

PARAPLEGIA COMPLICATING PERCUTANEOUS VERTEBROPLASTY FOR OSTEOPOROTIC VERTEBRAL FRACTURE

Case report

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ABSTRACT - We report a case of spinal cord and root compression during percutaneous transpedicular polymethylmethacrylate vertebroplasty (PTPV) for a compression fracture due to osteoporosis. Sudden onset of excruciating pain in the distribution of the right sixth intercostal nerve with hyperemia along its path, prompted the interruption of the procedure. Under narcotic sedation the patient was taken to the ICU and 10mg of dexamethasone was administered intravenously. Few hours later she developed paraplegia with preservation of light touch and a CT scan and MRI showed epidural extravasation of polymethylmethacrylate with spinal cord and root compression. Surgical decompression was followed by neurological recovery. The cement could be removed after been thinned out by high speed drill, with microsurgical technique, through a wide three level laminectomy of D5 to D7. Extravasation of cement is commonly encountered in PTPV and most of the time it is asymptomatic. Root compression may require surgical intervention if nonresponsive to steroid treatment. Cord compression is less often seen and requires emergency surgery. The cement does not adhere to the duramater and it can be removed easily.

KEY WORDS: spinal fracture, polymethylmethacrylate, osteoporosis, vertebroplasty, paraplegia.

Remoção cirúrgica de polimetilmetacrilato epidural como complicação de vertebroplastia percutânea para tratamento de fratura com compressão de vértebra dorsal osteoporótica: relato de caso

RESUMO - Relatamos um caso de compressão medular e radicular durante vertebroplastia percutânea transpedicular com polimetilmetacrilato (VPTP) para tratamento de fratura com compressão por osteoporose. O início súbito de dor lancinante na distribuição do 6º nervo intercostal direito, com hiperemia ao longo de seu trajeto, determinou a interrupção do procedimento. Sob sedação com narcóticos, a paciente foi levada ao CTI, sendo administrados 10mg de dexametazona por via endovenosa. Após algumas horas, ela desenvolveu paraplegia com preservação do tato, e a TC e a RM mostraram extravasamento epidural de polimetilmetacrilato com compressão medular e radicular. Descompressão cirúrgica resultou em recuperação neurológica. O cimento foi removido após ter sua espessura diminuída com o uso de broca de alta rotação, usando técnica microcirúrgica através de laminectomia ampla de tres níveis de T5 a T7. Extravasamento de cimento é comumente encontrado em VPTP, sendo assintomático na maioria das vezes. Compressão radicular pode requerer intervenção cirúrgica se não responsiva ao tratamento com corticosteróides. Compressão medular é vista com menos frequência e requer cirurgia de emergência. O cimento não adere à dura-máter e pode ser removido facilmente.

PALAVRAS-CHAVE: fratura vertebral, polimetilmetacrilato, osteoporose, vertebroplastia, paraplegia.

An increasing number of publications about percutaneous transpedicular polymethylmethacrylate vertebroplasty (PTPV) can be found in the literature mainly for the past six years. Although initially it was done for vertebral angiomas^{1,2} and for metastatic vertebral disease^{3,4}, more recently PTPV became an alternative method to relieve pain in patients with compression fractures due to osteo-

porosis⁴. Extravasation⁵ of the cement has been reported to occur in 11 to 73% of the procedures⁶. In most of these cases polymethylmethacrylate (PMMA) ends up in the soft tissues and in disc spaces and only in rare occasions it will cause symptoms⁷. Intravascular injection causing pulmonary embolism and epidural veins compromise^{7,8} as well as cement extrusion into the spinal canal leading to root and cord

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compression^{5,9} should be prevented by injecting the cement under continuous good quality fluoroscopy.

We report a case of a postmenopausal woman with a symptomatic compression fracture of D6 vertebra due to osteoporosis who developed excruciating radicular pain during the procedure and became paraplegic few hours later. Neurological manifestations cleared after an emergency surgical decompression was carried out.

CASE

History

This 82-year-old woman, had been continuously under medical treatment for the past 4 months, for incapacitating pain due to a compression fracture of D6. Spine plain films showed deformities in at least three other vertebrae resulting in a dorsal kyphosis. She could no longer tolerate nonsteroidal antiinflammatory drugs (NSAID) and she was taking codeine several times a day. Because of severe physical limitation she was depressed and the medication made her drowsy and worsened her constipation. A bone scan and an MRI confirmed the clinical impression that the fractured D6 vertebral body was responsible for her pain.

Vertebroplasty

Under neuroleptoanalgesia, in the prone position, D6 was localized with fluoroscopy and the analgesia was complemented with xylocaine infiltration of all the planes from the skin to periosteum. An anesthesiologist was monitoring the patient's vital signs and hemoglobin saturation. Fluoroscopy was switched from AP to lateral view once the bone biopsy needle reached the vertebral body in its course inside the pedicle. While injecting it was noticed that the cement was extruding towards the lateral aspect of the vertebral body. The needle was withdrawn and a new needle insertion was performed through the contralateral pedicle. The lateral fluoroscopic view now was obscured on account of the previously extravasated cement. The injection had been uneventful up to the point when the patient began complaining of chest wall pain and the procedure was interrupted.

A skin rash was seen along the 6th rib. The patient was taken to ICU and had to be kept on morphine for pain relief. Dexamethasone 10mg was administered intravenously. Up to this point she was able to move both lower extremities. Repeat physical examination was impaired because she was heavily sedated. About seven hours later she was no longer complaining of pain but she had developed paraplegia with preservation of light touch. A CT and an MRI scan revealed spinal cord and bilateral root compression from D5 to D6 (Figs 1 and 2).

Surgery

A bilateral laminectomy from D5 to D7 was carried out and the cement was drilled to the point it became

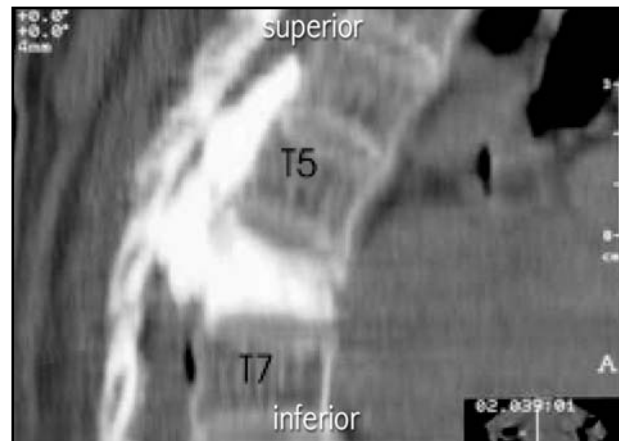


Fig 1. Sagittal CT scan of the thoracic spine showing PMMA leak into the epidural space.



Fig 2. Axial CT scan of the thoracic spine showing extravasation of PMMA into the vertebral canal with compression of the spinal cord and nerve roots. Notice also the presence of PMMA on the left side of the body of the T6 vertebra which interfered with the lateral visualization of the PMMA injection.

paper thin and easily dissected away from the dura-mater around the cord and the encased nerve roots. It was felt that the segment was stable because the vertebral body of D6 was filled satisfactorily with cement and the facet joint were partially preserved (Fig 3).

Postoperative course

Upon recovering from anesthesia she already had regained mobility of the lower extremities but some degree of a Brown-Séquard syndrome remained for two weeks along with urinary retention requiring intermittent urethral catheterization. Within a month she was walking unaided with full bladder control and no pain.

DISCUSSION

Percutaneous vertebroplasty with polymethylmethacrylate proved to be a cost-effective treatment for pain relief due to compression fracture secondary

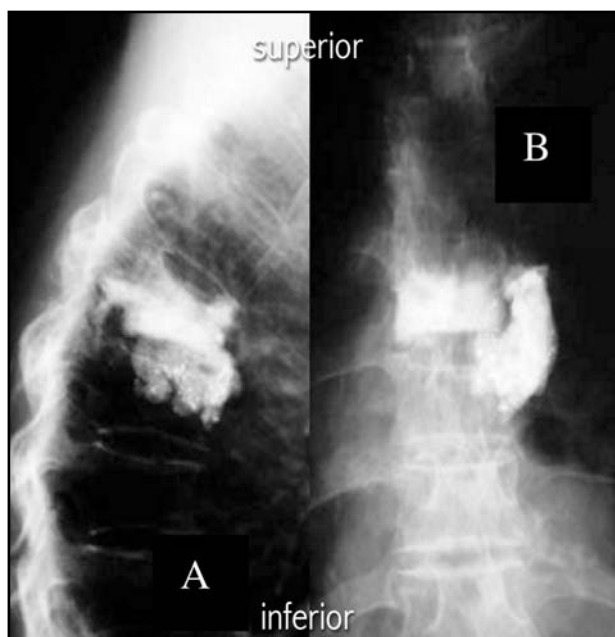


Fig 3. Lateral (A) and AP (B) postoperative plain x-ray views showing extravasated PMMA laterally to T6 and T7 vertebral bodies. T6 vertebral body and its left pedicle are enhanced by the contrasted cement.

to osteoporosis⁶. It can be performed in outpatients, with a very low morbidity rate, under local anesthesia, achieving lasting pain relief in more than 90% of the patients⁴. Spine surgeons very quickly develop skills to insert a needle through the vertebral pedicle on account of their previous experiences with pedicular screws. Certainly there is a learning curve and one has to participate in hands-on courses before trying to perform PTPV procedure¹⁰. Complications rates will rise as a greater number of procedures are being performed and undertrained doctors begin to undertake PTPV attracted by the good results found in the literature. PTPV has to be performed in a hospital with neurosurgical facilities, in order to be able to treat, without delay, complications such as cord compression.

Fluoroscopic digital images, bi-plane equipment and neuronavigation account for improved results due to added precision, lesser radiation exposure and shorter surgical time.

Even after many years in practice and more than 50 vertebrae injected without a single complication, one is apt to face a spinal cord and root compression due to unnoticed migration of cement into the spinal canal.

Several lessons to be learned from this case and from his own experience. The radiopacity of the cement has to be checked under fluoroscopy before mixing it with the monomer. Add barium as needed

to improve its visualization. High quality fluoroscopy is a must. Keep in mind that an osteoporotic vertebrae is almost "x-ray transparent" so that the cement injection has to be monitored by fluoroscopy all the time. You do not need to fill up the vertebra. Pain relief is obtainable even with 3cc of PMMA and a unilateral pedicular injection is all you need.

It is advisable to talk to the patient and inquire him of any discomfort while injecting PMMA. The level of sedation should allow the patient to answer questions.

Check for breaches in the posterior wall of the vertebral body in the preoperative CT scan; its presence is not a formal contraindication, but you must take extra care during the injection.

A vertebrogram does not insure safe PMMA injection. The contrast material has to be washed out with a saline flush before you start the cement injection.

Keeping the cement refrigerated in a bucket with ice will increase your working time by a few precious minutes. A thick cement lessens the chance of extravasation. Use larger gauge needle if it proves to be suitable for the size of the pedicle.

Surgical removal of extravasated cement from the spinal canal and from the root foramen can be accomplished through a laminectomy using high speed drill and microsurgical techniques.

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