

Case Report

Symptomatic calcified perineural cyst after use of bone morphogenetic protein in transforaminal lumbar interbody fusion: a case report

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Received 17 February 2012; revised 17 December 2012; accepted 4 May 2013

Abstract

BACKGROUND CONTEXT: Human recombinant bone morphogenetic protein-2 (BMP-2) is commonly used in spinal surgery to augment arthrodesis, and a number of potential complications have been documented.

PURPOSE: To present the case of a delayed radiculopathy that occurred because of a calcified perineural cyst that formed after an L4–L5 transforaminal lumbar interbody fusion (TLIF) in which BMP-2 was used.

STUDY DESIGN/SETTING: Case report of a 70-year-old man presented with back and right lower extremity pain.

METHODS: A 70-year-old man who had previously undergone a right L4–L5 TLIF presented 20 months after surgery with progressively radiating right leg pain. Imaging revealed a right-sided L4–L5 cystic lesion posterior to the interbody cage. The patient underwent reexploration, and a calcified mass was discovered.

RESULTS: Histopathology revealed fragments of organized collagenous connective tissue, new collagen, and partially calcified fragments of fibrocartilage, bone, and ligament.

CONCLUSIONS: This is the first reported case of a symptomatic calcified perineural cyst developing after a fusion procedure in which BMP-2 was used. The presence of connective tissue with metaplastic bone formation and maturation within the lesion suggests that formation of the cyst was secondary to application of BMP-2, as it possesses both osteogenic and chondrogenic capabilities. © 2013 Elsevier Inc. All rights reserved.

Keywords:

Bone morphogenetic protein; Perineural cyst; Transforaminal lumbar interbody fusion

Introduction

Bone morphogenetic proteins (BMPs) comprise a group of numerous multipotent growth factors that belong to the transforming growth factor-beta superfamily and are

involved in a wide range of developmental processes throughout the body. They regulate the growth, differentiation, and apoptosis of various cell types, including osteoblasts, chondroblasts, neurons, and epithelial cells [1].

FDA device/drug status: Not approved for this indication (BMP-2).

Author disclosures: **KDT:** Nothing to disclose. **SUR:** Nothing to disclose. **PEM:** Royalties: Book Publishers (B); Speaking/Teaching Arrangements: INOVA (A); Trips/Travel: INOVA (B); Research Support: NIH (D, Paid directly to institution/employer); Grants: NIH (D, Paid directly to institution/employer). **ACW:** Fellowship Support: NRSA (F, Paid directly to institution/employer). **FLM:** Consulting: Globus Medical (C), Biomet (C); Royalties: Stryker (B), Globus Medical (B); Grants: Globus Medical (D, Paid directly to institution/employer); Fellowship support: Neurosurgery Research Education Fund (E, Paid directly to institution/employer). **PP:** Consulting: Globus Medical (C), Medtronic (B), DePuy (B); Grants:

NIH-co-investigator (H, Paid directly to institution/employer); Fellowship Support: Neurosurgery Research Education Fund (E, Paid directly to institution/employer).

The disclosure key can be found on the Table of Contents and at www.TheSpineJournalOnline.com.

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Given their role in osteogenesis, BMPs were shown to augment spinal fusion in dogs in the 1980s [2], and the use of human recombinant BMP-2 in human spine surgery began in the 1990s. Since that time, the use of BMP-2 in spinal surgery has escalated rapidly. With increased usage, the surgical community has documented a variety of complications associated with BMP-2. These complications have been arguably more severe in the cervical spine and have resulted in prohibition of BMP-2 usage in anterior cervical procedures by the US Food and Drug Administration.

In this case report, we describe the development of a calcified cystic lesion causing a delayed radiculopathy. Although ectopic bone formation is a well-known complication of BMP-2, only a single report of a noncalcified perineural cyst exists in the literature. We believe our case represents the first instance of a calcified perineural cyst developing as a complication of BMP-2. Other complications arising from BMP-2 use are also reviewed.

Case report

A 70-year-old man presented with back and right lower extremity pain. The patient initially presented 3 years previously with back pain of approximately 2-year duration. He also had more recent activity-induced right leg pain radiating from his buttock down the lateral aspect of his leg to the ankle. These symptoms were refractory to conservative therapy. Imaging revealed right L4–L5 lateral recess stenosis. The patient underwent a right L4–L5 laminotomy without complication.

Postoperatively, the patient noted relief of his preoperative symptoms for 3 months, at which time his right lower extremity pain recurred. Repeat imaging revealed a right L4–L5 disc herniation, and the patient underwent an uncomplicated L4–L5 laminectomy and discectomy. The

patient recovered from this procedure with improvement of his symptoms but 8 months later returned with increased back, groin, and left buttock pain. Repeat imaging at that time revealed recurrent right-sided disc herniation at L4–L5 and Grade I spondylolisthesis. The patient underwent a repeat discectomy followed by right L4–L5 transforaminal lumbar interbody fusion (TLIF). Bone morphogenetic protein-2 (Infuse; Medtronic, Memphis, TN, USA) was placed in the interbody cage and disc space to maximize fusion. One small Infuse kit was used in which 4.2 mg of BMP-2 was placed onto two absorbable collagen sponges. One half-sponge (1.1 mg BMP-2) was placed into the anterior third of the disc space with local autograft bone. The other half-sponge was placed into the cage, which was then inserted into the disc space. The remaining sponge was divided and placed in the lateral gutters to obtain a posterolateral fusion. Postoperatively, the patient noted improvement in his symptoms.

Approximately 20 months after surgery, however, the patient presented with increasing right lower extremity

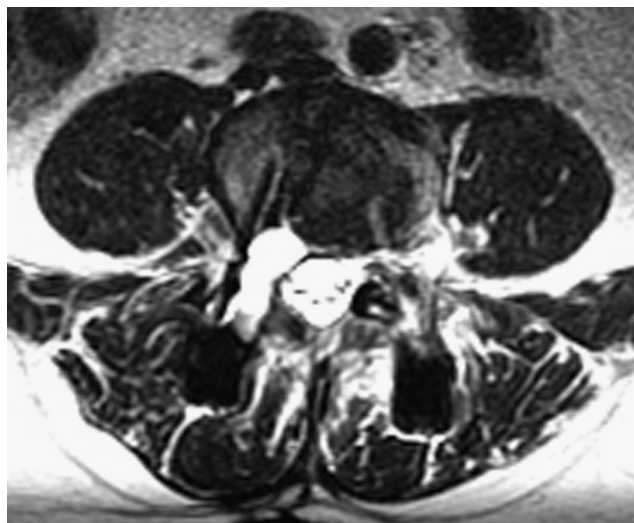


Fig. 1. Axial T2-weighted magnetic resonance imaging revealing right-sided cystic collection at the L4–L5 level.

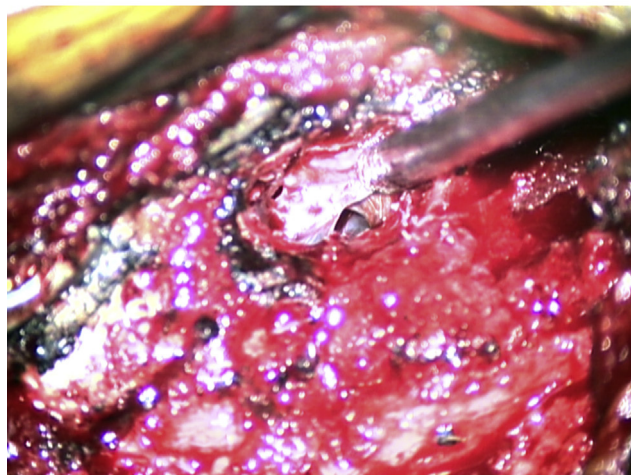
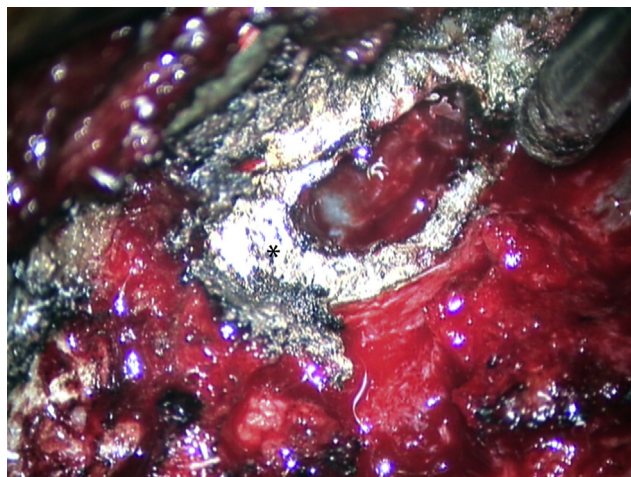


Fig. 2. (Top) Intraoperative photograph of right-sided L4–L5 calcified cyst with a hole created in the bony “shell” (asterisk) of the cyst, allowing visualization of the heterogenous inner contents. (Bottom) Intraoperative photograph showing collagenous septations within the cyst.

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