Echocardiographic accidental finding of asymptomatic cardiac and pulmonary embolism caused by cement leakage after percutaneous vertebroplasty

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Percutaneous vertebroplasty (PVP) is a therapeutic, interventional radiological procedure involving bone cement injection into a vertebral body. Although PVP is considered a minimally invasive procedure, cement leakage into the perivertebral venous system can occur with its migration towards the right heart and the pulmonary circulation. We report a case of accidental finding of asymptomatic cardiac and pulmonary embolism caused by cement leakage after PVP.

KEYWORDS
Percutaneous vertebroplasty; Complication; Pulmonary embolism; Echocardiography

Introduction
Percutaneous vertebroplasty (PVP) is a therapeutic, interventional radiological procedure involving bone cement injection into a fractured vertebral body in order to obtain pain relief and mechanical stability of the vertebral body. This procedure is used in the treatment for osteolytic lesions caused by bone metastases, aggressive haemangioma, multiple myeloma, and in patients who have medically intractable debilitating pain resulting from osteoporotic compression fractures.1,2

Complications are uncommon, and among them is the bone cement leakage into the spinal canal, the paravertebral tissues, or the perivertebral venous system, from which the cement drift towards the right heart and the pulmonary circulation can occur.3,4

The following report describes an echocardiographic finding of cardiac and pulmonary asymptomatic embolism caused by cement leakage after PVP.

Case report
A 68-year-old woman came to our attention to undergo a transthoracic echocardiography while being studied for arterial hypertension and with suspected systemic amyloidosis. The patient’s medical history reveals diabetes mellitus type 1 and peripheric neuropathy, arterial hypertension, hypercholesterolaemia, surgery for right knee, and left hip prosthesis. Two years earlier, the patient underwent several procedures of PVP with methylmethacrylate cement due to a severe osteoporosis with T12 and L2 compression fractures. At the first examination, the patient was asymptomatic.

The physical examination showed mild systolic murmur one-sixth at the base of the heart. Both chest inspection and peripheral pulses were normal. The patient was in stable good conditions. Blood examination confirmed hypercholesterolaemia and mild renal failure. EKG was normal.

In an apical four-chamber view, transthoracic echocardiography showed hyperechogenic linear image in the right ventricle (RV) (5.5 cm long and 0.4 cm thick), going from the RV apical portion to the right atrium through the tricuspid valve. This material appeared rigid, attached at the apex (distal part of the RV free wall), and with its proximal end free in the right atrium (Figure 1). At the colour Doppler, a mild tricuspid leakage with a central jet was evident: it was caused by the presence of this exogenous formation. Transmitralic pattern showed an impairment of the left ventricle diastolic function. No signs of cardiac amyloidosis were evident.

Transoesophageal echo confirmed the measures of this hyperechogenic structure giving no further information (Figure 2). Chest computed tomography (CT) confirmed the presence of a radio-opaque linear material in the RV.
cavity, showing another 5 cm long similar image in the posterior-superior branch of the left pulmonary artery (Figure 3).

The patient was asymptomatic, nevertheless, since the presence of cement into the RV represents a risk of cardiac perforation, a right cardiac catheterism was scheduled to attempt the removal of the intra-cardiac material. Catheterism was performed from the right femoral vein. During the traction, the material broke into two fragments (Figure 4): one persisted attached to the RV apex; the second, tracked from the femoral vein but lost before extraction, migrated into the left pulmonary vein. The further effort to remove the distal part of the material attached to the RV apex was unsuccessful.

After the procedure, echocardiogram showed the residual material (2.5 cm long) firmly attached to the RV apex, with its proximal end floating in the RV (Figures 5 and 6); on the other hand, chest CT displayed the embolized part of the cement located in the latero-basal segment of the left inferior lung.

Being unable to remove haemodynamically this so firmly attached cement fragment, a surgical approach was considered, but immediately excluded because of a low risk/benefit ratio, due to the presence of patient’s co-morbidities and the minimal residual risk of such a small and well fixed fragment.

**Discussion**

Although PVP is considered a minimally invasive procedure, it may result in cardiovascular complications. These complications are infrequent and consist in bleeding at the puncture site, local infection, cement leakage into the spinal canal, the paravertebral tissues or the peri-vertebral venous system, and several instances of pulmonary embolism.\(^5,6\)

The percutaneous injection of liquid acrylic bone cement may increase intra-medullary pressure, and thereby, marrow contents may shift into the paravertebral venous circulation.\(^7\) Cement leakage from targeted vertebral bodies has been reported in up to 73% of cases and venous leaks in up to 24%.\(^8,9\) Nevertheless, the majority of them remains asymptomatic. The surface of fresh or aged bone cement is not thrombogenic in vitro.\(^10\)

Nevertheless, the presence of cement into the RV showed to be capable of causing cardiac perforations.\(^11,12\)

We experienced a case of accidental finding of cardiac and pulmonary asymptomatic embolism caused by cement leakage after PVP with an unsuccessful attempt to remove it from the RV.

Transthoracic echocardiography is an inexpensive and non-invasive examination that should be always performed after PVP to early identify cement cardiac embolization which is often associated with high-risk complications.

**Supplementary data**

Supplementary data are available at European Journal of Echocardiography online.
References


