Thoracic Epidural Hematoma Complicating Vertebroplasty

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF 1 **Cumhur Kaan Yaltırık**
ABCDEF 2 **Selçuk Özdoğan**
ABCDEF 3 **Başar Atalay**

1 Department of Neurosurgery, Yeditepe University School of Medicine, Istanbul, Turkey
2 Department of Neurosurgery, İstanbul Training and Research Hospital, Istanbul, Turkey
3 Department of Neurosurgery, Yeditepe University School of Medicine, Istanbul, Turkey

Corresponding Author: Selçuk Özdoğan, e-mail: drselcukozdogan@hotmail.com
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Patient: Female, 64
Final Diagnosis: Thoracic epidural hematoma
Symptoms: Paraplegia
Medication: —
Clinical Procedure: Thoracal hemilaminectomy
Specialty: Neurosurgery

Objective: Diagnostic/therapeutic accidents
Background: Percutaneous vertebroplasty procedures are commonly used to treat vertebral fractures. These techniques may be associated with major complications.

Case Report: We present here a case of a 64-year-old female patient with T9 and T10 acute osteoporotic fractures, treated previously with vertebroplasty for four levels of osteoporotic vertebral fractures. The patient was treated by T9–T10 vertebroplasty. The post-operative neurological examination was normal. Two hours later, she progressively worsened and developed paraplegia. Magnetic resonance imaging (MRI) revealed a hyper-acute epidural hematoma over the T6 to T10 vertebrae. Evacuation of the epidural hematoma completely resolved her motor weakness. Previous literature reports one case with a thoracolumbar epidural hematoma over T11–L2 and another case with a L1 epidural hematoma after vertebroplasty.

Conclusions: Percutaneous vertebroplasty is generally a safe procedure but can have rare complications. Epidural hematoma after vertebroplasty is one of the uncommon complications. Before percutaneous vertebroplasty, patients should be informed about these rare complications. Prognosis is very good if early intervention is possible.

MeSH Keywords: Hematoma, Epidural, Spinal • Kyphoplasty • Postoperative Complications • Thoracic Vertebrae • Vertebroplasty

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Background

Vertebroplasty procedures are widely accepted standard treatment techniques for vertebral body compression fractures with a wide range of etiologies. These techniques are associated with complications. Most complications are minor and rarely require intervention. Unfortunately, major complications may require a surgical intervention or lead to a significant disability [1,2]. We report here a very rare complication of a thoracic epidural hematoma after vertebroplasty.

Case Report

A 64-year-old woman with prior surgery for osteoporotic vertebral compression fractures of T7–T8 and T11–L5 fractures six and 12 months prior, respectively, was admitted with the complaint of back pain. Radiologic investigations revealed an acute T9–T10 vertebral compression fracture (Figure 1A–1D). Treatment was by T9–T10 vertebroplasty (Figure 1E, 1F). Her post-operative neurological examination was normal. However, two hours later, her neurologic condition progressively worsened and she developed paraplegia. A computed tomography (CT) scan revealed no leakage of cement into the spinal canal (Figure 1G–1I). We suspected a vascular lesion in the thoracic spinal cord and ordered magnetic resonance imaging (MRI). MRI revealed a hyper-acute epidural hematoma over the T6 extending to T10 vertebrae (Figure 2A–2D). Laboratory tests conducted prior to the operation revealed normal thrombocyte levels, prothrombin time, and activated partial thromboplastin time.

When we evaluated the MRI, we saw that most of epidural hematoma was in the right side and thickest images were at T8 and T9 levels. We then decided to evacuate the epidural hematoma via T8–T9 right hemilaminectomy. We used a very thin catheter to wash and evacuate the hematoma at superior and inferior levels. There was a serious compression on the dura by venous hematoma but no cement leakage to the canal. We cleaned a serious mass of hematoma. After evacuation of the hematoma, the spinal cord became wider.

Her first day neurological examination was normal. On the first day after the operation, she was mobile, and by the second day, she was discharged from the hospital. Her control neurological examination was normal, and she was pain-free for six months after the surgery.

Discussion

For people with painful osteoporotic compression fractures that are refractory to analgesic treatment, vertebroplasty and kyphoplasty procedures yielded significantly better results in

unblinded trials than optimal pain management in terms of improving quality of life and reducing pain and disability. However, no convincing evidence yet exists that either procedure performs better than a local anesthetic placebo [3,4]. We report here a very rare complication of a pure thoracic epidural hematoma following vertebroplasty. Complications after vertebroplasty are rare but can be devastating. Death due to pulmonary emboli has been reported previously [5]. In addition, paraplegia has been reported after cement leakage to the spinal canal. However, no case of thoracic epidural hematoma with acute paraplegia after vertebroplasty has been previously reported [6].

A vast literature exists on the efficacy of vertebroplasty in terms of pain relief, quality of life improvement, and low rate of complications compared with nonoperative treatment for vertebral compression fractures [7,8]. Although uncommon, potential complications should be explained to the patient as part of informed consent including cement leakage; nerve or spinal cord injury resulting in paralysis, bowel/bladder dysfunction, or need for emergent decompression; pulmonary embolus; infection; bleeding; vascular injury; fracture of the ribs; pedicle or vertebral body; hypotension or depressed myocardial function; pneumothorax; and worsening pain.

Osteoporotic vertebral collapse is rarely associated with spinal epidural hematomas causing neurologic deficits. Epidural hematomas after vertebroplasty are extremely rare. Birkenmaier et al. [9] reported a case with an epidural hematoma over T11–L2 after vertebroplasty, and this is the only case that we found in our literature search. McArthur et al. reported two cases of hematoma after percutaneous kyphoplasty. One of the hematomas was L1 epidural and the other was subcutaneous hematoma [10].

Epidural hematoma could be caused by traumatization of the epidural venous plexus during the surgical procedure. Vertebrae pedicles could be broken with the vertebroplasty needle and it could cause hematoma. Also, before or after cement injection, the vertebra body could be broken due to needle and cement pressure and a new bleeding could begin. When a patient becomes mobilized after the procedure, new small pieces of bone could become broken as the sagittal load distribution can change due to the placement and amount of cement. Too many degenerative changes in the vertebral body and anticoagulation therapy could be risk factors for spinal epidural hematomas. Morbid obesity may also complicate the vertebroplasty procedure because of low quality radiological images in these patients.

Conclusions

We concluded that patients with thoracolumbar compression fractures should be evaluated precisely at every step of

Figure 1. Thoracolumbar radiography in anteroposterior and lateral views (**A, B**) showing T7, T8, and T11 vertebroplasty treatments. Magnetic resonance images in T1 and T2 sequences (**C, D**) reveal endplate fracture and hyperintensity of the new T10 vertebral compression fracture in T2 and hypointensity in T1 images (arrow). Thoracolumbar radiography demonstrates T9 and T10 vertebral bodies treated with polymethylmethacrylate in lateral (**E**) and anteroposterior views (**F**). Computed tomography scan revealed completely filled vertebral bodies by polymethylmethacrylate without any leakage into the spinal canal. Sagittal images of bone density (**G**) and soft tissue density did not show an epidural hematoma. Axial cuts showing cement in one pedicle (arrow) (**H, I**).

treatment. Guidelines should be thoroughly assessed prior to the operation. Vertebroplasty patients require close follow-up within the first 24 hours. Any neurological deficit or unrelieved pain should be investigated immediately with CT and MRI. Post-operatively complicated patients may have a chance

for complete recovery if correct diagnosis and early corrective surgery can be performed.

Conflict of interest

None.

Figure 2. Magnetic resonance images in T2 sagittal (A) and T1 sagittal (B) images revealed a hyper-acute epidural hematoma over the T6 extending to the T10 vertebrae. Axial cuts showing epidural hematoma compressing the spinal cord (C). Arrows indicate the epidural hematoma. Axial cut showing polymethylmethacrylate in the left pedicle (D) (arrow).

References:

1. Moreland DB, Landi MK, Grand W: Vertebroplasty: Techniques to avoid complications. *Spine J*, 2001; 1: 66–71
2. Jay B, Ahn SH: Vertebroplasty. *Semin Intervent Radiol*, 2013; 30: 297–306
3. Kallmes DF, Jarvik JG: Spinal augmentation research: FREE at last? *Lancet*, 2009; 373: 982–84
4. Stevenson M, Gomersall T, Lloyd Jones M et al: Percutaneous vertebroplasty and percutaneous balloon kyphoplasty for the treatment of osteoporotic vertebral fractures: A systematic review and cost-effectiveness analysis. *Health Technol Assess*, 2014; 18: 1–290
5. Tozzi P, Abdelmoumene Y, Corno AF et al: Management of pulmonary embolism during acrylic vertebroplasty. *Ann Thorac Surg*, 2002; 74: 1706–8
6. Sietsma MS, Heerspink FO, Ploeg WT et al: Kyphoplasty as treatment for osteoporotic vertebral compression fractures: relatively safe, but still no evidence of functional improvement; A review of the literature. *Ned Tijdschr Geneesk*, 2008; 152: 944–50
7. Chandra RV, Meyers PM, Hirsch JA: Vertebral augmentation: Report of the Standards and Guidelines Committee of the Society of NeuroInterventional Surgery. *J Neurointerv Surg*, 2014; 6: 7–15
8. Wardlaw D, Cummings SR, Van Meirhaeghe J et al: Efficacy and safety of balloon kyphoplasty compared with non-surgical care for vertebral compression fracture (FREE): A randomised controlled trial. *Lancet*, 2009; 373: 1016–24
9. Birkenmaier C, Seitz S, Wegener B et al: Acute paraplegia after vertebroplasty caused by epidural hemorrhage. A case report. *J Bone Joint Surg Am*, 2007; 89: 1827–31
10. McArthur N, Kasperk C, Baier M: 1150 kyphoplasties over 7 years: Indications, techniques, and intraoperative complications. *Orthopedics*, 2009; 32: 90