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Intracardiac Leakage of Cement During Kyphoplasty and Vertebroplasty: A Case Report

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

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Patient: Male, 28
Final Diagnosis: Intracardiac cortoss leak
Symptoms: Back pain
Medication: —
Clinical Procedure: Kyphoplasty
Specialty: Orthopedics and Traumatology

Objective: Diagnostic/therapeutic accidents

Background: Intracardiac leakage of bone cement after kyphoplasty and vertebroplasty is a rare and life-threatening complication. Cortoss, which is an injectable, non-absorbable, polymer composite that is designed to mimic cortical bone, can be used instead of cement. Here, we present the case of a patient with right intra-cardiac Cortoss embolization.

Case Report: A 28-year-old man known to have ulcerative colitis since the age of 15 and treated with corticosteroids for more than 4 years and with anti-immune drugs presented to our hospital complaining of back pain and decreased body height due to osteomalacia with failed conservative treatment. Kyphoplasty and vertebroplasty of the thoracic 10–12 and first lumbar vertebrae were done with any complications. Three months later, the patient underwent kyphoplasty and vertebroplasty of lumbar 2–5 vertebrae by injecting Cortoss instead of cement, which was complicated with paravertebral intravascular leakage. We stopped surgery and transferred him to the recovery room, where he had slight chest pain that resolved spontaneously without neurological deficit.

Two days later he developed severe chest pain and chest X-ray showed a large white shadow at the right side of the heart and another 2 small shadows just lateral to it. Sudden deterioration of patient status necessitated an emergency echocardiogram, which showed pericardial tamponade and a perforated right ventricle. Aspiration of pericardial blood and emergency open heart surgery were done. He was discharged 4 days later and was followed up at an outpatient clinic.

Conclusions: Cardiac embolism is a serious condition that can complicate vertebral kyphoplasty; it requires a high level of suspicion and immediate action, and may need open heart surgery to save the patient's life.

MeSH Keywords: Cardiac Tamponade • Kyphoplasty • Polymethyl Methacrylate • Vertebroplasty

Full-text PDF: <http://www.amjcaserep.com/abstract/index/idArt/897719>

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Background

Percutaneous vertebroplasty is a minimally invasive procedure used to treat back pain and prevent deformity secondary to osteoporotic fractures or destructive lesions [1,2]. In rare cases, the cement leaks anterior and lateral to the vertebral body; this leakage can be intra-disc, intraspinal, or intra-vascular [3,4]. Cement inside the vessels can reach the heart, pulmonary circulation, or even cerebral circulation [5,6]. Intracardiac cement leakage is very rare and few cases are found in the literature. Cortoss is an injectable, non-resorbable, polymer composite that is designed to mimic cortical bone material instead of bone cement. Cortoss is the best artificial material for this use; it has nearly the same compressive and tensile strength as cortical bone and it enhances formation of bone

Figure 1. Lateral view X-ray of thoraco-lumbar spine showing biconcave vertebrae and wedge vertebra and T10-L1 vertebrae augmentation with bone cement.

on its surface [7–10]. Here, we describe a case of intra-cardiac embolism of Cortoss 2 days after surgery.

Case Report

We report the case of a 28-year-old male patient who was diagnosed with ulcerative colitis at age 15 years. He had been treated conservatively with corticosteroids for over 4 years, and had also received anti-immune drugs. Over time he developed hip pain (due to avascular necrosis of the femoral head), back

Figure 2. MRI sagittal of thoraco-lumbar spine view showing multilevel biconcave and wedge vertebrae.

Figure 3. Anterior-posterior and lateral view of lumbar spine showing Cortoss leakage toward the paraspinal vessels.

pain, and loss of trunk height due to adverse drug effects. Bone DEXA-scan, X-rays, and MRI of the spine revealed osteomalacia without spinal canal or nerve root canal stenosis, multilevel biconcave vertebrae, and multilevel vertebral compression fractures (Figures 1, 2). Conservative treatment with alendronate, vitamin D, and Calcium for more than 3 years failed to control back symptoms and gradual shortening of stature. We discussed with the patient performance of kyphoplasty and vertebroplasty of thoracic 10–12 and first lumbar vertebrae. This was performed in a single session by injecting methyl methacrylate, without complications.

After 3 months the patient was readmitted for vertebroplasty and kyphoplasty of lumbar spine 2–5. At that time, we discussed with the patient the use of Cortoss because it is designed to mimic cortical bone material and enhance bone formation on its surface. The procedure was aborted and injection of Cortoss was ceased because of paraspinal intravascular leakage (Figure 3). In the recovery room, the patient did not have any neurological deficit or dyspnea, just non-significant chest pain that resolved after full recovery with simple analgesia.

Two days later, he developed progressive chest pain, dyspnea, and tachycardia. A chest X-ray showed a white shadow (about 5 centimeter) at the right side of the heart and 2 small shadows at the right lung hilum, and an echocardiogram showed pericardial effusion (Figure 4). Suddenly, he deteriorated and

Figure 4. Chest X-ray (P-A view) showing a large white shadow in the heart area and 2 small shadows at the lung hilum.

went into shock, requiring aspiration of pericardial effusion, as recommended by the cardiologist to save the patient's life. Later, patient underwent urgent open heart surgery to remove the Cortoss from the right side of the heart and right pulmonary artery (Figure 5). The patient had an uneventful recovery. His condition improved and he was discharged on the 4th post-operative day and was followed up at an outpatient clinic.

Figure 5. Chest X-ray (P-A view) after open-heart surgery showing absence of the white shadows.

Discussion

Intracardiac cement embolism is a rare complication after vertebroplasty or kyphoplasty. We reviewed the literature and found only 15 case reports of intra-cardiac cement embolism [11–25]. Most of the cases were diagnosed during or within a short period after surgery, except for 1 diagnosed 2.5 years after kyphoplasty because of pericardial perforation [23]; cement reached the heart and lodged inside the right atrium or ventricle and in 1 case cement lodged in the ventricular septum [17]. The

sequelae of the cardiac embolism are: perforation, pericardial tamponade, or pericardial perforation, which may cause chest pain, dyspnea, and shock [13,14,16,17,20,23]. All patients underwent open-heart surgery except for 1 in whom cement was removed by catheterization [12].

Our patient developed chest pain immediately after surgery. The pain was relieved by simple analgesia. At 2 days post-surgery, the pain suddenly increased, with sweating and severe hypotension due to ventricular wall perforation by myocardial contraction on the sharp ends of the Cortoss, which resulted in pericardial tamponade demonstrated by echocardiogram and pericardial aspiration.

Emergency life-saving surgery was done to remove the Cortoss pieces and repair the heart wall. To the best of our knowledge, this is the first case of Cortoss (rather than regular cement) cardiac embolism as a complication of kyphoplasty and vertebroplasty. This shows that both cement and Cortoss can cause heart embolism after it changes from paste during injection into a hard substance.

Conclusions

Cardiac embolism is a serious condition that can complicate vertebral kyphoplasty. It needs a high level of suspicion, and requires immediate actions, including open heart surgery, to save the patient's life.

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