

Intracardiac Foreign Body (Bone Cement) after Percutaneous Vertebroplasty

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Percutaneous vertebroplasty is a relatively easy and minimally invasive procedure used in treating vertebral fractures. However, the procedure has many complications, one of which is bone cement leakage, which happens frequently. Leakage to the paravertebral venous system, in particular, may lead to especially devastating consequences. Here we report a case of a 65-year-old male patient with an intracardiac foreign body (bone cement) that generated a perforation on the right ventricle, and result in hemopericardium after percutaneous vertebroplasty. We performed open heart surgery to remove the foreign body.

Key words: 1. Foreign body
2. Pericardial effusion
3. Percutaneous vertebroplasty
4. Bone cements

CASE REPORT

A 65-year-old male was admitted to the emergency room with the chief complaint of epigastric pain and dyspnea that had started 10 days earlier. The patient had a history of undergoing percutaneous vertebroplasty (PV) in the third lumbar vertebra a month earlier, which was treated at a local clinic. A chest roentgenogram showed a long linear radio-opaque foreign body in the right ventricle (RV) and a shorter one in the pulmonary artery (Fig. 1A). A computed tomography (CT) scan showed the foreign body in the RV, perforating the RV wall near the aortic root and just to the left lateral to the right coronary artery (Fig. 2A), and a moderate quantity of hemopericardium was detected (Fig. 2B). The cardiac echography findings showed hemopericardium and the foreign

body, but no cardiac wall motion dysfunction or valvular dysfunction was seen. We planned open heart surgery for the removal of the bone cement. Sternotomy was performed in a routine fashion. When the pericardium was opened, a moderate amount of hemopericardium was evacuated (200 mL). The sharp end of the bone cement was perforating the RV wall as we expected (Fig. 3A). By using bi-caval venous cannulation and single aortic cannulation, a cardiopulmonary bypass was conducted. The body temperature was lowered to mild hypothermia. The bone cement perforating the RV wall was embedded strongly. Right atriotomy was performed, and the tricuspid valve was checked and shown to be unharmed. Except for the perforated site, the RV showed no signs of injury. By retracting the tricuspid valve leaflet, the bone cement could be seen in the RV chamber. The foreign body

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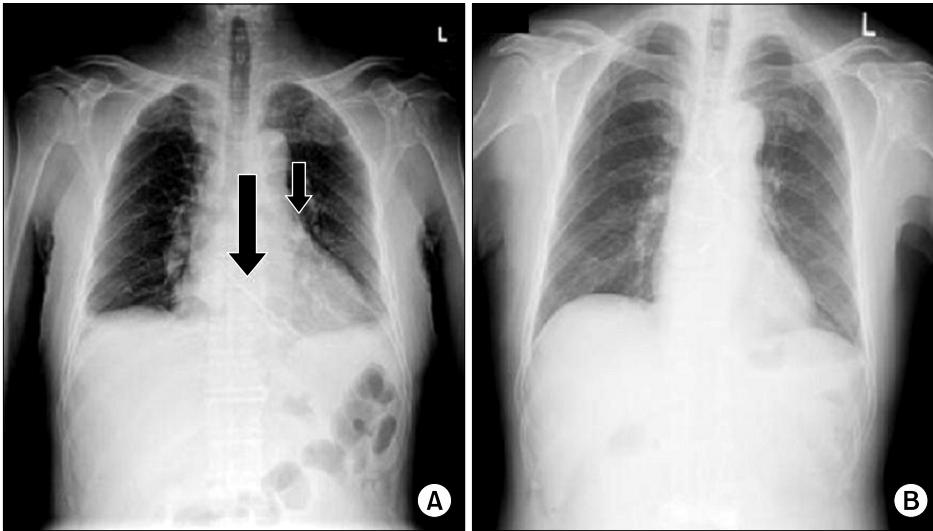


Fig. 1. (A) Initial chest roentgenogram showing the foreign bodies (arrows). (B) Postoperative chest roentgenogram showing no remnants of the foreign bodies.

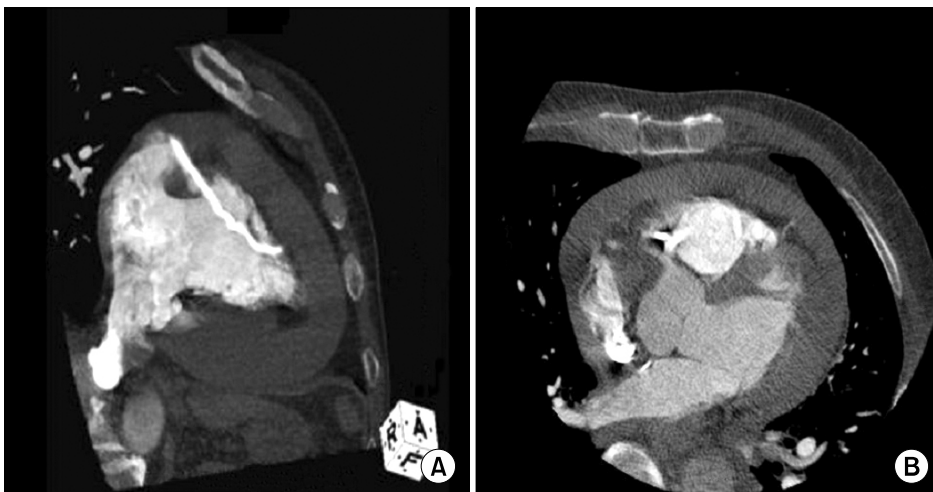


Fig. 2. (A) Foreign body perforating the right ventricular wall. (B) Hemo-pericardium due to perforation of the right ventricular wall.

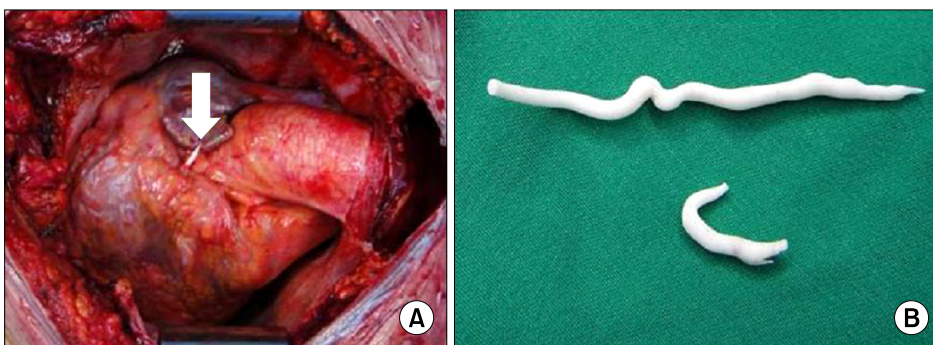


Fig. 3. (A) Sharp end of a foreign body perforating the right ventricle (arrow). (B) Foreign bodies removed (9 and 2 cm in length, respectively).

was removed by delicately mobilizing the bone cement from inside of the RV chamber toward the outside (Fig. 3B). The perforated site was repaired using a pledgeted Prolene suture.

Total systemic circulatory arrest was performed for the removal of the bone cement in the left pulmonary artery, and the pulmonary trunk was opened. The bone cement was re-

moved with biliary forceps in a blind manner (Fig. 3B). After repair of the pulmonary artery, the body temperature was raised back to normal, and the patient was weaned from the cardiopulmonary bypass successfully. Postoperative recovery was uneventful and fast. On postoperative day 7, a follow-up CT scan, a chest roentgenogram, and cardiac echography were performed. The procedures showed no remnants of the foreign bodies (Fig. 1B) or functional disorder. The patient was discharged the next day.

DISCUSSION

PV currently seems to be the standard procedure for vertebral compression fractures [1,2]. PV is a fairly safe and easy procedure involving an injection of polymethylmethacrylate (PMMA), otherwise known as bone cement, into the collapsed vertebrae for pain control and stabilization of the vertebral body [1]. During the procedure, bone cement leaks out quite often, but because PV is performed under the guidance of fluoroscopy or CT, the leaks are easily detected during the procedures [1]. Bone cement leakage into the paravertebral venous system can lead to pulmonary embolism and even worse, intracardiac injury, as described in our report. Cement leakages have been detected with CT scans at a frequency of 55.4% and 75.1% [1,2], and among those leakages, the most devastating consequences resulted from leakages into the paravertebral venous system. Venous leakages have occurred at a frequency of 7.2% [1], and such leakages can lead to pulmonary embolisms (0.8%) [1]. Pulmonary embolism caused by bone cement leakage can initially be managed using heparin, followed by warfarin for 6 months in symptomatic patients [3]. In rare cases, the cement embolus can migrate to the cardiac chambers or to the main pulmonary arteries. While still in a semi-fluid state, the bone cement probably migrates to the chambers of the heart through the venous system, and the cement solidifies in the cardiac chambers, resulting in the formation of a foreign body. In one case, an endovascular procedure under fluoroscopic observation was performed to remove a piece of bone cement in the RV [4]. This case was very fortunate because a surgical procedure was avoided. However, when the cement embolus perforates the cardiac chamber, open heart surgery is inevitable [5,6]. In cases

where the cement embolus had been stuck in the main pulmonary artery, a surgical procedure with cardiopulmonary bypass were performed [7]. Our experience was a combination of the two situations described above. In a different case, a cardiac tamponade resulted from cement embolism. Fortunately, in this case the patient was treated only with pericardiostomy because the emboli were small. The result was uneventful [8].

Intracardiac bone cement is not a complication that cardiovascular surgeons encounter every day, but the number of PV cases is growing, and it is possible that intracardiac cement will not be so rare in the future. To prevent complications, PMMA should be injected slowly, and low viscosity PMMA should be avoided [2]. During a PV procedure, close monitoring with a CT scan or fluoroscopic guidance is essential. However, when complications occur, surgical removal is recommended, except for a few exceptional cases.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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