

Graft Resorption With the Use of Bone Morphogenetic Protein: Lessons From Anterior Lumbar Interbody Fusion Using Femoral Ring Allografts and Recombinant Human Bone Morphogenetic Protein-2.

Clinical Case Series

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Abstract:

Study Design. This is a prospective cohort study examining the results and radiographic characteristics of anterior lumbar interbody fusion (ALIF) using femoral ring allografts (FRAs) and recombinant human bone morphogenetic protein-2 (rhBMP-2). This was compared to a historical control ALIF using FRAs with autologous iliac crest bone graft (ICBG).

Objective. To determine whether the use of rhBMP-2 can enhance fusion ALIF with stand-alone FRAs.

Summary of Background Data. ALIF is a well-accepted procedure in reconstructive spine surgery. Advances in spinal surgery have produced a multitude of anterior interbody implants. The rhBMP-2 has promoted fusion in patients undergoing ALIF with cages and threaded allograft dowels. The FRA still remains a traditional alternative for anterior support. However, as a stand-alone device, the FRA has fallen into disfavor because of high rates of pseudarthrosis. With the advent of rhBMP-2, the FRA may be more attractive because of its simplicity and remodeling potential. It is important to understand the implications when rhBMP-2 is used with such structural allografts.

Methods. A total of 36 consecutive patients who underwent ALIF with stand-alone FRAs by a single surgeon (E.G.D.) at 1 institute were included. A cohort of 9 consecutive patients who received FRAs filled with rhBMP-2 was followed prospectively. After noticing suboptimal results, the senior author terminated this method of lumbar fusion. A total of 27 prior consecutive patients who received FRAs filled with autogenous ICBG were used for comparison. Analyzing sequential radiographs, flexion-extension radiographs, and computerized tomography with multiplanar reconstructions determined nonunions. Minimum follow-up was 24 months.

Results. Pseudarthrosis was identified in 10 of 27 (36%) patients who underwent stand-alone ALIF with FRAs and ICBG. Nonunion rate was higher among patients who received FRAs with rhBMP-2 (i.e., 5 of 9 [56%]). Statistical significance was not established because of the early termination of the treatment group ($P > 0.3$). Of interest, radiographs and computerized tomography revealed early and aggressive resorption of the FRAs when used with rhBMP-2. This preceded graft fracture and even disintegration, resulting in instability and eventual nonunion.

Conclusion. The use of rhBMP-2 did not enhance the fusion rate in stand-alone ALIF with FRAs. In fact, the trend was toward a higher nonunion rate with rhBMP-2, although this was not significant with the numbers