

E-Presentation #6

ACDFs Supplemented with Cellular or Non-cellular Allografts have Equivalent Radiographic Fusion and Clinical Outcomes

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Clinical need for improved fusion in ACDF

- ACDF is a common surgical treatment for cervical radiculopathy and myelopathy
- High pseudarthrosis and revision rate^{1,2}
 - 11.1% reoperation rate for symptomatic pseudarthrosis²
- Surgeons are trying supplementation with allograft to try and improve fusion
 - Demineralized bone matrix (DBM)³
 - Osteoconductive and osteoinductive
 - Type 1 collagen w/ BMP but no live viable cells
 - ViviGen^{4,5}
 - Osteoconductive, osteoinductive, and osteogenic
 - Live viable osteoblasts, osteocytes, and bone lining cells

1. Fraser JF, Härtl R. Anterior approaches to fusion of the cervical spine: a metaanalysis of fusion rates. *J Neurosurg Spine*. 2007;6(4):298-303. doi:10.3171/spi.2007.6.4.2

2. Epstein NE. A Review of Complication Rates for Anterior Cervical Discectomy and Fusion (ACDF). *Surg Neural Int*. 2019;10:100. Published 2019 Jun 7. doi:10.25259/SNI-191-2019

3. Zhang H, Yang L, Yang XG, et al. Demineralized Bone Matrix Carriers and their Clinical Applications: An Overview. *Orthop Surg*. 2019;11(5):725-737. doi:10.1111/os.12509

4. LifeNet Health Data on File DHF 12-008, DHF 15-001, CC#52268.

5. Darveau, S. C., Leary, O. P., et al. (2021). Existing clinical evidence on the use of cellular bone matrix grafts in spinal fusion: updated systematic review of the literature, *Neurosurgical Focus FOC*, 50(6), E12.

Objective

To assess radiographic fusion and clinical outcomes after ACDF supplemented with cellular (ViviGen) or non-cellular (DBM) allografts

Methods

- Single surgeon's database was interrogated for consecutive patient's undergoing primary ACDF supplemented with DBM or ViviGen allograft from 2017-2019
- Flexion and extension radiographs obtained at 3, 6, and 12 months postop
- VAS-pain, NDI, EQ-5D, PROMIS, and EAT-10 were collected preop and at 3, 6, and 12 months postop
- Fusion assessed by two-independent reviewers
 - Motion between spinous processes <2mm
 - Bony bridging

Motion Between Spinous Processes



Figure 1: Motion between spinous processes is defined as the difference in distance between the tips of spinous processes on flexion and extension films. In this example, 14.5 mm on flexion radiograph minus 12.9 mm on extension radiograph is equal to 1.6 mm motion between spinous processes. Less than 2 mm motion is defined as fusion at the operative level.

6. Cannada LK, Scherping SC, Yoo JU, Jones PK, Emery SE. Pseudoarthrosis of the cervical spine: a comparison of radiographic diagnostic measures. *Spine (Phila Pa 1976)*. 2003;28:46–51.

Bony Bridging

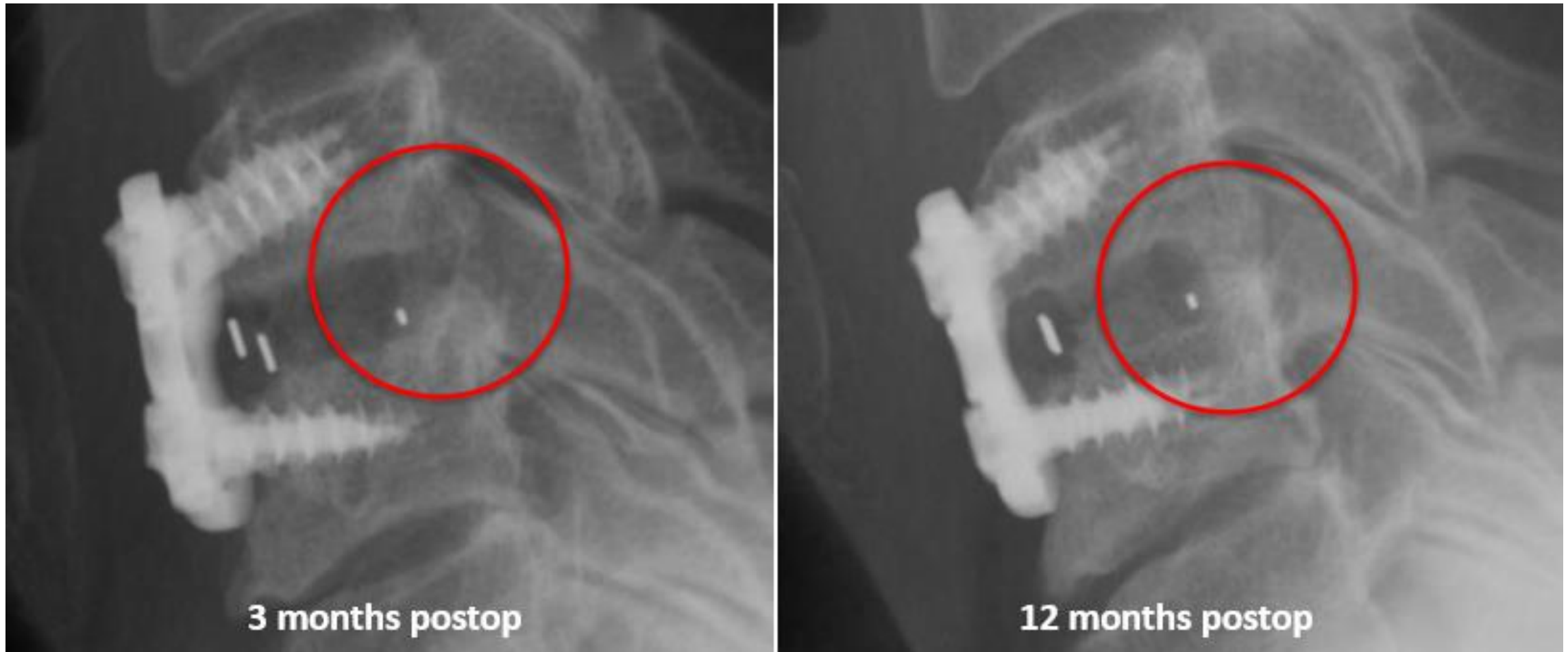


Figure 2: Complete bony bridging was defined as flowing trabecular bone between the vertebral bodies of operative levels. In this example, bony bridging is not present at 3 months but is present at 12 months postop.

Results

- 34 pts and 67 operative levels in cellular and non-cellular groups
- No significant difference in
 - age, smoking status, BMI, or gender ($p > 0.05$)
 - Number of 1-, 2-, 3-, or 4-level ACDFs
- **Motion between spinous processes**
 - No difference between groups at 3, 6, or 12 months postop ($p > 0.05$)
- **Bony bridging**
 - No difference between groups at 3, 6, or 12 months postop ($p > 0.05$)
- **When both $<2\text{mm}$ motion and bony fusion were used as criteria for fusion**
 - No difference in fused levels between groups at 3, 6, or 12 months postop ($p > 0.05$)
- No patient required revision ACDF for symptomatic pseudarthrosis; no difference in PROs at 12 months except improved EQ-5D and PROMIS-physical in the cellular group ($p = 0.03$); all pts met MCID for all PROs

Conclusion

- An equivalent percentage of patients were fused at all operated levels in the cellular and non-cellular groups at 3, 6, and 12 months postoperatively
- PROs were mostly equivalent between the cellular and non-cellular groups

Thus, ACDFs supplemented with cellular or non-cellular allografts have equivalent radiographic fusion and clinical outcomes.