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A CASE REPORT

POLYMETHYLMETHACRYLATE-FILLED NEEDLE TRACK THREE WEEKS AFTER PERCUTANEOUS VERTEBROPLASTY

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Percutaneous vertebroplasty is widely used for the treatment of osteoporotic compression fractures. Although this procedure has a relatively safe history, potential complications have been described.

In this case report, we present a patient who underwent percutaneous vertebroplasty and presented at the three week follow up visit with an asymptomatic polymethylmethacrylate (PMMA) -filled needle track, that was evident on an X-ray of the lumbar spine.

Keywords: Percutaneous vertebroplasty, cement extravasation, needle track

Percutaneous vertebroplasty is a therapeutic, interventional radiologic procedure that involves injection of bone cement into a fractured thoracic or lumbar vertebral body for the relief of pain and the strengthening of bone. The procedure was first described in 1984 by Deramond et al (1), and was used initially for the treatment of spinal hemangiomas. Percutaneous vertebroplasty was first performed in the US. by Jensen et al (2) in 1993. Since then, the procedure has gained widespread popularity for the treatment of osteoporotic compression fractures, osteonecrosis, nonunion of fracture fragments, tumor of the vertebral body, and multiple myeloma.

During the injection period, polymethylmethacrylate (PMMA) leakage is dangerous, because the cement is still in a viscous state and can migrate suddenly and rapidly from the intraosseous space to the veins draining the vertebral body (3). Complication rates can range from 1% to 10%; however, most complications are seen with neoplasms (4). Potential complications listed by Fenton et al (5) include: infection; bleeding; extravasation of cement into the epidural space, which can cause spinal cord or nerve root compression; extravasation into the epidural venous plexus which can lead to spinal cord infarction, fracture of the pedicles, cement embolization to the lungs, increased pain not associated with cement leak and radiculopathy. An additional possible complication not listed by Fenton is a fracture of the posterior elements.

CASE DESCRIPTION

An 82 year-old man referred by his primary care physician for persistent low back pain after slipping on ice 4-5 months previously presented with dull pain in the low back and buttocks. He rated the pain level as 7/10 on a visual analog scale. He denied numbness, paresthesias, or radiation of pain into the legs. He stated that pain was exacerbated by movements in any direction and was worse standing from the seated position.

Previous treatments included pain medications, which provided minimal help, and a back brace. He also had an epidural steroid injection two weeks previously, with no relief of symptoms. X-rays and a MRI revealed an old benign L1 compression fracture, an acute benign fracture along the superior endplate of the L5 vertebral body, and facet hypertrophy and mild spondylolisthesis at L4-L5.

Physical examination revealed decreased range of motion in the lumbar spine. Manual muscle testing revealed 5/5 strength throughout in the upper and lower extremities. Deep tendon reflexes were 2^+ at C5, C6, C7, L4, and S1. Sensation was intact to light touch and pinprick in the major dermatomes in the upper and lower extremities. He had no neural tension signs. No focal midline or SI tenderness was appreciated.

Percutaneous vertebroplasty was performed via a transpedicular approach in a standard ambulatory surgical center setting under strict sterile conditions. The patient was placed in the prone position on the fluoroscopy table, and the L5 vertebrae were identified in the anteroposterior and lateral views. He received 1 gram of cefazolin intravenously. The procedure was performed with continuous monitoring under light intravenous sedation with dedicated nursing support during the procedure.

After sterile preparation of the puncture site, the skin, soft tissues and periosteum of the targeted pedicles were anesthetized using 0.25% bupivacaine. Next, under fluoroscopic guidance, two 11-gauge six-inch Stryker® cannulas were advanced in a trajectory that allowed for the tips to make contact with the center of the upper outer third of the L5 pedicles. The cannulas were then advanced towards the L5 vertebral body under continuous fluoroscopic guidance, until the tips reached the anterior third of the vertebral body on each side. Needle location outside of major venous structures was confirmed by injection of contrast material. SpinePlex™ Radiopaque Bone Cement was then mixed with the Stryker® PCD Precision Delivery System and injected via the Stryker® PCD Precision Delivery System cannula. A total of 2 cc of cement was injected until the body of the vertebrae was adequately filled on both sides and the cement boluses met in the middle, towards the superior endplate and close to the level of the fractured bone. Further injection of bone cement was discontinued

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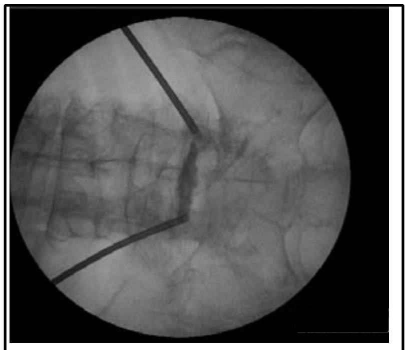

Fig. 1. *AP view after injection of PMMA*

after some vascular runoff was evident. Ten minutes elapsed from the beginning of the injection until cement filled the superior vertebral body. The cannulas were removed after waiting an additional five minutes (Fig. 1).

Following the procedure, the patient was observed in the supine position for one hour, followed by sitting and then standing as tolerated. Careful evaluation for new onset chest or back pain, respiratory distress, and neurological dysfunction revealed no problems. The patient was discharged on the same day in stable neurological condition. Patient follow-up was done by telephone within 24 hours.

The patient was seen two weeks following the procedure with 25-30% improvement of pain and no side effects. There were no signs of infection or pain to palpation over the insertion sites. A decision was made to proceed with upper lumbar zygapophysial joint injections. Exactly one week after the follow-up visit, the following images (Fig. 2) were obtained. The images appeared to show PMMA in the needle track, within the soft tissue structures. No cement was demonstrated in the retroperitoneal or epidural space. This was confirmed with a musculoskeletal radiologist.

Discussion

We presented a case of benign cement extravasation within the needle track following vertebroplasty procedure. To our knowledge, this complication has not been described in the literature. The patient did not have any symptoms or complications as a result of the PMMA in the needle track. We took reasonable precautions to avoid any type of cement extravasations. We waited approximately five minutes from the end of the procedure before withdrawing the cannula. Waiting a longer period of time may have allowed the cement to further harden prior to withdrawal of the cannula. The manufacturer recommends a maximum time of fifteen minutes from mixing to completion of injections. Therefore, this did not allow much additional waiting time.

In the future, withdrawal of the cannula under continuous fluoroscopy may be helpful to determine whether there was filling of the needle track with cement. In addition, obtaining images after withdrawal of the cannulas may also be useful in determining if any cement in the needle track was due to cement leakage from the cannula or to extravasation from the vertebral body.

Placing the stylet immediately back into the bone trocar at the end of the injection may be the most appropriate and reliable way of reducing the risk of cement leakage from the cannula.

Conclusion

We presented a case of benign cement extravasation within the needle track following vertebroplasty procedure. Despite the potential complications, percutaneous vertebroplasty remains a safe procedure with few significant side effects and can provide immediate pain relief for patients.

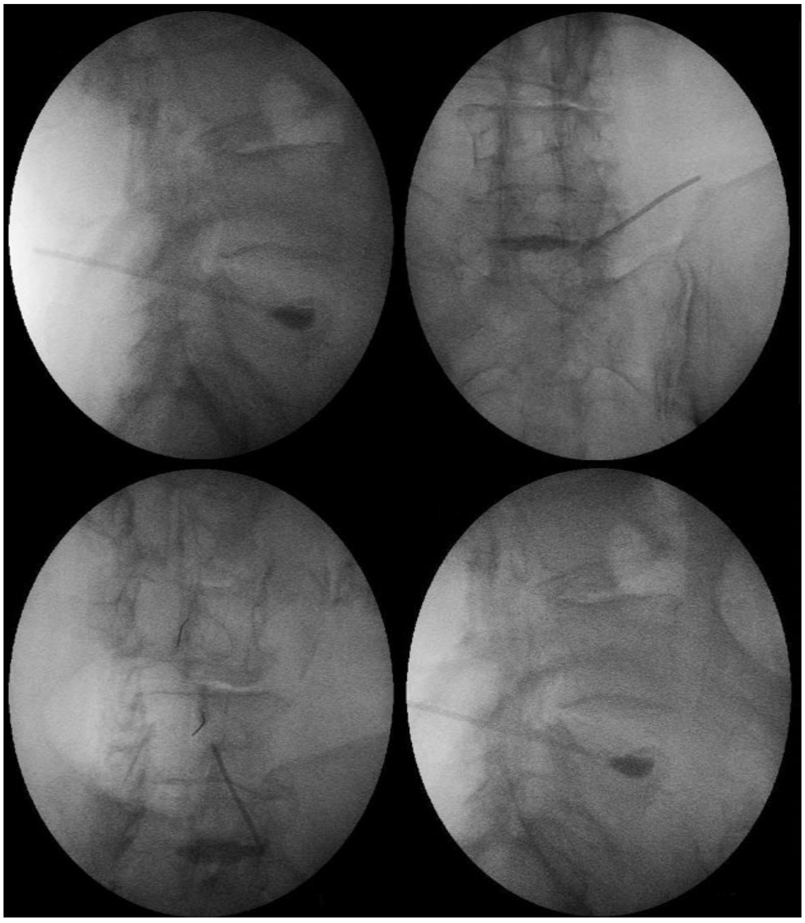

Fig. 2. *AP, lateral and Oblique views three weeks after percutaneous vertebroplasty*

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