CERVICAL SPINE FUSION RATES RELATED TO BONE GRAFT TYPE AND SPINAL LEVELS

Glenn R. Buttermann, MD, MS

Midwest Spine & Brain INSTITUTE

Background

- ACDF is a proven treatment for degenerative conditions with significantly improved long-term outcomes.
- Pseudarthrosis is related to suboptimal postoperative HRQoL.
- Fusion success depends, in part, on type of material used for bone graft.

Purpose

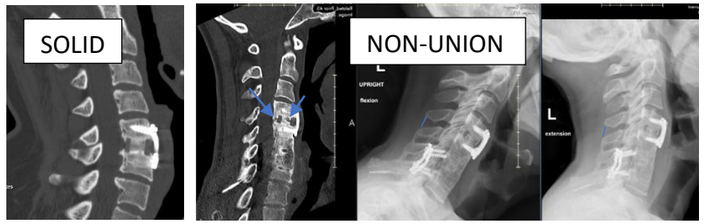
- Assess the fusion rate and improvement in clinical outcomes for ACDF comparing 4 types of bone graft: Autograft (IBG), Allograft (DBM, Progenix), Modified ceramic (I-Factor), Bone morphogenetic protein (0.3 mg/level BMP – off label)

Methods

- Comparative, non-randomized 4 cohort study, 2 year FU.
- Consecutive ACDF patients, Jan 2018 – Dec 2021 (4 years), from private practice & "care" system.
- Trauma, tumor, infection excluded.
- Technique: All had PEEK interbody and anterior plate.
- BMP used for patients with non-union risk factors:
  - Secondary surgeries (pseudo repair, adjacent levels)
  - History of pseudo elsewhere
  - 3 or more levels.

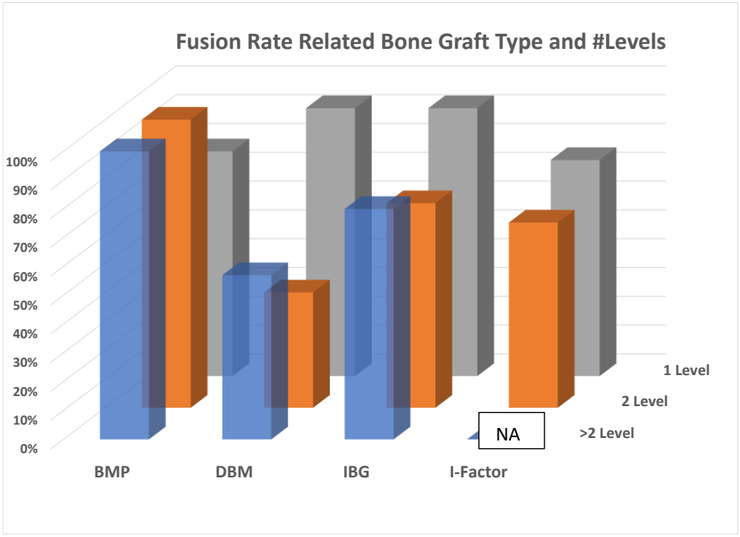
Clinical evaluation: prospective pre- & postop neck & arm VAS, NDI.

- Radiographic, pre- & postop:
  - Flexion/extension xrays, <2mm spinous process change
  - 1 year high resolution CT, cancellous bone *throughout* the interbody space without interruption
- If either of these criteria were not attained at any surgical level, then the patient was considered to have a nonunion:



Results

- 110 patients of which 94 (*85%*) had complete data (outcomes and radiographic)
- Mean age 59 y/o, 58% female
- Overall, *non-union rate 24%,* using strict criteria
- No differences in *age* between solid vs non-union groups
- Analysis by *bone graft type*, non-union rate: IBG (n = 35) = 21%, DBM, n = 18) = 56%, Enhanced ceramic (n = 17) = 21%, BMP (n = 22) = 9%.



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Results continued

ACDF Outcomes

	Fusion Status	
	Solid	Non-union
Pre-op Neck Pain	6.9	7.3
1st yr Neck Pain	2.9	5.1
2nd yr Neck Pain	2.5	4.7
Pre-op Arm Pain	4.9	5.1
1st yr Arm Pain	1.8	3.3
2nd yr Arm Pain	1.2	2.6
Pre-op NDI	53	57
1st yr NDI	27	41
2nd yr NDI	24	35

	Bone-Graft Type			
	IBG	DBM	I-factor	BMP
Pre-op Neck Pain	7.5	6.9	6.1	6.9
1st yr Neck Pain	3.9	4.4	1.8	3
2nd yr Neck Pain	2.8	4.8	1.8	1.8
Pre-op Arm Pain	5	6.4	3.6	5.3
1st yr Arm Pain	2.7	2.5	1	2.2
2nd yr Arm Pain	1.5	3	0.8	0.9
Pre-op NDI	54	60	52	53
1st yr NDI	32	41	20	32
2nd yr NDI	27	46	18	28

Conclusion

- Greater outcomes improvement with solid fusion.
- Highest fusion rate was in the BMP group (particularly for revision cases).
- Progenix DBM is the least expensive but has a high nonunion rate (>1 level ACDF) and only a modest improvement in outcomes.
- IBG and modified ceramic similar fusion rate for 1 & 2 level ACDF.