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Case Report

Lateral wedging of the cemented vertebra after balloon kyphoplasty: a case report

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Abstract: Balloon kyphoplasty has been shown to be safe in treatment of vertebral compression fractures refractory to conservative management. However, few reports have focused on lateral wedging of cemented vertebra after kyphoplasty. A 72-year-old woman with a T12 osteoporotic compression fracture underwent kyphoplasty using polymethylmethacrylate (PMMA) via a bipedicular approach. The patient felt pain free, whereas she did not receive anti-osteoporosis treatment after the surgery. The abnormal spatial distribution of PMMA cement within the T12 vertebral body and cement leakage right lateral to the vertebral body was observed in postoperative radiographs. Twelve months later, lateral wedging of the cemented vertebra was detected in plain radiographs. In the kyphoplasty procedure, symmetric cement filling should be achieved to avoid lateral wedging of the cemented vertebra. Postoperative anti-osteoporotic medication treatment is also very important.

Keywords: Kyphoplasty, osteoporosis, vertebral compression fracture, lateral wedging.

Introduction

Balloon kyphoplasty is a minimally invasive surgical treatment for vertebral compression fractures, especially in the setting of osteoporosis, metastasis, myeloma, and vertebral angioma [1].

Although kyphoplasty has been demonstrated to be a safe treatment method, it is not free of complications. Various complications of this procedure, including migration of cement into the venous system [2, 3], infection [4], new fractures [5], and refracture of the cemented vertebra [6, 7], have been documented.

However, few reports have focused on lateral wedging of cemented vertebra after kyphoplasty. Here, we reported a patient who presented with lateral wedging of osteoporotic vertebral body at the previously kyphoplasty-treated vertebral level. The clinical and radiological characteristics were investigated to analyze the possible causes of cemented vertebrae lateral wedging after kyphoplasty.

Case report

A 72-year-old woman with a T12 osteoporotic compression fracture underwent kyphoplasty using polymethylmethacrylate (PMMA) via a bipedicular approach at a local hospital. The patient felt pain free, whereas she did not receive anti-osteoporosis treatment after the surgery. Postoperative radiographs showed that the anterior vertebral body height and kyphotic angle were partially corrected after the kyphoplasty treatment. There was no coronal imbalance. However, the abnormal spatial distribution of PMMA cement within the T12 vertebral body and cement leakage right lateral to the vertebral body was observed (**Figure 1**). Twelve months later, she presented with back pain of several weeks. Plain radiographs showed T12 vertebra right lateral wedging (**Figure 2**). Magnetic resonance imaging (MRI) showed that right side of T12 vertebra was significantly compressed and height of left side was maintained, and there was edema in the L3 vertebra without vertebral compression (**Figure 3**). Bone mineral analysis showed osteo-

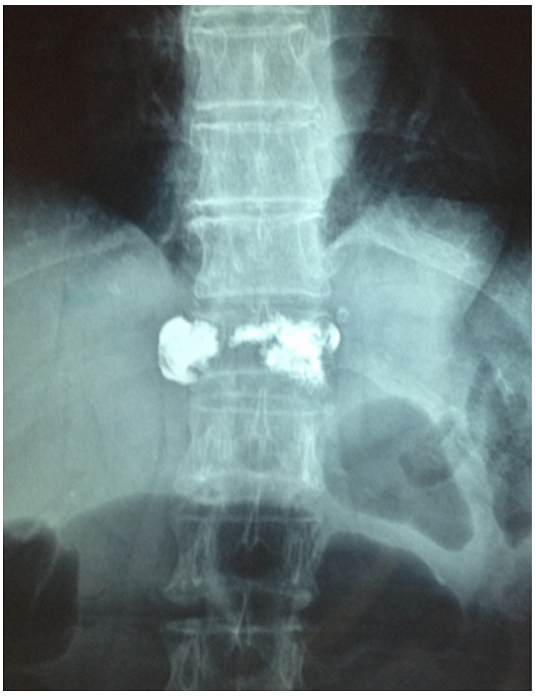

Figure 1. Immediate postoperative anteroposterior radiograph showed the abnormal spatial distribution of PMMA cement within the T12 vertebral body and cement leakage right lateral to the vertebral body. Insufficient filling of PMMA cement was noted on the right side. There was no obvious coronal imbalance.

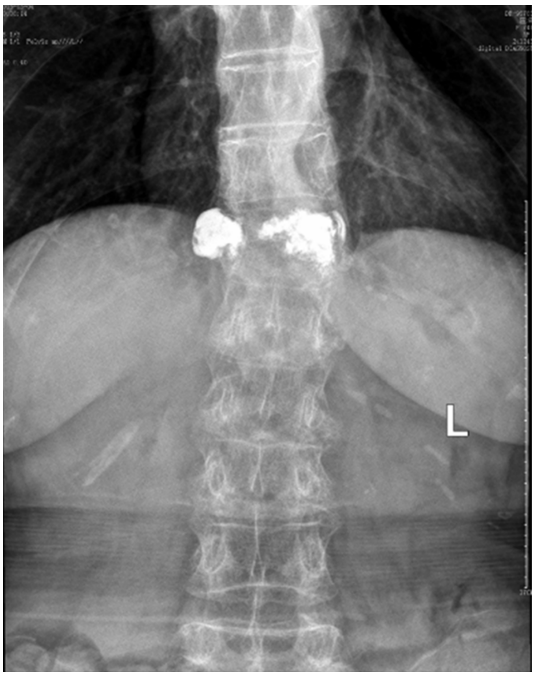

Figure 2. Twelve months after the kyphoplasty procedure, anteroposterior radiograph showed T12 vertebra right lateral wedging.

porosis with a T-score of -3.3. The patient then received conservative treatment and her anti-osteoporotic medication treatment was supervised.

Discussion

The phenomenon of lateral wedging of the cemented vertebra after PMMA augmentation has never been reported previously. The consequences of lateral wedging of the cemented vertebra include progressive imbalance of the vertebral body leading to scoliosis that may adversely affect physical function and quality of life. The present case extremely raised our conserns not only due to its rarity but also the etiological factor underlying its occurrence.

Asymmetric distribution of cement may be the most important risk factor associated with lateral wedging of the cemented vertebra. Lieschner et al. emphasized asymmetric distributions led to the unilateral loading of the vertebra, and, consequently, spine instability [8]. Chen et al, in a cadaveric study, also demonstrated that if bone cement is augmented only on one side, the stiffness of non-augmented side will be significantly lower than the augmented side, which might lead to an imbalance of stress on the vertebrae and subsequently to a wedging or collapse of the biomechanically weaker side [9].

Additionally, severe osteoporosis might play a role in the present case. The patient's severe osteoporosis and noncompliance with osteoporosis medication after kyphoplasty treatment would further accelerate bone mass loss and decrease the stiffness of the biomechanically weaker side, inducing lateral wedging finally.

Traditionally, the standard technique for kyphoplasty involves cannulating both pedicles and placing double balloons into the vertebral body [10]. Garfin et al [1] described double balloons are generally used to provide en masse reduction. Recently, a few studies have reported that unipedicular kyphoplasty could safely and effectively treat vertebral compression fractures and the outcomes were comparably satisfactory with bipedicular treatment [11-13]. However, the presence of cement across the vertebral midline to achieve symmetric filling is essential for unipedicular kyphoplasty. We recommend that if the surgeon is unsatisfied with

Figure 3. MRI showed right side of T12 vertebra was significantly compressed (A) and height of left side was maintained (B).

the balloon position or the extent of balloon inflation or cavity created in the procedure of unipedicular kyphoplasty, bipedicular procedure should be performed.

Conclusion

In the kyphoplasty procedure, symmetric cement filling should be achieved to avoid lateral wedging of the cemented vertebra. Postoperative anti-osteoporotic medication treatment is also very important.

Disclosure of conflict of interest

None.

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