



Percutaneous Endoscopic Retrieval of Intraspinial Cement Leakage: Technical Note

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■ **OBJECTIVE:** We sought to preliminarily explore the efficacy and safety of percutaneous endoscopic spinal surgery for epidural cement leakage. We report a case series of patients who underwent percutaneous retrieval of leaked epidural cement and achieved spinal decompression under endoscopy.

■ **METHODS:** Five patients with neurologic impairment due to epidural cement leakage after percutaneous vertebroplasty were treated with percutaneous endoscopic spinal decompression. Computed tomography reconstruction and 3-dimensional imaging were used to evaluate the extruded material. During follow-up at 3, 6, and 12 months postoperatively, all patients were advised to undergo plain radiograph and computed tomography examinations.

■ **RESULTS:** The leaked epidural cement was successfully removed in all patients under percutaneous endoscopy through a unilateral or bilateral approach. At the 12-month follow-up, the visual analog scale score of all patients improved. In addition, the neurologic function of each patient improved to at least 1 grade level, as evaluated using the American Spinal Injury Association. According to the modified MacNab criteria, 2 patients had excellent recovery, whereas the other 3 patients had good recovery.

■ **CONCLUSIONS:** We described a novel and minimally invasive procedure to ameliorate intractable epidural cement extrusion. As an alternative to conventional laminectomy, percutaneous endoscopic retrieval achieved the targeted decompression without damaging the posterior lamina. Moreover, the whole operation was performed

under regional anesthesia accompanied with dexmedetomidine sedation, allowed real-time neural function evaluation, and had lower risks of anesthesia-related complications, compared with general anesthesia.

INTRODUCTION

Percutaneous vertebroplasty (PVP), involving the percutaneous injection of polymethylmethacrylate (PMMA) into a collapsed vertebral body, was first described by Galibert et al¹ for the treatment of a hemangioma at the C2 level. Currently, it has gained widespread acceptance as an effective and safe therapeutic procedure for painful osteoporotic spinal compression fracture and spinal metastasis.²⁻⁶ However, compared with complications such as transitory fever, transient worsening of pain, cement extravasation, pulmonary embolism, infection, epidural hematoma, rib fracture, and adjacent vertebral body fractures, intraspinal cement leakage with obvious neural deficit was the most disastrous and intractable.⁷⁻¹⁷ Generally, an urgent and extensive laminectomy is required to completely remove the intraspinal extravasated material.^{8,9}

In the era of microinvasive surgery, percutaneous endoscopic spinal surgery (PESS) for cervical, thoracic, and lumbar degenerative diseases could achieve sufficient decompression under continuous visualization, thereby concurrently minimizing operation-related traumas and maximizing the preservation of patients' functioning.¹⁸⁻²¹ To preliminarily explore the efficacy and safety of PESS for epidural cement leakage, we first report a case series of patients who underwent percutaneous retrieval of leaked epidural cement and who achieved spinal decompression under endoscopy.

Key words

- Cement leakage
- Endoscopes
- Minimally invasive surgery
- Percutaneous vertebroplasty
- Polymethylmethacrylate

Abbreviations and Acronyms

ASIA: American spine injury association

CT: Computed tomography

PESS: Percutaneous endoscopic spinal surgery

PMMA: Percutaneous polymethylmethacrylate

PVP: Percutaneous vertebroplasty

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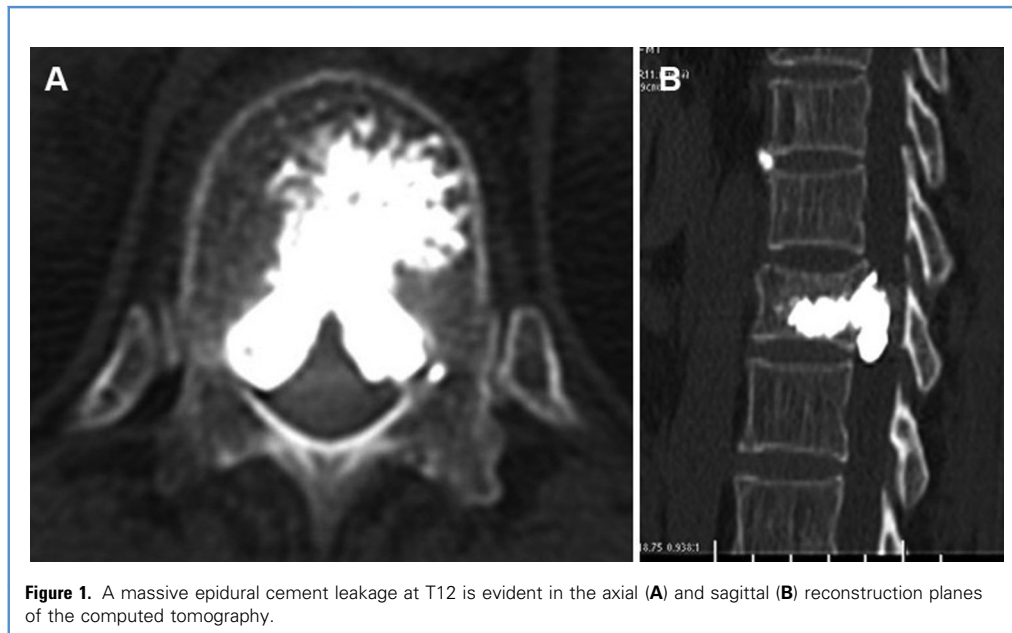


Figure 1. A massive epidural cement leakage at T12 is evident in the axial (A) and sagittal (B) reconstruction planes of the computed tomography.

METHODS

Patients

From May 2014 to May 2017, patients who had epidural cement leakage after undergoing PVP from another institution and were transferred to our hospital were included in this study. They developed neurologic symptoms (radiating pain, weakness, or sphincter disturbances); hence they underwent percutaneous endoscopic spinal decompression 1 day after the cement leakage.

Computed tomography (CT) reconstruction was used to evaluate the leakage condition (Figure 1). Table 1 shows the patient demographic data, previous PVP level, and unilateral/bilateral leakage condition. The neurologic status of the patients was evaluated using the American Spinal Injury Association (ASIA) classification and the modified MacNab criteria.²² All patients complained of radiating pain in the lower extremity, which was measured using the visual analog scale (ranging from 0 [no pain] to 10 [extremely severe pain]). During follow-up at 3, 6, and 12 months postoperatively, all patients were advised to undergo plain X-ray and CT examinations. The informed consent was provided by the patients to participate in the study. This study was approved by the ethics committee of the Second Affiliated Hospital of Chongqing Medical University and the Honghui Hospital of Xi'an Jiaotong University.

SURGICAL TECHNIQUE

The patients were placed in supine position under intravenous regional anesthesia. The local anesthetic agent used consisted of a 20-mL mixture of lidocaine, bupivacaine, and saline at a ratio of 1:1:1. Dexmedetomidine (0.5 µg/kg bolus, followed by 0.1–0.5 µg/kg/hour) was injected intravenously to provide the desired level of sedation. On the basis of the distribution of the

leaked cement as shown on the preoperative CT reconstruction, 1 or two 2-cm deep paramedian skin incisions were made at the level of the intervertebral foramen of the pathologic vertebra. The tip of the guide rod was placed on the lateral surface of the facet joint under fluoroscopic guidance (Figure 2A and B). The guide rod was tilted into the intervertebral foramen using a “sliding technique” (Figure 2C). After a sequential dilation, the working sheath was then advanced into the extraforaminal region through the guide rod. A diamond high-speed burr (SPINENDOS Drill system, SPINENDOS GmbH, Munich, Germany) was used to undercut a part of pedicle and superior facet joint (Figure 2D). Hence the working cannula could be easily advanced into the inner foraminal zone through the enlarged foramen. During pediculoplasty, the previous channel used for cement injection, the extravasated cement, and dural sac could be visualized successfully under an endoscope (Figure 3A–C). A low-energy bipolar flexible radiofrequency probe (Ellman Trigger-Flex Probe, Ellman International, Hewitt, New York, USA) was used to control the intraoperative bleeding. As the leaked

Table 1. Demographic Characteristics, Previous Surgical Level, and Leakage Type

Age (years)	74.4 ± 8.6
Gender (male/female)	3/2
Previous surgical level	
L1	2
T12	3
Leakage type	
Unilateral leakage	4
Bilateral leakage	1

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