



Radiographic and CT Evaluation of Recombinant Human Bone Morphogenetic Protein-2-Assisted Anterior Cervical Discectomy and Fusion

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Introduction

Spinal fusion is often performed to restore spinal stability following surgery for spondylolisthesis, degenerative disc disease (DDD), trauma or infection. [1,2] In the specific setting of cervical radiculopathy due to DDD, anterior cervical discectomy and fusion (ACDF) is a standard-of-care treatment for patients who do not respond to conservative therapy. [3-5] Grafting in ACDF has traditionally been autograft, preferably iliac crest autograft. [6,7] Iliac crest autografts remain the most common site for obtaining autogenous bone grafts. [6] Providing an excellent source of both cortical and cancellous bone, iliac crest autografts are efficacious with respect to fusion. [6] However, grafting bone from the iliac crest is associated with significant morbidity, such as arterial or ureteral injury, herniation, chronic pain, nerve injury, infection, fracture and pelvic instability. [6] This has led to increased exploration for, and use of, alternatives to bone grafts such as synthetic grafts, demineralized bone, ceramics, calcium phosphatases and bone morphogenetic proteins (BMPs). [8-24]

Methods

This study included 26 patients who underwent single-level ACDF with

Results

A polyetheretherketone (PEEK) cage was used as an interbody disc spacer in all 26 patients. Patients were evaluated between two and six weeks after surgery and subsequently at 3, 6, 12, and 24 months postoperative. All patients underwent plain radiography at every follow-up visit, and CT evaluation was performed at 3, 6, 12, and 24 months as part of the study protocol. Earliest fusion was observed at three months in 38% of patients. Likely fusion was observed in all patients by 12 months postoperative.

Conclusions

rhBMP-2 leads to both successful interbody fusion and an enhanced fusion rate with unique imaging characteristics. Additional characteristics of rhBMP-2 observed in 100% of patients included pre-vertebral soft-tissue swelling and early endplate resorption. Other common features included PEEK cage migration, heterotopic bone formation, and cage subsidence.

Learning Objectives

Studies investigating spinal fusion assisted with recombinant human bone morphogenetic protein-2 (rhBMP-2) have yielded promising results, suggesting rhBMP-2 is an efficacious alternative to iliac crest autografts. rhBMP-2-assisted spinal fusion both hastens healing and eliminates patient morbidity from iliac crest autograft. Unique to rhBMP-assisted spinal fusion is its distinct radiographic fusion pattern as fusion is achieved. Despite promising results and increased clinical use of rhBMP-2, there remains a paucity of literature documenting this radiographic process. The objective of this study is to radiographically demonstrate the distinct fusion pattern of rhBMP-2 in the setting of anterior cervical discectomy and fusion (ACDF).

References