



MIS Posterior Cervical fusion

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Disclosures

- Medtronic
- Nuvasive
- Alphatec
- St. Jude
- Centinel
- Who did I forget?






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- 46 y/o male 72" 205 lbs.
- C/o neck pain with weakness numbness and tingling in parascapular areas.
- S/P ACDF C4-C7 1 year ago



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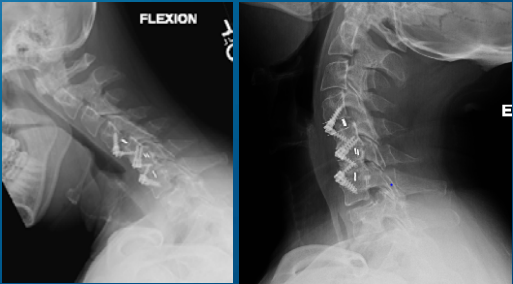
Case JS

CT scan .



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Case JS



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Spinal Disord Tech. 2015 Mar;28(2):41-6. doi: 10.1097/BSD.0b013e31829a37ac. Do CT scans overestimate the fusion rate after anterior cervical discectomy and fusion?

Objective: To compare the fusion rates after anterior cervical discectomy and fusion (ACDF) using a ray series compared to tomography (CT).

Background: The goal of this study was to determine whether the presence of a solid fusion on either tomography or ACDF is an adequate but a necessary part of practice. Commonly used criteria include radiograph and CT scans. Currently, there is no gold standard imaging modality to determine fusion status.

Methods: Twelve patients (seven males and five females) who underwent ACDF at levels C4-C6 with CT scans and dynamic x-rays obtained at 3, 6, and 12 months postoperatively were included. Four spine surgeons (three from the same institution and one from another institution) reviewed the CT scans and dynamic x-rays.

Results: On the basis of the x-ray criteria, the fusion rates were 40%, 45%, and 50% at 3, 6, and 12 months, respectively. On the basis of CT criteria, the fusion rates were 70%, 75%, and 80% at 3, 6, and 12 months, respectively. There was a significant difference in the fusion rates between the two imaging modalities at all time points. In addition, in 10 patients, there was a discrepancy between the two imaging modalities at one or more time points.

Conclusion: X-rays, which incorporate both static and dynamic factors, predicted lower fusion rates at each time point when compared with CT scans, which evaluate only static factors. Depending on the time point, agreement from the CT scans was 100% at 3 months, 90% at 6 months, and 80% at 12 months. The fusion rates on CT scans were significantly higher than those demonstrated on the dynamic x-rays. Thus, we conclude that CT scans may overestimate the fusion rate during the early stages of ACDF fusion with or without an adjunct, and that CT scans alone may not accurately determine fusion status. Reliable determination of fusion rates that require dynamic information cannot be determined on x-ray tomography with high-resolution static information.

PMID: 25720862 (PubMed link for Web.ME)

X ray Criteria for fusion
-static factors
-dynamic factors
CT- static
X ray predicted lower fusion rates vs CT

Conclusion: 33-44% thought to be fused on CT
-demonstrated >imm motion on Flex/Ext X Ray

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Flex/ Ex Motion

C4-5 remains stable
C5-6 10.6 mm movement
C6-7 8.7 mm movement

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Technology Overview

- Posterior Cervical Intervertebral Fusion Device
 - Tissue sparing
 - Indirect decompression
 - Stabilization and fusion

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Mechanism of Action

Decompress
symptomatic nerve roots through facet distraction

Stabilize
By fusing the joint, Preventing translation

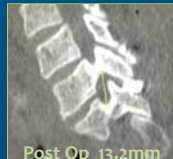

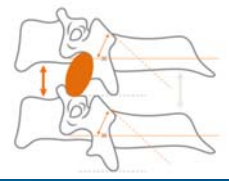
DTRAX

93% Fusion Rate @ 1 Year
98% Fusion Rate @ 2 Years
Implants packed with bone to promote fusion

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Indirect Decompression

20%+ Increase in Foraminal Area *



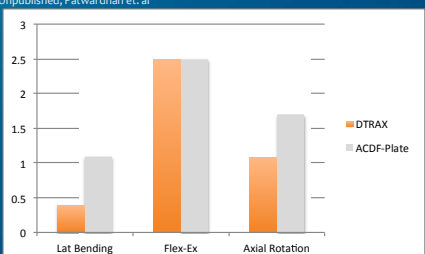
1. Buckley et. al Foramen distraction effectiveness of the DTRAX facet screw system
2. Tan et. al Effect of machined intra-facet allograft on foraminal height and area

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Significant Stabilization

Preventing Facet Translation Limits Segmental Motion Similar to Plated ACDF

Unpublished, Patwardhan et. al



Motion Type	DTRAX	ACDF-Plate
Lat Bending	~0.4	~1.1
Flex-Ex	~2.5	~2.5
Axial Rotation	~1.1	~1.7

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How I use it



Adjacent Level, Non-Union after ACDF, facet arthrosis

Supplemental Stabilization & Posterior fusion with ACDF

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Case JS – what we did



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DTRAX Stability

Biomechanical Stability of a Novel Posterior Cervical Fusion Device
Avinash G. Patwardhan
Loyola University Chicago,
Edward Hines Jr. VA Hospital, 2014 (unpublished)

Evaluate acute stabilization for:

- DTRAX vs ACDF, Single Level
- ACDF vs ACDF + DTRAX, Single and 2-level

Conclusions

- DTRAX Cervical Cage stabilization is comparable to the ACDF construct in flexion-extension, lateral bending and axial rotation in a single level fusion.
- Supplementing ACDF with DTRAX will significantly increase stabilization in single and 2-level fusion.

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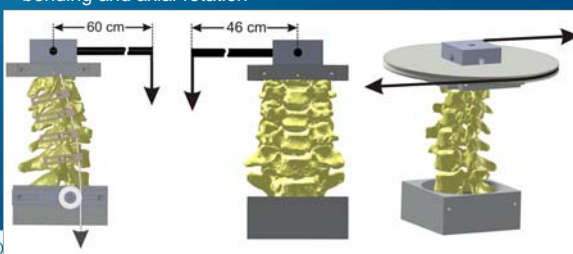
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Materials and Methods

7 Fresh frozen cervical spine cadavers

1.5 Nm moments applied in flexion/extension, lateral bending and axial rotation



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Study Design, Test Sequence

- A. Intact (C2-T1)
- B. +C5-C6 DTRAX
- C. +C6-C7 plated ACDF

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Study Design, Test Sequence

- D. +C6-C7 DTRAX
- E. + C3-C5 plated aCDF
- F. + C3-C4 and C4-C5 DTRAX

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Range of Motion

DTRAX and ACDF are similar in reducing range of motion

	Stand-Alone DTRAX vs ACDF		
	ROM in Degrees (sd)		p-value
	DTRAX C5-C6	ACDF C6-C7	
Flexion-Extension	2.5 (1.3)	2.5 (0.8)	0.911
Lateral Bending	0.4 (0.3)	1.6 (0.7)	0.000
Axial Rotation	1.1 (1.7)	1.7 (0.4)	0.370

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JNS JOURNAL OF NEUROSURGERY
OFFICIAL JOURNALS OF THE AANS SINCE 1944

ARTICLE
Percutaneous posterior cervical fusion with the DTRAX Facet System for single-level radiculopathy: results in 60 patients
Clinical article
McCormack BM1, Bundoc RC, Ver MR, Ignacio JM, Berven SH, Eyster EF.

Does it Fuse?

- Clinical Data
- Facet Surface Area comparable to Interbody Space
- Fusion Distance in Facets shorter compared to Interbody Space

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Does it Fuse?

Fusion			
	6 months	12 months	24 months
Evidence of Bridging Trabecular Bone (%)	85.0%	93.3%	98.1%
Translational Motion < 2 mm (%)	98.3%	100%	100%
Angulation < 5° (%)	73.3%	83.3%	

C4 Facet Surface Area Comparable to Interbody Surface Area

20%+ Increase in Foraminal Area^{1,2}

Facet Articular Height Less than Disc Height

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Outcomes of this study

Significant Improvement in VAS: Neck & Arm

Visual Analogue Scale (VAS): Neck

Time	Score
Baseline	7.6
2 weeks	2.5
4 weeks	2.4
3 months	2.1
6 months	2.3
12 months	2.8
24 months	2.8

Visual Analogue Scale (VAS): Arm

Time	Score
Baseline	7.4
2 weeks	2.1
4 weeks	2.3
3 months	2.5
6 months	2.2
12 months	2.8
24 months	2.8

Comparable Improvement to ACDF & TDR

Clinical improvement similar to ACDF and CDA (Gold Standards)
Neck Disability Index (NDI)
NDI (Percentage): Comparable to ACDF & CDA

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Retrospective Study

- Retrospective Study of all subjects with Posterior Fusion with DTRAX
- 10 patients: 3 women 7 men
- All s/p ACDF with Psuedoarthrosis and recurring pain symptoms

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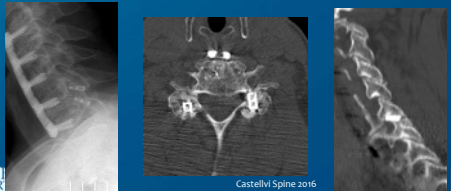
Materials and Methods

- Collecting VAS (5 points- neck, right and left shoulder and right and left arm)
- Neck Disability Index
- SF 12
- Neuro/Motor exam
- radiographs
- Earliest subject is 22 months out.
- Early data suggests good relief of arm and shoulder pain

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Outcomes


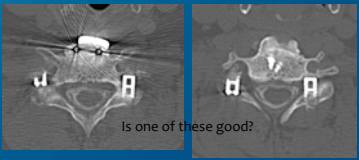
- 7 of the 11 patients are out 12 mos or better
- Fusion Rate is 100%
- 2 Complications
 - 1 patient was re-operated on for migration of the original DTRAX (before adding the bone screw) (first patient)



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Outcomes

2. Cage placed too close to nerve root-



Is one of these good?

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DTRAX Cases

Case 1; DB

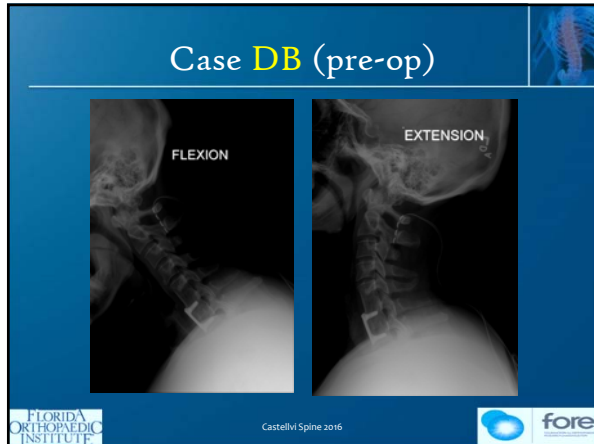
- ♣ Male 49y/o 6'1" 225lbs.
- ♣ Sheet/metal welder; electro mechanic
- ♣ c/o neck pain and parascapular pain w/ h/w and n/t on both upper extremities
- ♣ Post ACDF C5-C7 (1998 and 1999) and broken hardware revisions (2002) outside of FOI
- ♣ Posterior laminectomy/cervical spinal cord stimulator (July 2013)
- ♣ Post RFA C2-C6 (September 2013)

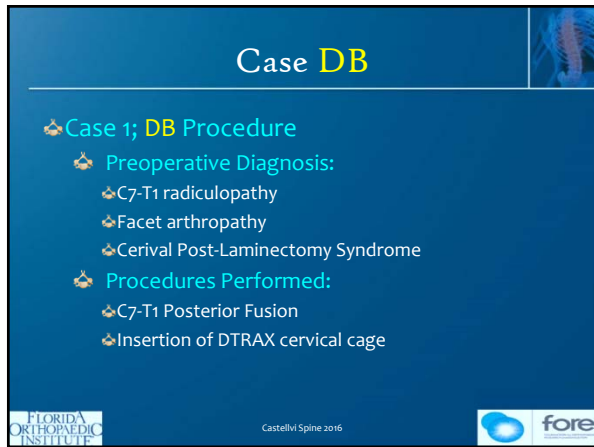
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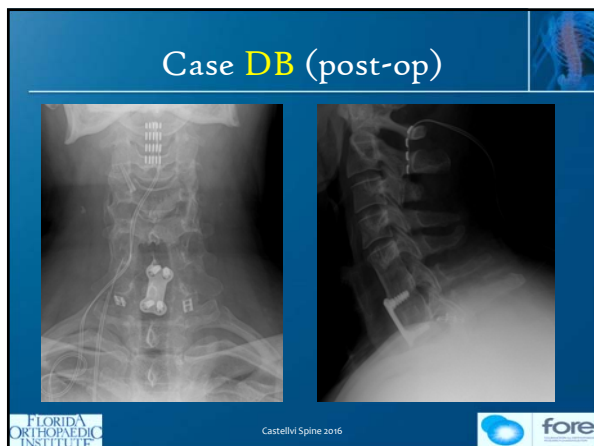
Case DB (pre-op)

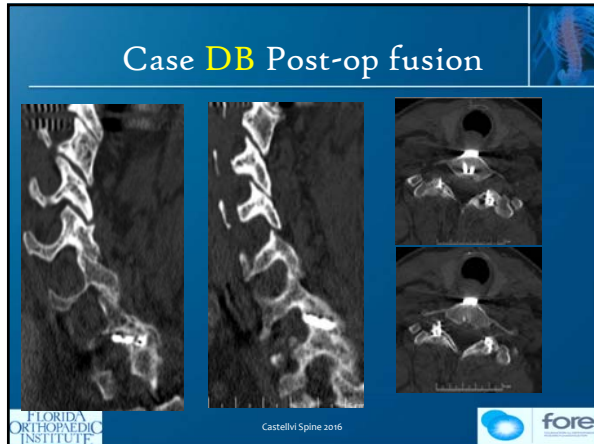


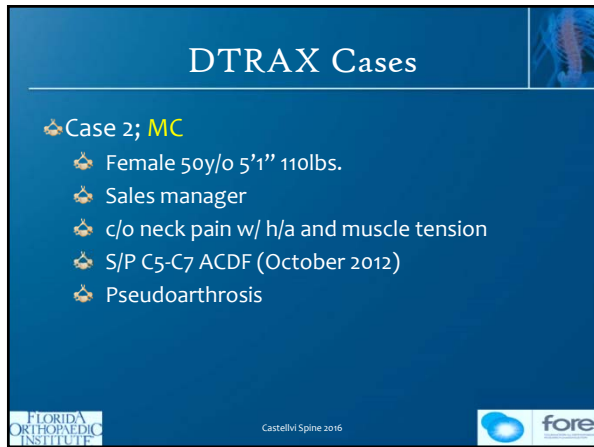
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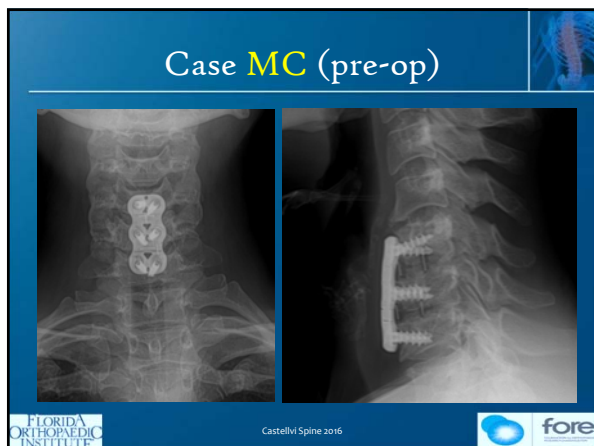


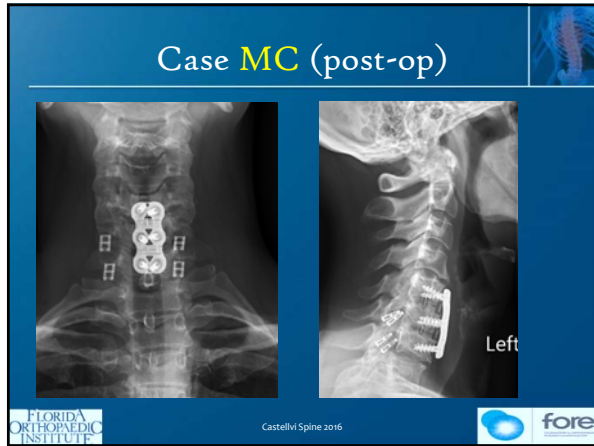


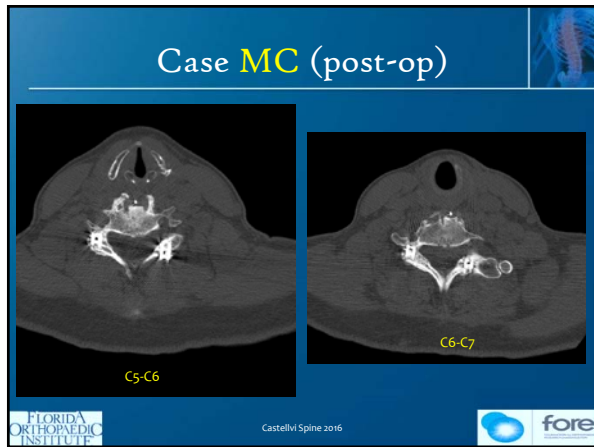


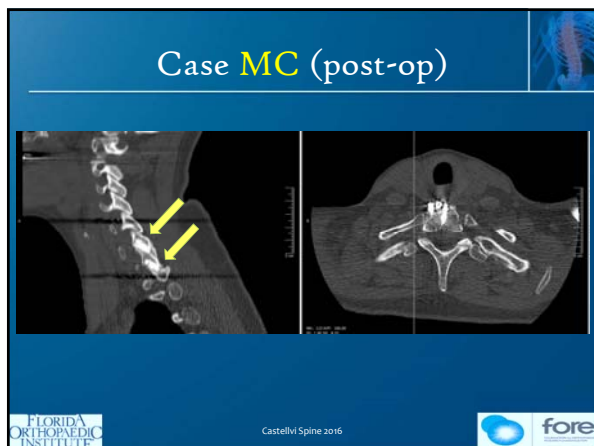













Case MC (post-op)




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Several months later

- 👉 Symptoms returned-
- 👉 MRI revealed anterolisthesis of C7 on T1
- 👉 And modic changes at C4-C5




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Case MC



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Summary

Our preliminary data at 1 year demonstrates that percutaneous distraction and fusion using the DTRAX facet system is a safe and effective treatment option with cervical psuedoarthrosis.

Thank you

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