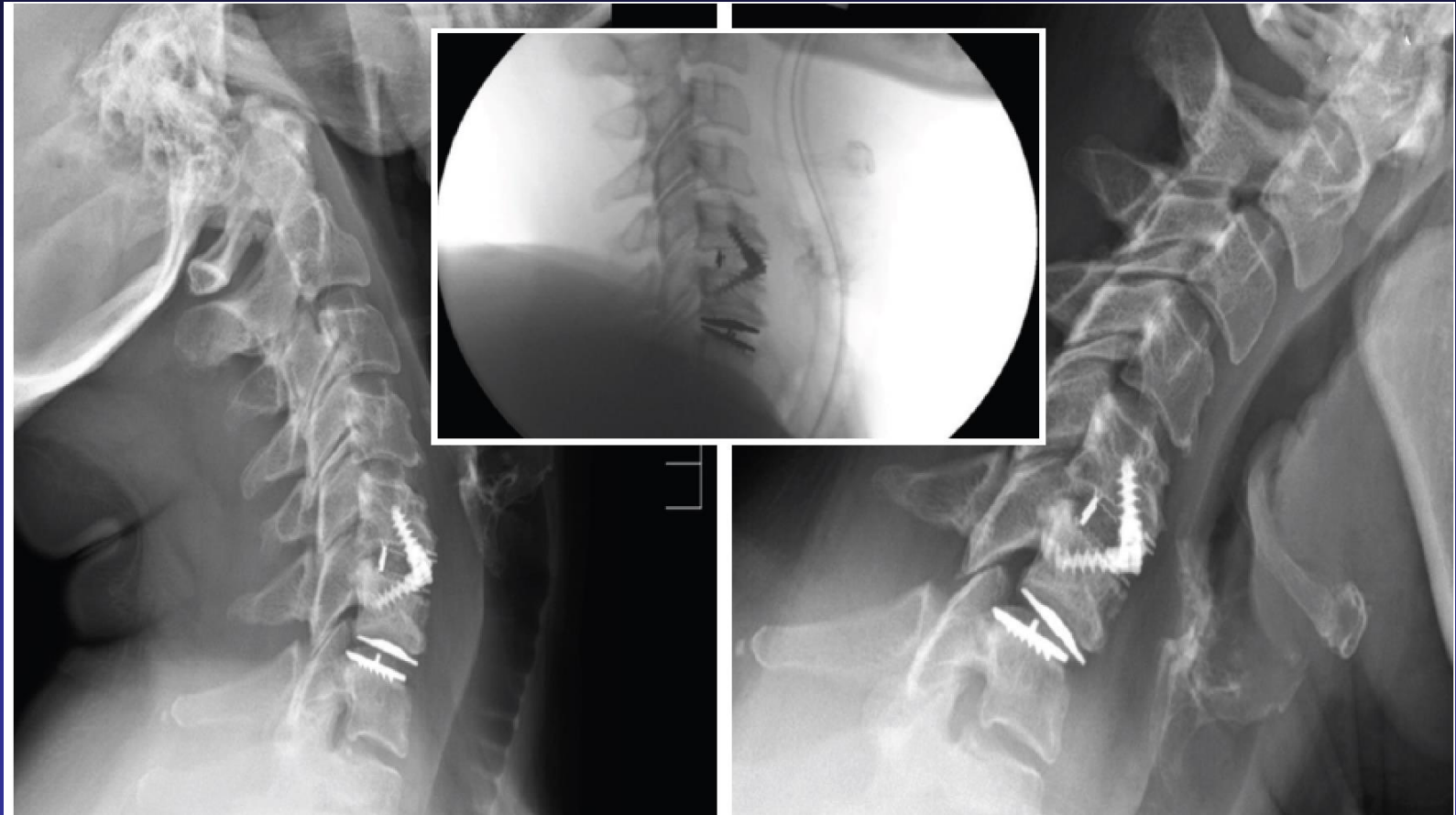




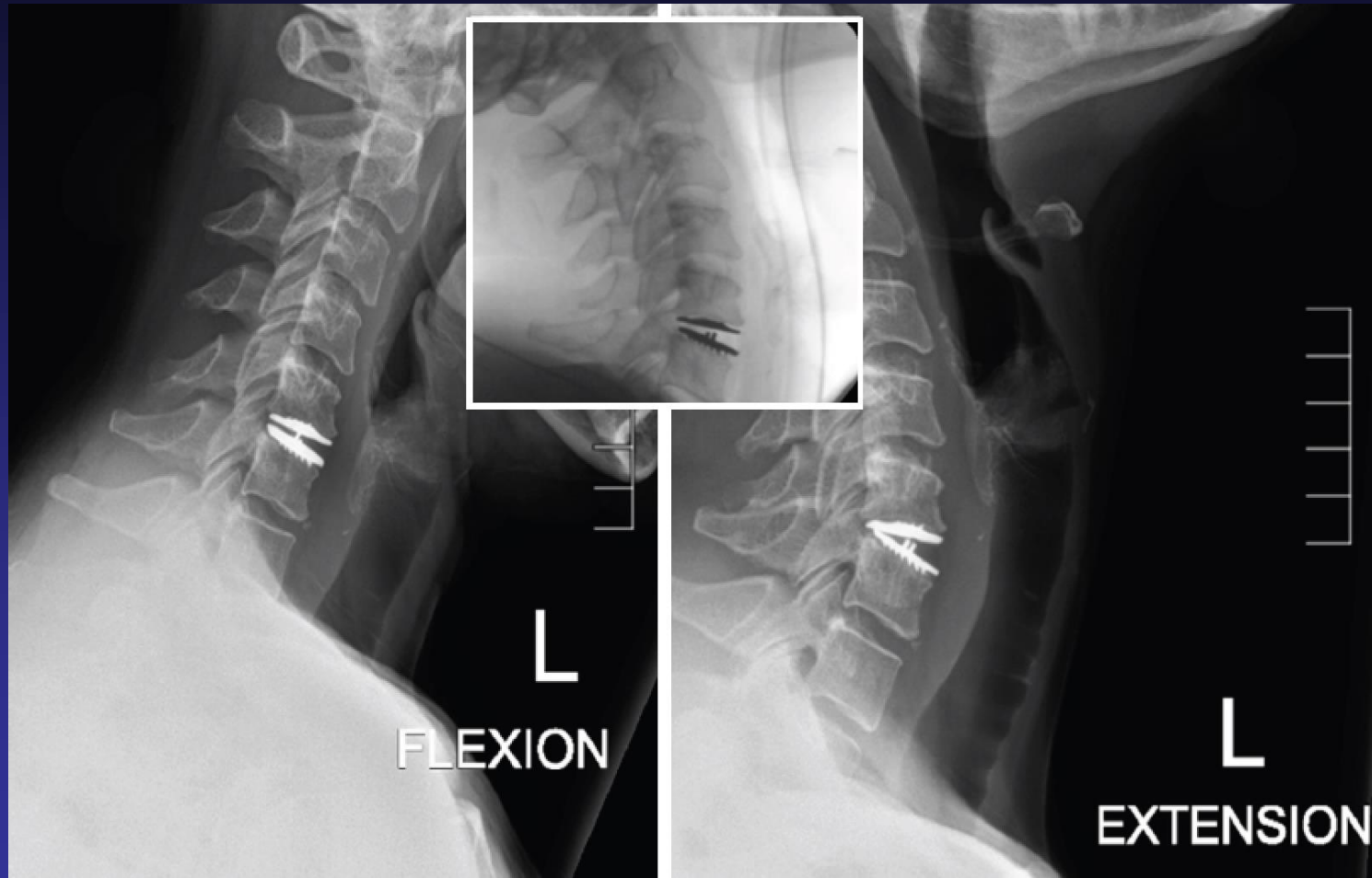




Segmental hypermobility



Segmental hypermobility

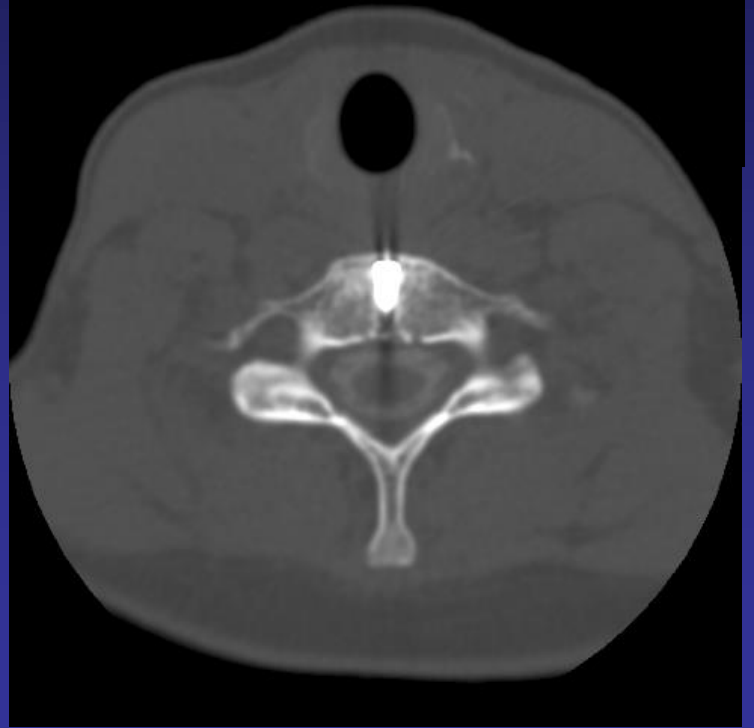
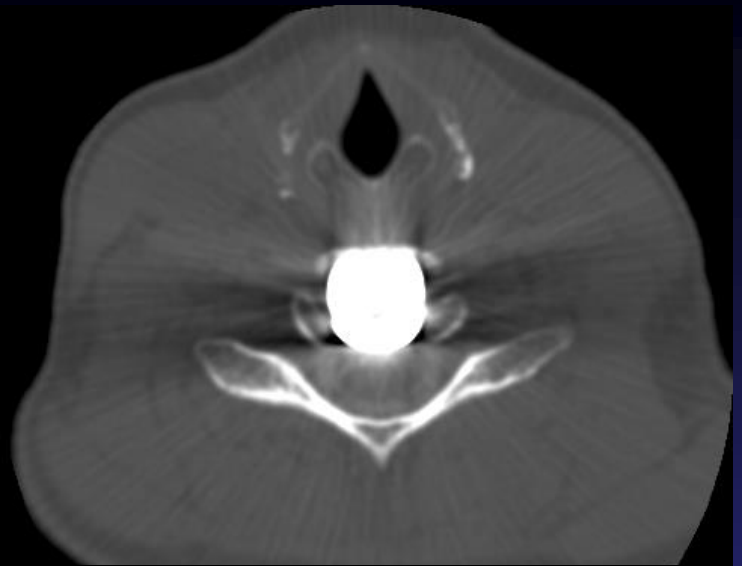
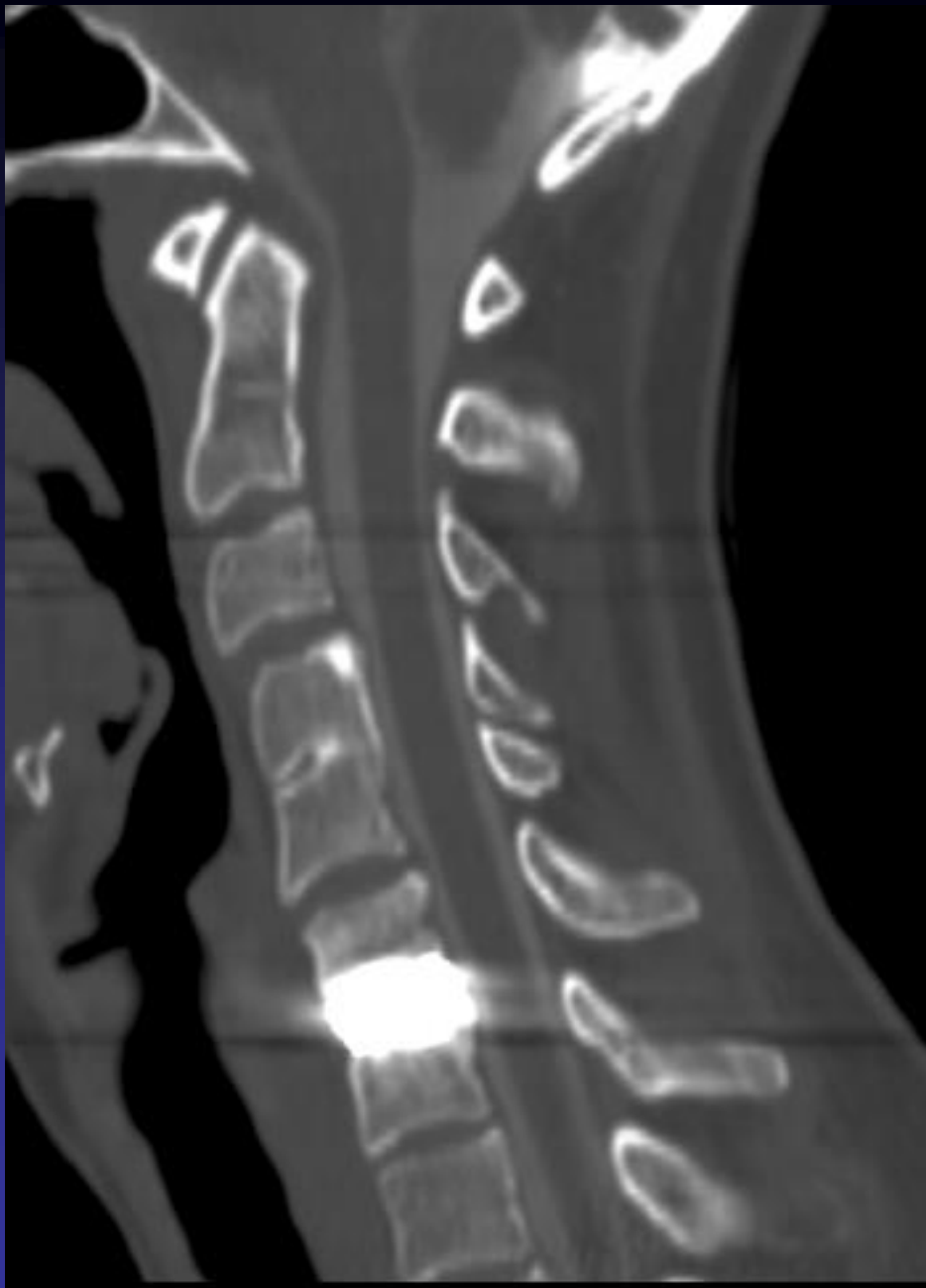




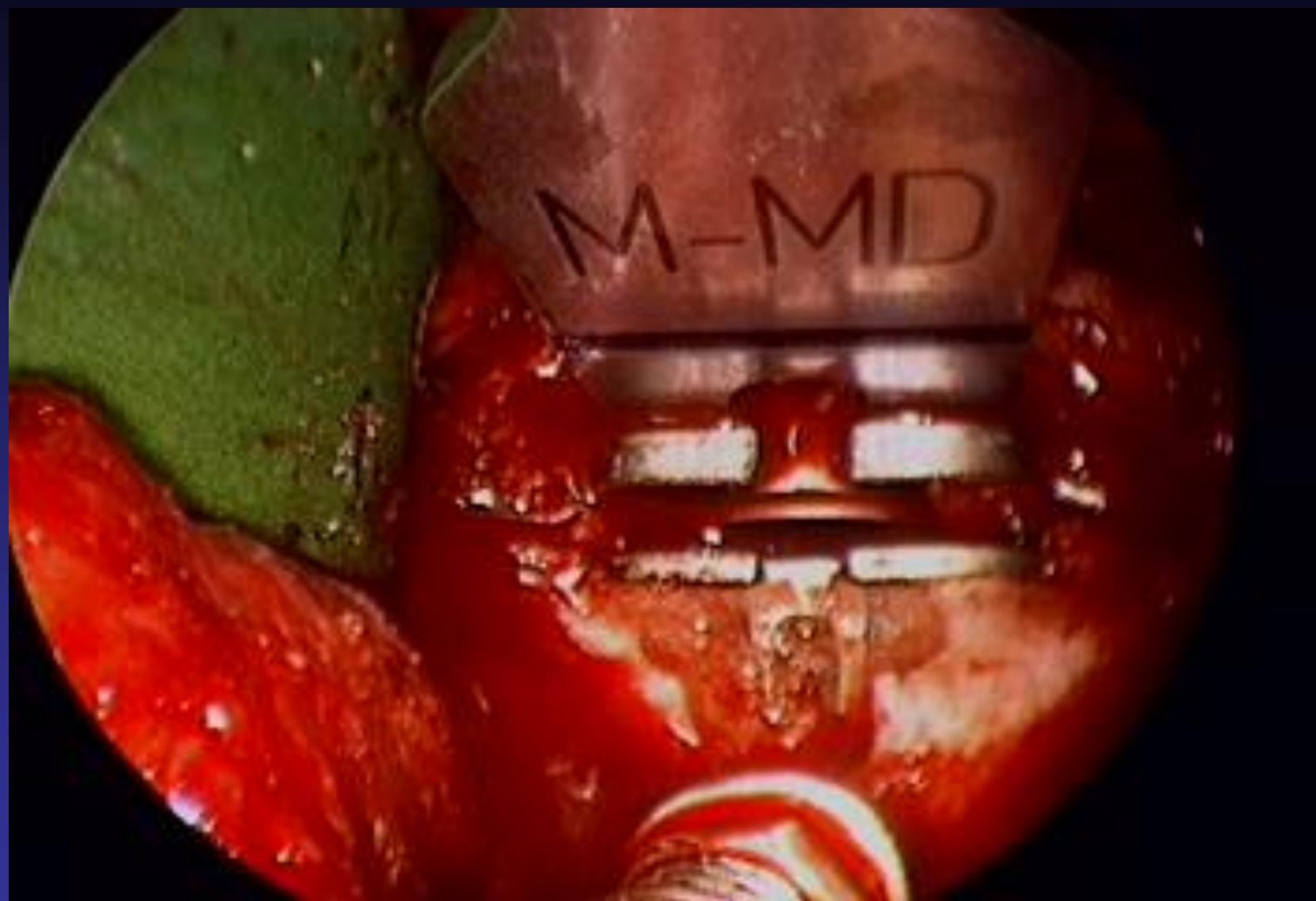








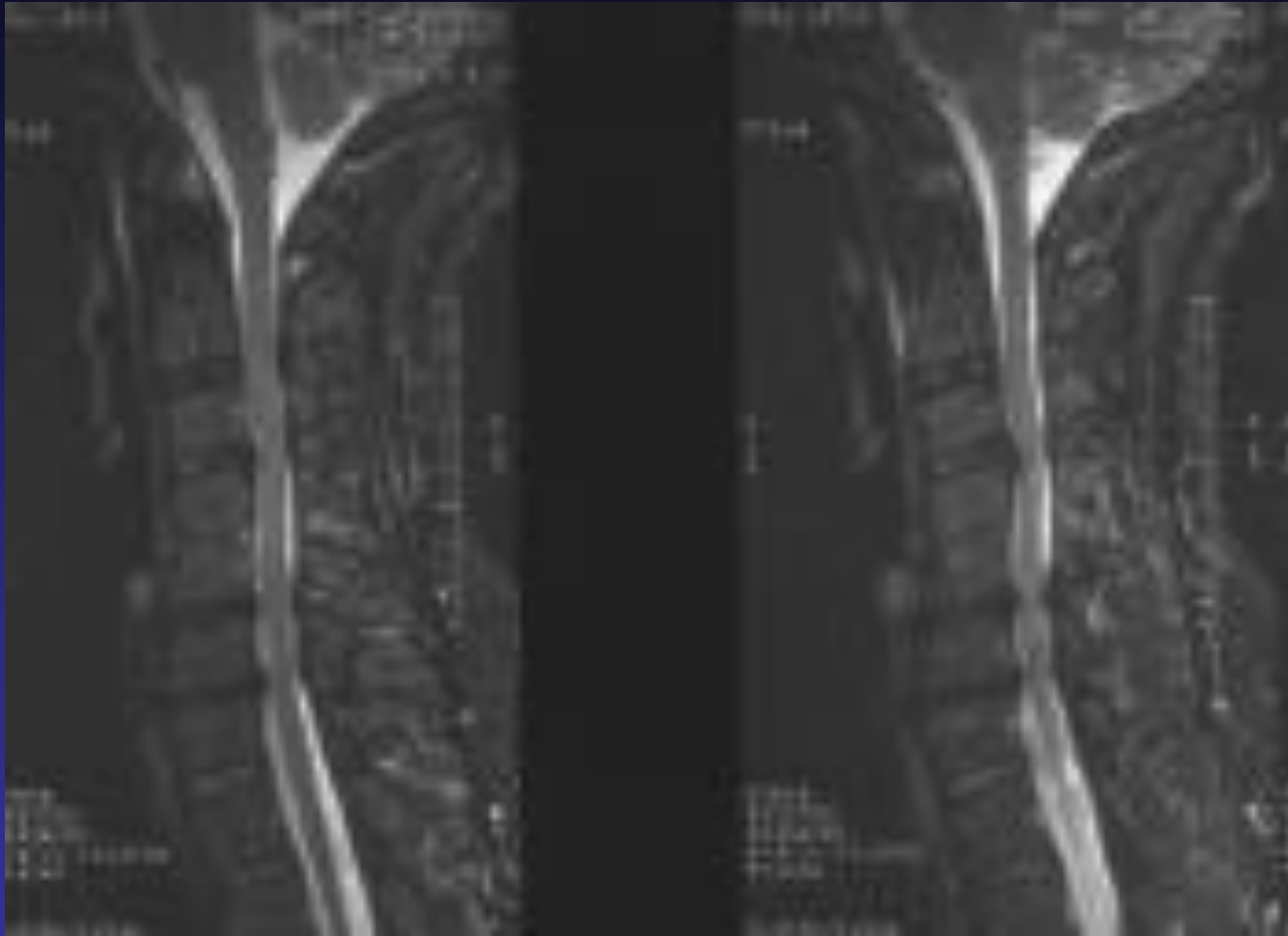








50 y.o neck and bilateral arm pain









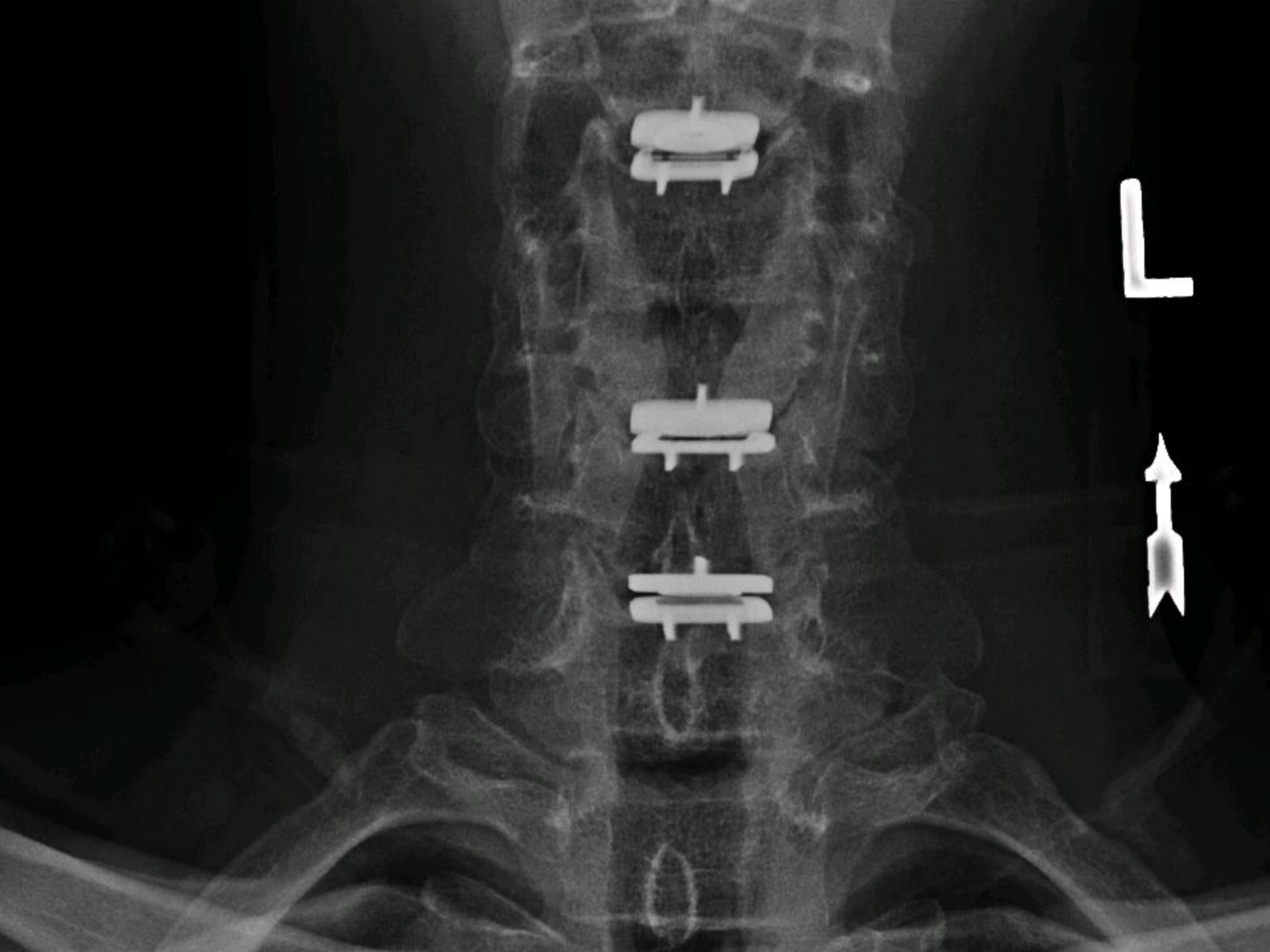
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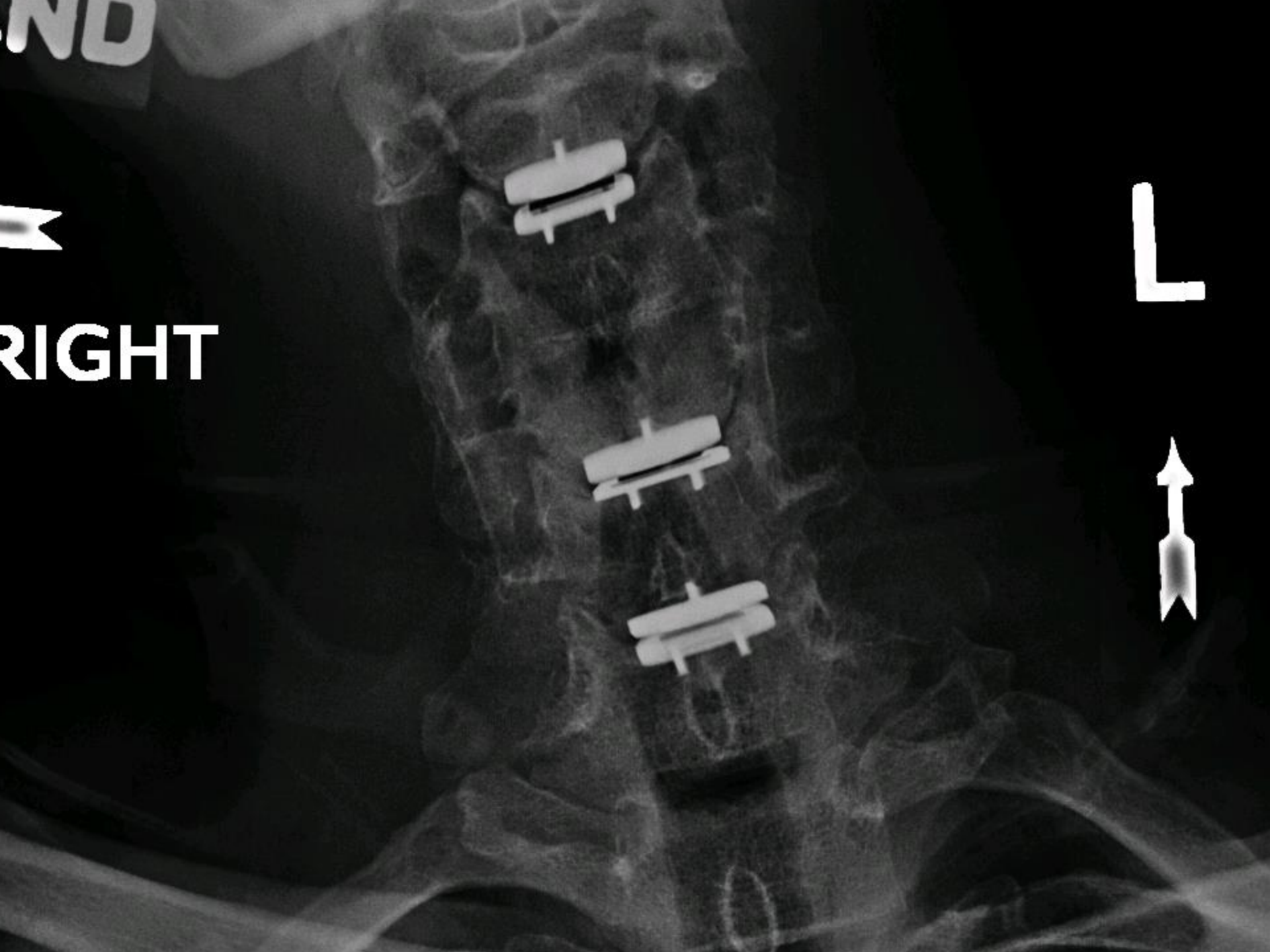


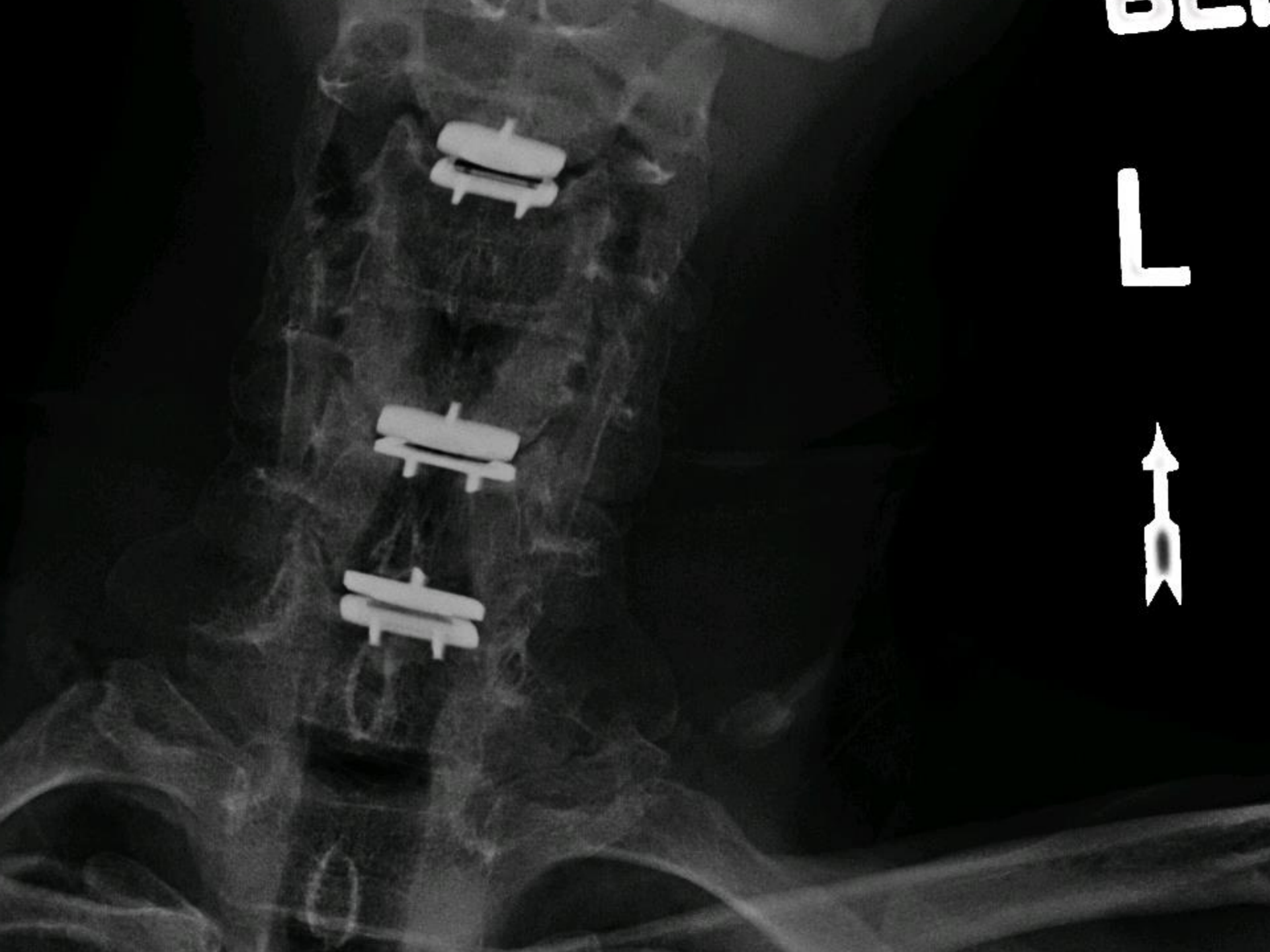


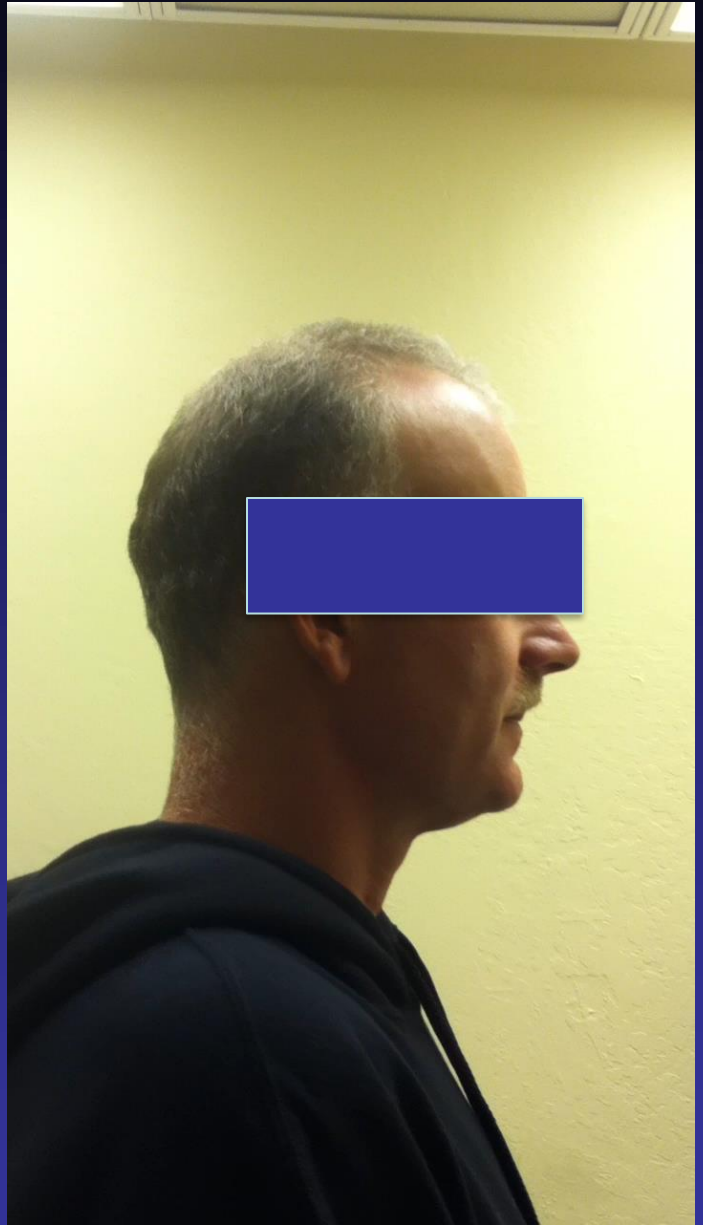
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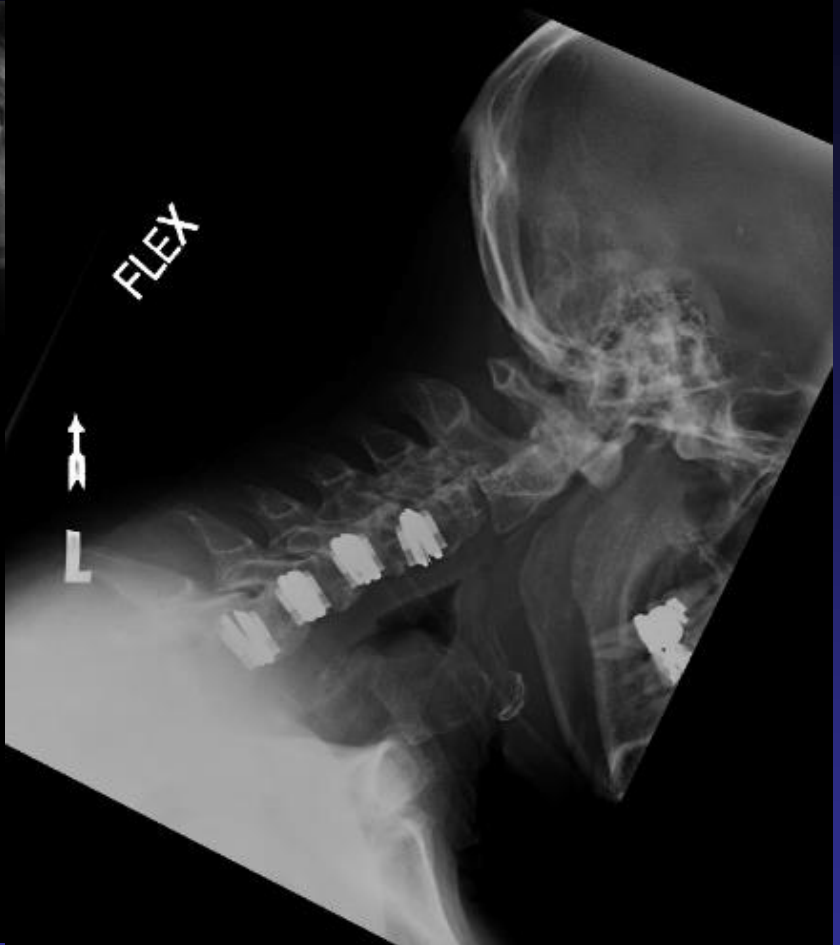
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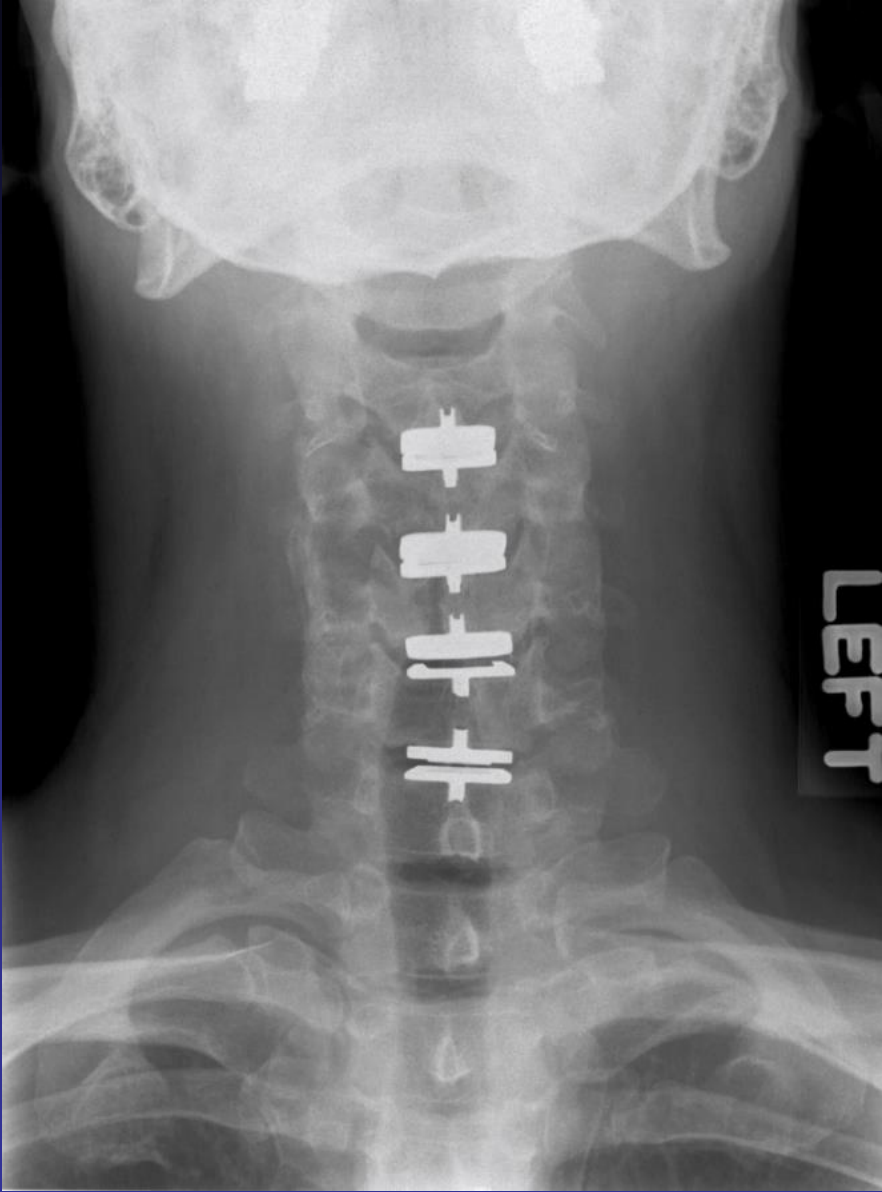






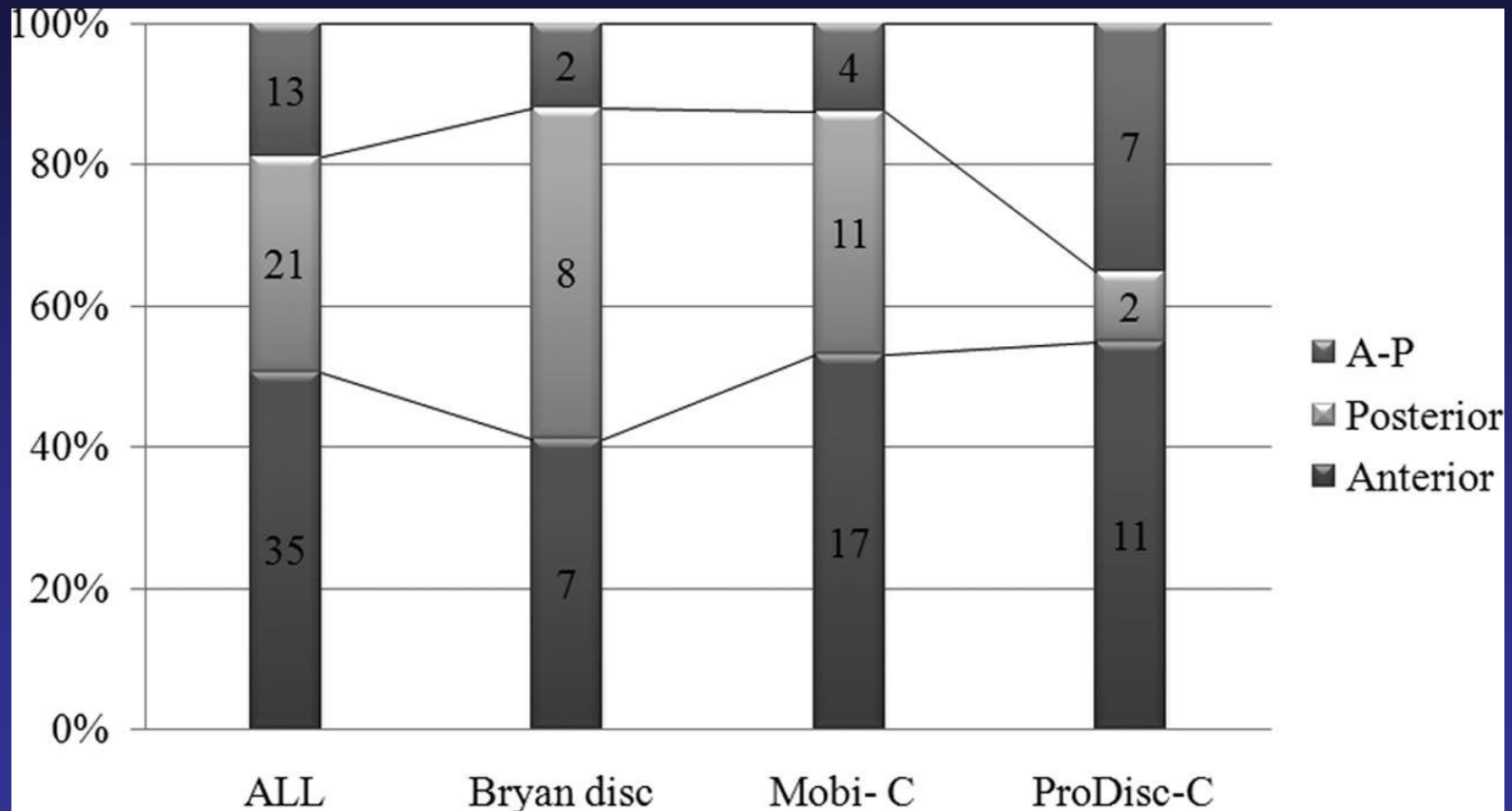




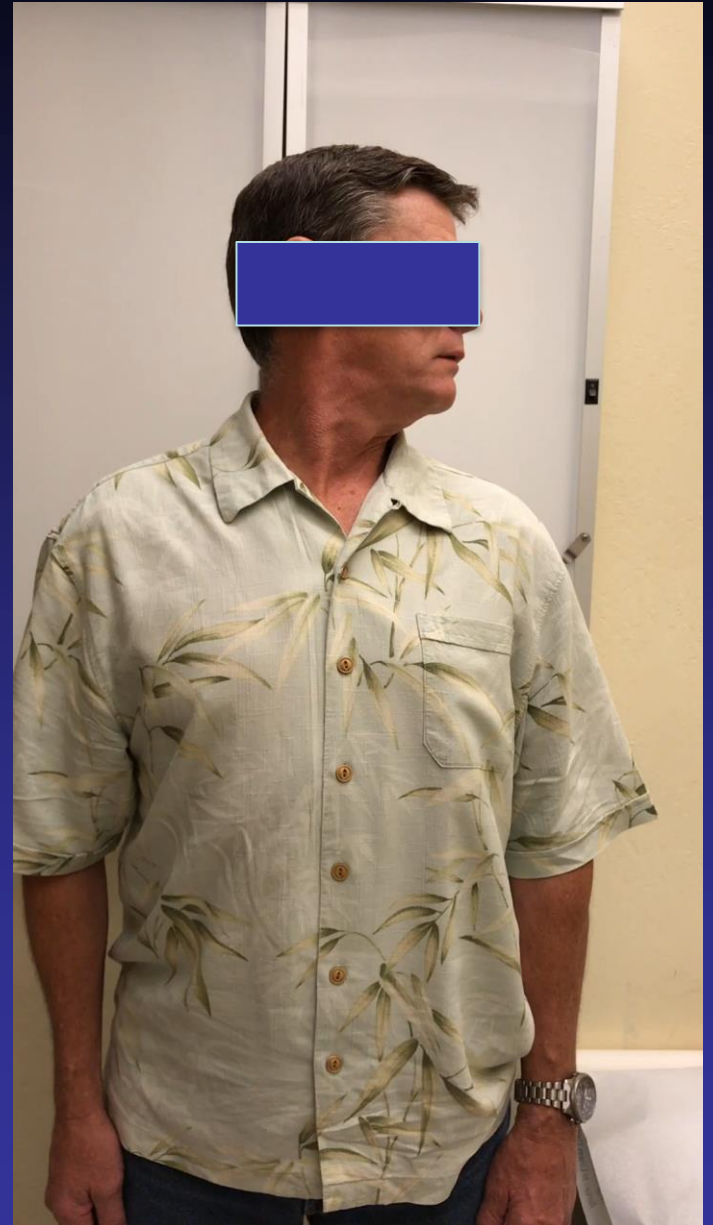


Difference in Occurrence of Heterotopic Ossification According to Prosthesis Type in the Cervical Artificial Disc Replacement SPINE 2010

Seong Yi, MD, PhD,* Keung Nyun Kim, MD, PhD,* Moon Sul Yang, MD,*
Joong Won Yang, MD,* Hoon Kim, MD,* Yoon Ha, MD, PhD,* Do Heum Yoon, MD, PhD,*
and Hyun Chul Shin, MD, PhD†







Conclusions

- ▶ Single level cTDR is safe and effective in short and intermediate term follow-up
- ▶ 2 lvl cTDR outcomes are good and are comparable to single level cTDR outcomes
- ▶ Little data exist for > 2lvl cTDR
- ▶ Data suggests that cTDR can slow down ASD
- ▶ Important to have good selection criteria for prospective patients to avoid complications

Thank you!

