Case report

Herniated disc of lumbar spine caused by bone cement leakage after kyphoplasty – A case report and literature review

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ABSTRACT

Introduction and importance: To describe an unusual case with herniated disc caused by bone cement leaking to disc space after kyphoplasty.

Case presentation: We reported a 72-year-old woman with L4 osteoporotic compression fracture. New-onset of left sciatica, numbness and intermittent claudication suffered her immediately after kyphoplasty. Herniated disc caused by bone cement leaking to disc space after kyphoplasty. The patient was post decompressive operation of L3-L4 and the symptoms subsided well then.

Clinical discussion: Percutaneous vertebroplasty (PVP) was a common procedure today. Especially for back pain caused by osteoporotic fracture, reported pain relief rate was satisfactory. Current studies about bone cement leakage showed kyphoplasty less than vertebroplasty. However, for the mechanism and stress effect of balloon expansion, new weak points and cracks over endplate was created, which may cause bone cement leakage to disc space and related symptoms.

Conclusion: Kyphoplasty was a common, effective and minimal invasive operation for patients with compression fracture of spine. Cement leakage to intervertebral disc space was generally asymptomatic, but it should be avoided as much as possible. The leakage could affect the stability and weight-bearing of spinal column. Accelerated degenerative process of disc would be found and newly herniated disc would be noted. It should be ceased the procedure when relative amount of bone cement leakage to disc space during kyphoplasty.

1. Introduction

Kyphoplasty was a common, effective and minimal invasive operation for patients with osteoporotic compression fracture of spine. The operation was generally satisfactory which pain subsided and exertion increase. Bone cement leakage was a common complication, however, it was not resulted in serious consequences. Current studies about bone cement leakage showed kyphoplasty less than vertebroplasty. We reported a 72-year-old woman with L4 osteoporotic compression fracture. New-onset of left sciatica, numbness and intermittent claudication suffered her immediately after kyphoplasty. Delay onset of herniated disc caused by bone cement leaking to disc space had confirmed. Cement leakage to intervertebral disc space was generally asymptomatic, but it should be avoided as much as possible. The leakage could affect the stability and weight-bearing of spinal column with accelerated degenerative process of disc and newly herniated disc would be noted. It should be ceased the procedure when relative amount of bone cement leakage to disc space during kyphoplasty. This case report has been reported in line with the SCARE Criteria [1].

2. Presentation of case

We reported a 72-year-old female with severe low back pain while exertion. Symptoms improved after lying down. The symptoms localized over buttock area and not extending to lower limbs. She had history of receiving L2 kyphoplasty due to traumatic history weeks ago. Image survey showed L4 compression fracture. The patient was post kyphoplasty over L4 (Fig. 1). The back pain improved well then. However, she complained tenderness and numbness over left lower limb immediately after the procedure. Intermittent claudication suffered her as well. Follow-up MRI showed bone cement leakage in L3-L4 disc space causing herniated disc, left side (Fig. 2). Which was compatible with clinical
symptoms. The patient was post decompressive operation of L3–4 and the symptoms subsided well then.

3. Discussion

Percutaneous vertebroplasty (PVP) was a common procedure today. Especially to back pain caused by osteoporotic fracture, reported pain relief is achieved in approximately 70%–100% [2,3]. However, cement leakage could often be found with reported rates between 11% and 73% [2,3,4]. The leakage could be found mostly at venous plexus, extended out of the bone cortex to intradiscal space, epidural, foraminal and paravertebral areas [5,6,7,8]. Severe complications related to spinal stenosis even needed emergent surgical intervention.

Cement leaking to disc space was common seen around 25% to 41% of patients after vertebroplasty [5,9]. There were no significant relationship between age, sex, type of fracture, amount of deformity, fracture location in the vertebral column and cement leakage [5]. The shape of the vertebral collapse (gibbus, vertebra plana, H shape) was not associated with cement leakage [10]. However, it should be aware of needle tip penetrating through the intact endplate while advancing [5]. Besides, if continuation of vacuum clefts extending into the disc space, the risk of cement leakage into these area would increase [5]. Though most intervertebral leakage to disc space was asymptomatic initially, long-term mechanical consequences on adjacent vertebrae were noticed [11]. During previous studies, the bone cement and related augmentation would increase stiffness of the motion segment and related loading pressure to nucleus [14,15]. Adjacent body fracture and herniated disc might be observed through cement leakage [12,13]. Besides, bone cement leakage to intradiscal space was found being risk factors of new compression Fractures in adjacent vertebrae after percutaneous vertebroplasty [12,16].

In our case, we done balloon kyphoplasty then cement injection. The leakage rate of kyphoplasty was 5 to 30% [17,18,19]. On the other hand, vertebroplasty from 31 to 96% [17,20,21]. The leakage rate showed less
of kyphoplasty comparing to pure vertebroplasty. However, for the mechanism and stress effect of balloon expansion, new weak points and cracks over endplate was created, which may cause bone cement leakage to disc space. The leakage cement affected the weight-bearing system of adjacent vertebrae after percutaneous vertebroplasty, Asian Spine J. 5 (2011) 601–607.

A. Polieke, L.P. Nolte, S.J. Ferguson, The effect of cement augmentation on the load transfer in an osteoporotic functional spinal unit: finite-element analysis 28 (2003) 991–996.

M.H. Kim, A.S. Lee, S.H. Min, S.H. Yoon, Risk factors of new compression fractures in adjacent vertebrae after percutaneous vertebroplasty, AsianSpine J. 5 (2011) 180–187.

R.S. Taylor, R.J. Taylor, P. Fritzell, Balloon kyphoplasty and vertebroplasty for vertebral compression fractures: a comparative systematic review of efficacy and safety 31 (2006) 2747–2755.

D.R. Fourney, D.F. Schomer, R. Nader, J. Chlan-Fourney, D. Suki, K. Ahrar, L.D. Rhines, Z.L. Gokaslan, Percutaneous vertebroplasty and kyphoplasty for painful vertebral body fractures in cancer patients, J. Neurosurg. 98 (2003) 21–30.

C. Kasperk, J. Hillmeier, G. Noldge, I.A. Grafe, K. Dafonseca, D. Raupp, et al., Treatment of painful vertebral fractures by kyphoplasty in patients with primary osteoporosis: a prospective nonrandomized controlled study, J. Bone Miner. Res. 20 (2005) 604–612.

A. Gangi, B.A. Kastler, J.L. Dietemann, Percutaneous vertebroplasty guided by a combination of CT and fluoroscopy, Am. J. Neuroradiol. 15 (1994) 83–86.

Payam Mounavi, Sandra Roth, Joel Finkelstein, Gordon Cheung, Cari Whyne, Volumetric quantification of cement leakage following percutaneous vertebroplasty in metastatic and osteoporotic vertebrae, J. Neurosurg. 99 (2003) 56–59.