CASE REPORT

Retained needle after cement injection during vertebral augmentation and its management strategy

Angelika Kosse,¹ Jonathan Pishoi Nakhla,² Reza Yassari,³
Apolonia Elisabeth Abramowicz,⁴ Allan Brook⁵

¹Department of Anesthesiology, Montefiore Medical Center, Bronx, New York, USA

²Department of Neurological Surgery, Montefiore Medical Center, Bronx, New York, USA

³Department of Neurosurgery, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, New York, USA

⁴Bronx, USA

⁵Montefiore Medical Center, Bronx, New York, USA

Correspondence to

Dr J P Nakhla, Department of Neurological Surgery, Montefiore Medical Center, Bronx, NY 10467, USA; jonathan.nakhla@gmail.com

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SUMMARY

A middle aged patient with multiple myeloma resulting in numerous pathological fractures underwent an L2, L3, and L5 vertebral cement augmentation for pain relief. After injection, the trocar at L2, the final level, could not be withdrawn despite several attempts of needle rotation, a second needle inserted to distract on, and rocking the needle on the pedicle. After a neurosurgical consultation, the patient was transferred to the operating room for open removal. As the needle protruded approximately 3 inches from the patient's back, the patient could not be positioned supine, and was anesthetized and intubated in the right semi-prone position prior to being placed prone on the operating room table. The needle was surgically exposed, cut off at the pedicular bone edge, and its free component was removed.

BACKGROUND

We encountered a unique situation in which the needle used to inject cement could not be removed, which has not previously been described in the literature. In addition, as it occurred outside the operating room, surgical removal of the needle required an expedient multidisciplinary approach. Although seemingly rare, needle retention during vertebroplasty can occur in experienced hands and may necessitate operative removal. If general anesthesia is required, it has to be initiated in a suboptimal, lateral, or semi-prone position.

CASE PRESENTATION

A middle aged patient with multiple myeloma who underwent radiation therapy with extensive bony involvement and severe thrombocytopenia presented with pain due to pathologic fractures of the vertebral column. The patient was scheduled for a three level lumbar percutaneous vertebral cement augmentation. It was performed prone under fluoroscopy utilizing a coaxial approach injected through a (10 G DFINE) needle placed under biplane fluoroscopic guidance (figures 1–3).

After injection of cement at all three levels, the needle could not be withdrawn from the L2 body despite multiple rescue maneuvers. Attempts were made to rotate the needle under fluoroscopy, which revealed that the entire cement mass would rotate with the trocar. This was tried multiple times without success for approximately 20 min. Thereafter, attempts were made to rock the trocar,

Figure 1 (A, B) Anteroposterior view of the cement mass rotating as the needle is manipulated.

followed by insertion of a second needle to try and dislodge the cement mass from the initial trocar, which also failed. This led to bleeding around the site and therefore we aborted these maneuvers. Polyvinyl alcohol particles (350–455 mixed with 500–750 µm size particles in a contrast slurry) were infused down the trocar which provided adequate hemostasis. As local pressure was applied around the site, a neurosurgical consultation was requested within 30 min. The patient was subsequently brought to the operating room for open removal of the retained needle. The patient was transferred in the prone position with a temporary dressing and intubated in the semi-prone position on the stretcher. The patient was rotated onto the operating room table while minimizing motion of the spine. To remove the needle, the neurosurgeon followed the needle to the entry point in the pedicle and cut the needle shaft at its insertion. The patient had no complications and made an uneventful recovery.

TREATMENT

Open dissection and removal of the retained vertebroplasty needle shaft was carried out.

Figure 2 (A) The 18 G needle could not dislodge cement from the trocar. (B) The 13 G needle could not dislodge cement from the trocar.

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Figure 3 (A, B) A lateral of the needle attached to a small amount of cement mass moving within the vertebral body.

OUTCOME AND FOLLOW-UP

The patient's wound healed without sequelae with good pain relief and the ability to ambulate after recovery.

DISCUSSION

To our knowledge, retention of a vertebral augmentation needle in hardened cement requiring open removal has not been previously reported. In our case, a medical grade bone cement, polymethylmethacrylate (PMMA DFINE) with an opacifying agent (barium sulfate), was injected through a large (10 G DFINE) needle placed under fluoroscopic guidance into the affected vertebra after radiofrequency ablation.

Cement leakage is the most common complication of vertebroplasty, occurring in about 40% of all cases.¹ Cement leakage into the circulation may cause pulmonary embolism; leakage into the spinal canal may lead to cord or nerve root compression.¹ The vast majority of leaks are small and clinically have no impact.^{1,2} Furthermore, leakage is more common in lytic malignant tumors, such as multiple myeloma.¹ The risk of cement leakage is thought to decrease when high resolution fluoroscopy and viscous opacified cements are used. Other complications of vertebroplasty include periprocedural fractures from positioning of the patient or infections at the procedure site.¹⁻³

In our case, the amount of time the cement adjacent to the trocar while performing multiple levels was certainly longer than a single level case. It is common to perform multilevel vertebroplasty and remove the needle at the conclusion of the case. There are at least two possible scenarios that could explain this complication. First, a small amount of PMMA coating the inside of the trocar was still attached to the cement block. This is difficult to ascertain as insertion of the trocar went easily and fully engaged the locking device on the handle. Second, there may have been an abnormal attachment to the outside of the trocar

or damage to the outer coating. Unfortunately, we are unable to resolve this as the needle is retained in the patient. Furthermore, the lack of trabeculae in this severely myelomatous bone may also have played a small role as the cement does not have a framework of bone to adhere against in the vertebral body.

A possible solution that was not tried included adding additional cement from a contralateral pedicular approach to solidify the cement mass into the vertebrae. Given the local bleeding and already one retained needle, we were apprehensive about trying this. In hindsight, removal of each trocar prior to proceeding to the other levels may have avoided this scenario unless the reaction was unique to this set specifically. Lastly, a possibility that was not considered during the procedure was to hammer the needle anteriorly to dislodge it from the cement mass, although this seemed counterintuitive at the time.

Learning points

- Initiate withdrawal of the needle from the cement mass before the cement has polymerized to ensure safe needle removal.
- In the event of rare complications, a multidisciplinary approach to the problem is necessary for patient safety.
- We would like to add retention of the needle used for cement injection to the list of possible vertebral cement augmentation complications.

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Contributors All authors participated in the creation, editing, and drafting of this case report.

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