Epidural Cement Leakage Through the Adjacent Disc in Kyphoplasty: A Case Report

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Summary

A 56-year-old woman with a T8 fracture, underwent percutaneous kyphoplasty using polymethyl methacrylate. An epidural cement leakage had occurred through the T7-T8 disc without the cement reaching the posterior part of the T8 vertebral body. This leakage did not cause any neurological deficit or any complaint. The patient's complaint of back pain was resolved and three days after the kyphoplasty she was discharged, without any neurologic deficit. The described leakages into the spinal canal by now, had occurred through fractures or deficiencies in the vertebral cortex or by injection of cement into the basivertebral vein. Our case showed that epidural cement leakage can occur from the adjacent discs through a radial annular tear as well as from the fractured posterior wall of the vertebral body directly. Physician should remain aware about such complications.

Key words: Kyphoplasty; complications; epidural; cement leakage

INTRODUCTION

PMMA cement leakage in kyphoplasty does occur though it is relatively rare. In their review Hulme et al found 41% cement leakage rate in vertebroplasty and 9% in kyphoplasty procedures(2). Cement leakage can occur in adjacent discs, and anterior, lateral, posterior to the vertebral body(12).

We report a case of intra-operative cement leakage into the spinal canal through the upper adjacent disc during balloon kyphoplasty. To our knowledge this kind of leakage haven't been reported before in the literature previously.
CASE PRESENTATION

A 56-year-old female was admitted to our hospital with back pain. Complaints started 1.5 months ago with falling from stairs. There was tenderness with percussion of the lower thoracic spine without any neurologic deficit. MRI revealed a type A1(5) fracture of T8. Because our clinic's policy is not to take the risk for kyphosis progression especially in the postmenopausal female patients, conservative treatment wasn't considered and a percutaneous left-sided unilateral balloon kyphoplasty was performed. After inflating a 15-mm balloon, it was started to inject the PMMA into the T8 vertebral body. When the first filler device (1.5 cc) completed, it was noted a small amount of cement was leaked into the adjacent T7-T8 disc. The cement hadn't been reached to the posterior 1/3 part of the T8 vertebral body. We waited for about a minute expecting the cement, in the crack(s) of the upper end plate, to harden and serve as a plug. But when we injected additional 0.5 cc PMMA, a leakage from the T7-T8 disc to epidural space was noted (Figure 1, 2, 3 and 4). We stopped to inject the cement and terminated the procedure. The patient was examined immediately and no neurological deficit was determined. The patient's complaint of back pain was resolved and three days after the surgery she was discharged, without any neurologic deficit.

Figure 1: Lateral thoracic radiograph shows the cement leakage into the T7-T8 disc and spinal canal. Black arrows indicate the epidural cement located at the T7-T8 disc level, posterior to the line that linking the T7 and T8 posterior vertebral borders. White arrowhead indicate the posterior border of the T8 vertebral body.

Figure 2: Axial CT scan passing through the T8-T9 disc space. The cement can be seen in the right side of the epidural space, in the right T7-T8 intervertebral foramen and in the T7-T8 disc space.
DISCUSSION

Cement extravasation can occur during the kyphoplasty procedure. The cement viscosity, injected cement volume, and the vertebral body wall incompetence were the critical factors affecting the cement leakage\(^9\). Yeom et al. described three different types of cement leakages after percutaneous vertebroplasty such as type S leak via the segmental vein, type B via the basivertebral vein and type C through a cortical defect\(^{13}\). This classifying can also be adapted to percutaneous kyphoplasty. Type C leakages can occur in any place around the vertebra depending where the cortical fracture is. Cement leakage into the superior or anterior disc also should be considered as type C leakages. Becker et al. reported that most leakages were superior and anterior (15% and 10% respectively); only 2% were posterior\(^1\). A systematic review of 69 clinical studies of the literature by Hulme et al found 48% paraspinal, 38% intradiscal, 11% epidural, 1.5% pulmonary and 1.5% foraminal leakages rates for kyphoplasty procedures\(^2\).

Paraspinal and intradiscal cement leakages are usually asymptomatic. Recent literature show that there is no specific impact of intradiscal leakages on the occurrence of adjacent secondary fractures\(^{3,8}\). Epidural leakage however, both in vertebroplasty and in kyphoplasty\(^7\) may cause devastating neurological deficits such as paraplegia. Because of this risk,
minimizing the cement leaks should be a goal with all cement augmentation procedures. For this purpose some precautions have been proposed. Schmidt et al. suggested to stop the injection, if cement reaches the posterior part of the vertebra. They say this lowers the risk of a cement leak in case of posterior wall fracture (Yeom type C leakages)\(^{(11)}\). Robinson et al. emphasized that correct placement of the balloon, high viscosity of the PMMA cement, controlled application of the cement in to the vertebra, and limitation of the applied volume reduce the risk of leakage\(^{(10)}\). In Zou et al.’s paper it has been proposed small amounts of middle- or late-stage bone cement of dough phase can be used initially to block the defect during surgery in order to avoid later bone cement leakage from the defect\(^{(14)}\).

Radial annular tears are associated with disc degeneration and usually occur in the lumbar discs,\(^{(6)}\) but also possible in the thoracic spine. With time and/or trauma these tears will progress outwardly (radically). The cement might have leaked to the epidural space through a preexisting full thickness radial annular tear as in extruded disc herniations. The full thickness radial annular tear on the T8-T9 disc in our case might be existed before the patient's fall or a simple radial tear became a full thickness radial tear after trauma.

Though cement leakage into the disc in the vertebral augmentation procedures is a well-known complication and many such cases were reported in the literature\(^{(4)}\), the main discussion has been made about if the cement leakage into the disc increases the risk of new fracture or not. What we want to emphasize here, seemingly harmless intradiscal cement leakage can be turn into dangerous epidural cement leakage if we continue to inject the cement and if there is preexisting full thickness radial annular tear. As conclusion, epidural cement leakage in kyphoplasty can occur from the adjacent discs through a radial annular tear as well as from the fractured posterior wall of the vertebral body directly. Physician should remain aware about such complications.

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