

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Cement cardiac embolism following kyphoplasty noted on thoracic imaging

Charles Oshinsky*, Sivasubramaniam Bhavani, Alexandra Funaki

University of Chicago Medical Center, 5841 S Maryland Ave, Chicago, IL 60637, USA

ARTICLE INFO

Article history:

Received 26 March 2018

Revised 30 May 2018

Accepted 3 June 2018

Keywords:

Cement

Cardiac embolism

Polymethyl methacrylate

PMMA

ABSTRACT

Asymptomatic polymethyl methacrylate cardiac embolism is an uncommon complication of kyphoplasty. We report a case of a 56-year-old female with an incidentally noted radiopaque foreign body in the right ventricular cavity on chest x-ray following kyphoplasty. In this report, we discuss how to differentiate between the potential intracardiac foreign bodies and how to establish the diagnosis of polymethyl methacrylate embolism. Once diagnosed, the management of these patients remains controversial.

© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Case report

The patient is a 56-year-old female with a history of renal and / pancreas transplant 10 years prior complicated by post-transplant lymphoproliferative disease treated with multiple chemotherapeutics, admitted with 1 week of fever, fatigue, and malaise. She denied cough, dyspnea, and chest pain. She was diagnosed through imaging and bronchoalveolar lavage with cytomegalovirus (CMV) pneumonitis, and subsequently treated for this.

Incidentally, a radiopaque foreign body was noted in the right ventricular cavity on her initial chest radiograph (Figs. 1 and 2) and chest computed tomography (CT) (Fig. 3,4). Relevant history included L4 kyphoplasty for vertebral compres-

sion fracture 3 months prior to presentation, and port placement for chemotherapy 9 months prior to presentation. She had a normal chest radiograph 6 months ago.

Subsequent lumbar spine radiographs demonstrated cement in the left paravertebral vein (Figs. 5 and 6). The diameter and length of the foreign body in the right ventricle correlated with the caliber and length of polymethyl methacrylate (PMMA) in the left paravertebral vein, providing further evidence that the foreign body noted in the right ventricle was PMMA embolism.

The patient had no specific symptoms related to the PMMA cement embolism. Transthoracic echocardiogram did not show any functional deficits due to the cement embolism. Cardiac surgery recommended against intervention given the lack of functional deficits and because the cement had likely

* Corresponding author.

E-mail addresses: charlie4910@gmail.com (C. Oshinsky), Sivasubramaniam.Bhavani@uchospitals.edu (S. Bhavani), afunaki@radiology.bsd.uchicago.edu (A. Funaki).
<https://doi.org/10.1016/j.radcr.2018.06.001>

1930-0433/© 2018 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

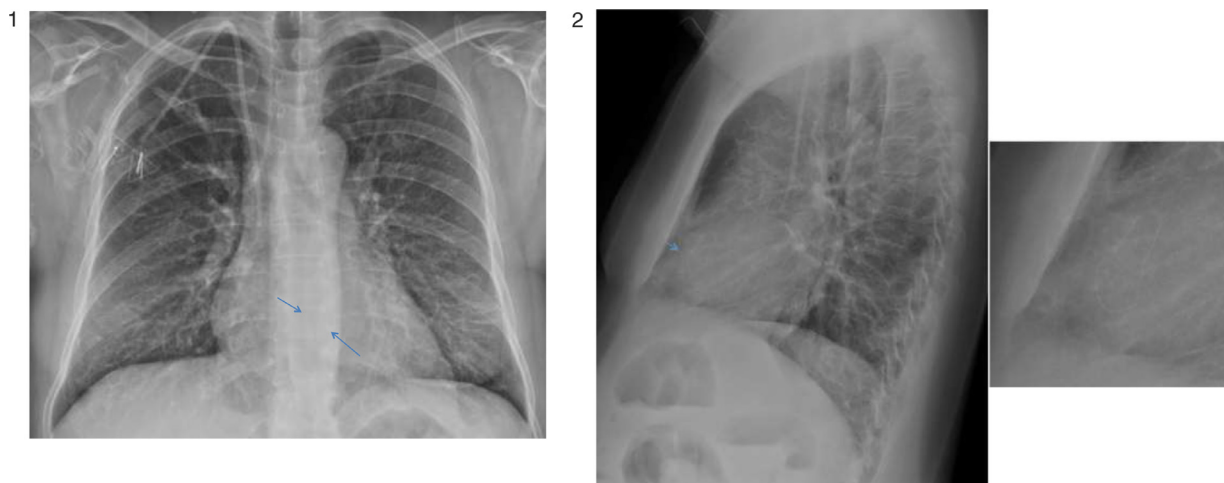


Fig. 1,2 – The pulmonary artery (PA) film shows a faint radiodensity around the level of the mitral valve – The lateral film shows the radiodensity around the right ventricle (RV) and proximal pulmonary outflow tract.

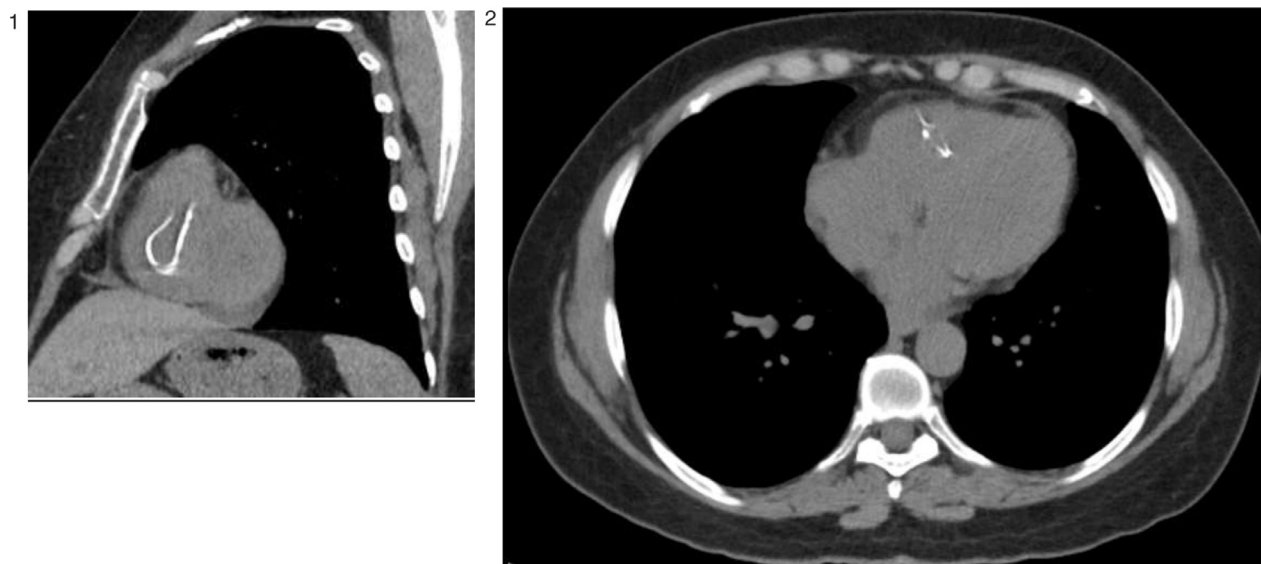


Fig. 3,4 – Chest CT shows the foreign body in the right ventricle extending onto the proximal pulmonary outflow tract. CT, computed tomography.

hardened and become adherent to the right ventricle. Annual screening transthoracic echocardiograms and anticoagulation were recommended.

Discussion

The chest radiograph and chest CT inform the differential diagnosis. On the PA film, a faint radiodensity is visible at or slightly below the expected location of the mitral valve. However, on the lateral film, the radiopaque object is noted anteriorly in the projection of the right ventricular cavity and

proximal pulmonary outflow tract. The chest CT confirms that the foreign body is in the right ventricle extending onto the proximal pulmonary outflow tract. In a patient with a new right ventricle foreign body and history of kyphoplasty, PMMA cardiac embolus must be considered in the differential; however, with the history of port placement for chemotherapy, a sheared guide wire tip or catheter fragment embolism [1,2] must be excluded by careful evaluation of current and prior imaging studies.

The radiopacity and caliber of the foreign body can help differentiate retained iatrogenic devices from PMMA. The foreign body in this patient was only 373 Hounsfield Units. This



Fig. 5 – Pre kyphoplasty.

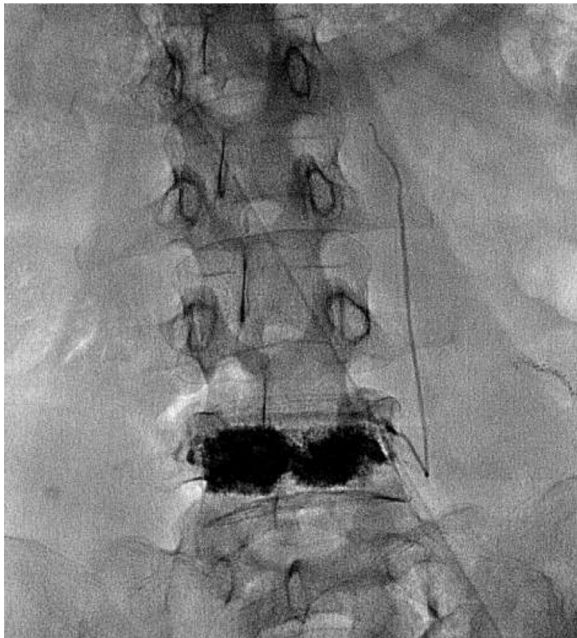


Fig. 6 – Post kyphoplasty. Cement noted in the left paravertebral vein. This correlates with the diameter and length of the foreign body in the right ventricle, further evidence that the foreign body in the ventricle is PMMA embolism. PMMA, polymethyl methacrylate.

further differentiates PMMA cement embolism from other foreign bodies such as metallic guide wires, which are more radiodense. Metallic guide wires are readily visible on chest radiographs and fluoroscopy with diameter ranging from 0.018 inch to 0.035 inch (0.5–0.9 mm). Intravascular loss of a guide wire or breakage of a guide wire may occur [3]. Wire fragments may loop in the right atrium or less commonly extend into

the right ventricle or a pulmonary artery. Retained or fragmented wire, or disconnected or fragmented catheter can be easily mistaken for an intentional iatrogenic device in the axial plane.

The diagnosis of PMMA cardiac embolus is further supported by lumbar spine radiography. As noted above, in our patient, Figure 6 notes cement in the left paravertebral vein consistent with PMMA.

Cement extravasation can occur after both kyphoplasty and vertebroplasty, and is reported to be more common after vertebroplasty [4]. Despite the prevalence of extravasation, patient presentation can range from asymptomatic to cardiac tamponade or perforation. Leakage of PMMA into the vasculature during vertebroplasty is common, and up to 26.9% of vertebroplasties result in pulmonary embolism [5]. Cardiac embolism of PMMA is less commonly reported in the literature and the incidence remains unknown. Our noncontrast imaging studies were not sufficient to rule out thrombotic pulmonary embolism, but the patient had no signs or symptoms of PE and no evidence of PMMA pulmonary emboli.

Management of patients with cement embolism remains controversial, with a limited evidence base. Asymptomatic patients may be managed conservatively, though percutaneous or surgical retrieval of the PMMA has been attempted. Risks of not intervening include pulmonary embolization, right ventricular dysfunction, infection, and thrombosis [6,7]. However, definitive management with removal may be complicated if the PMMA is adherent to the ventricle wall [8]. If the patient is managed conservatively, anticoagulation should be considered as PMMA is thought to be thrombogenic.

Though PMMA cardiac embolism is an uncommon complication of kyphoplasty, this diagnosis must be considered in appropriate patients with foreign objects and history of kyphoplasty. History and thorough evaluation of thoracic imaging are necessary to establish this diagnosis.

REFERENCES

- [1] MacTaggart JN, Pipinos II, Johanning JM, Lynch TG. Acrylic cement pulmonary embolus masquerading as an embolized central venous catheter fragment. *J Vasc Surg* 2006;43(1):180–3.
- [2] Surov A, Buerke M, John E, Kösling S, Spielmann RP, Behrmann C. Intravenous port catheter embolization: mechanisms, clinical features, and management. *Angiology* 2008;59(1):90–7 Feb.
- [3] Schummer W, Schummer C, Gaser E, Bartunek R. Loss of the guide wire: mishap or blunder. *Br J Anaesth* 2002;88(1):144–6.
- [4] McCall T, Cole C, Dailey A. Vertebroplasty and kyphoplasty: a comparative review of efficacy and adverse events. *Curr Rev Musculoskeletal Med* 2008;1(1):17–23.
- [5] Shridhar P, Chen Y, Khilail R, Plakseychuk A, Cho SK, Tillman B, et al. A review of PMMA bone cement and intra-cardiac embolism. *Materials* 2016;9(10):821.
- [6] Hatzantonis C, Czyz M, Pyzik R, Roszczyk B. Intracardiac bone cement embolism as a complication of vertebroplasty: management strategy. *Eur Spine J* 2017;26:1–7.
- [7] Braitheh F, Row M. Right ventricular acrylic cement embolism: late complication of percutaneous vertebroplasty. *Heart* 2009;95(4):275.
- [8] Georg KM, Campbell M. Embolized methyl methacrylate to the right atrium after kyphoplasty. *Circulation* 2013;127:1251–3.