Rare disease

Right atrial mass in patient undergoing chemotherapy

Louise Thompson,¹ Zeeshan Khawaja,² Katarzyna Dickinson,³ Eric McWilliams³¹Department of Medicine for the Elderly, Conquest Hospital, The Ridge, St Leonards-on-Sea, East Sussex, UK;²Cardiology Department, St Thomas' Hospital, London, UK;³Cardiology Department, Conquest Hospital, The Ridge, St Leonards-on-Sea, East Sussex, UK**Correspondence to** Dr Eric McWilliams, eric.mcwilliams@esht.nhs.uk**Summary**

A 58-year-old lady, with a Hickman line in situ for chemotherapy for invasive ductal breast carcinoma, presented with fever. Blood cultures grew coagulase negative staphylococci. Transoesophageal echocardiography revealed a mass in the right atrium in the region of the Eustachian apparatus. The Hickman line was removed and the patient was treated for right-sided endocarditis. However, the mass persisted after prolonged intravenous antibiotics and a decision was made to remove it surgically. Histology revealed organised thrombus. The differential investigation of a right atrial mass in this position is discussed.

BACKGROUND

Episodes of sepsis are relatively common in patients undergoing chemotherapy, especially those with indwelling catheters. However, persistent bacteraemia and the development of a cardiac mass requires more aggressive investigation and management.

CASE PRESENTATION

A 58-year-old lady presented with fever and sepsis on a background of grade 3 invasive ductal carcinoma of the right breast. She had previously undergone a wide local excision and axillary node clearance. She was on a chemotherapy regime and had a Hickman line in situ (figure 1A). In the past, she had neutropaenic sepsis but was not neutropaenic on this occasion. Multiple blood cultures were positive for coagulase negative staphylococci. Her Hickman line was removed and a transoesophageal echocardiogram (TOE) was performed, which showed no obvious vegetations on any of the valves. However, a fleshy echodense mass was visualised in the right atrium, in the region of the Eustachian apparatus (figure 1B). In the context of sepsis, it was felt that, although this would be a most unusual location, endocarditis of the Eustachian valve was the most likely scenario and she was treated with appropriate intravenous antibiotics administered via a new peripherally inserted central catheter line. She received vancomycin, rifampicin and gentamicin for 2 weeks and a further 4 weeks of vancomycin monotherapy. During this time, she received low molecular heparin (tinazeparin 4500 units) daily by subcutaneous injection. Further chemotherapy was withheld on the advice of her treating oncologist, in view of probable endocarditis and the fact that she had already received close to the planned full treatment of chemotherapy. She improved clinically and remained afebrile with gradual normalisation of her inflammatory markers.

INVESTIGATIONS

A second TOE was performed after antibiotic therapy. Unfortunately the appearances were similar, if not slightly

more marked than the original images. The mass measured 1.6×1.4 cm and the base arose from the right atrial wall in the region of the Eustachian apparatus. It appeared fleshy and mobile. By echocardiogram its appearance was more suggestive of a tumour rather than vegetation or thrombus. Cardiac magnetic resonance imaging (CMR) revealed the mass was at the junction of the inferior vena cava (IVC) and right atrium, at the level of the Eustachian apparatus (figure 1C). There was no invasion through the right atrial wall. There were a few mediastinal lymph nodes, but none exceeded 1 cm in diameter. The mass did not enhance during the early phase following gadolinium contrast; in the late phase there was no evidence of myocardial infarction or fibrosis. The appearance was not felt to be typical of an intracardiac thrombus. The valves appeared normal; the tricuspid valve was not affected by the mass (figure 2A,B). She had good left ventricular systolic function as well as normal right ventricular volumes and systolic function. The mass was of moderate intensity in both the T1 and T2 weighted images and did not suppress on the STIR (short tau inversion recovery) imaging.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis was infection, thrombus or cardiac metastasis. With her initial presentation with bacteraemia, the working diagnosis was of right-sided bacterial endocarditis with coagulase negative staphylococci. An unusual variant of right-sided endocarditis – endocarditis on the Eustachian apparatus was entertained. However, as the mass persisted and appeared to grow in size over 6 weeks, there was a concern that this might even represent an unusual intracardiac metastasis. Thrombus was also considered but felt to be unlikely as she had been treated with low molecular weight heparin from admission.

TREATMENT

Her case was discussed with cardiac surgical colleagues. Diagnostic coronary angiography excluded any obstructive

Figure 1 (A) Chest x-ray showing tip of Hickman line in right atrium (yellow arrow). (B) Transoesophageal echo 90 degree bicaval view, showing mass in region of Eustachian apparatus (yellow arrow). (C) Cardiac magnetic resonance image showing position of right atrial mass (yellow arrow). (D) Histology of excised mass consistent with organising thrombus.

Figure 2 Axial and coronal cardiac magnetic resonance imaging views, labelled.

coronary disease and specifically no overt abnormal myocardial enhancement or tumour circulation.

The patient underwent open heart surgery and wide excision of the mass and atrial wall, limited by the IVC inferiorly and the right coronary artery in the atrioventricular

groove. The defect in the right atrial wall was repaired using a pericardial patch. Histology revealed an organised thrombus (figure 1D). There was no evidence of malignant cells. Microbiological studies of the thrombus were negative.

OUTCOME AND FOLLOW-UP

The patient made an uneventful recovery from open heart surgery. Postoperatively, she was formally anticoagulated with warfarin for 6 months. She remains well, 2 years later with no signs of recurrence of her breast cancer and no episodes of infection or thromboembolic phenomenon. Routine transthoracic echo follow-up is normal.

DISCUSSION

The likely sequence of events in this patient is that she developed some localised right atrial thrombus at the contact point of the Hickman line in the right atrium, secondary to catheter trauma and irritation from the chemotherapy. Later she developed staphylococcal line sepsis, presumably with infection of the right atrial thrombus. This infection responded to removal of the indwelling catheter and prolonged intravenous antibiotics but the right atrial thrombus grew and organised, as she was only treated with prophylactic rather than therapeutic anticoagulation.

The Eustachian apparatus is an embryological remnant of the valve of the IVC derived from the right valve of the sinus venosus. During fetal life, the purpose of this valve is to direct oxygen-rich blood returning to the fetus via the umbilical vein from the placenta towards the foramen ovale and across to the left atrium, thus avoiding the right heart and pulmonary circulation. After the closure of the foramen ovale it does not have a specific function. It usually regresses in childhood, but may persist into adult life.¹ At echocardiographic examination, the Eustachian valve may appear as a thin flap originating from the orifice of the IVC or it may appear as a rigid elongated structure in the inferior portion of the right atrium.²

The differential diagnosis of a Eustachian valve mass on echocardiographic examination includes endocarditis, thrombus or tumour.

Eustachian valve endocarditis is rare with only a few cases having been reported.^{3–4} This may be because the Eustachian valve is an unlikely site for a vegetation to occur or because interrogation of the Eustachian valve does not routinely take place on echocardiographic examination. It is characterised by clinical signs and symptoms of right-sided endocarditis and is more commonly seen in intravenous drug misusers and has been reported in patients requiring central venous catheters.⁵ It usually occurs without the involvement of other cardiac valves.⁶ Antimicrobial management is not altered due to the finding of Eustachian valve endocarditis and should be tailored to the isolated organism.³

A thrombus adherent to the Eustachian valve has been reported in association with pulmonary thromboembolism. This may complicate diagnosis and management. It may be successfully treated with anticoagulant therapy although thrombectomy has been required.⁷

There have also been distinct cases of a right atrial myxoma^{8–9} or a papillary fibroelastoma¹⁰ arising from the Eustachian valve reported in the literature. A case of non-bacterial thrombotic endocarditis on a background of central catheter insertion has been reported previously.

Echocardiography, which is widely available and relatively inexpensive, has been the initial imaging modality of choice for the detection and characterisation of cardiac

masses. Certain echocardiographic features (eg, associated wall motion abnormality, degree of mobility, associated pericardial effusion) can suggest a thrombus versus a tumour and may also help differentiate a benign from a malignant tumour. Contrast echocardiography with fluoride based microbubbles can also help differentiate between thrombi and tumours based on vascularity. Both cardiac CT and CMR are being used more frequently to both, detect and characterise cardiac masses. The wide field of view provided by both techniques afford excellent view of the pericardium and adjacent great vessels, regional lymph nodes, etc. Cardiac CT is exquisite in the detection of calcification within masses and is the most robust non-invasive technology for imaging the coronary arteries. CMR provides better soft-tissue contrast that can accurately depict the internal structure of masses and tumours. CMR also provides physiological assessment of chamber function and CMR can help characterise certain masses by fat content. Both cardiac CT and CMR employ contrast enhancement to detect vascularity of masses. Gadolinium enhancement with CMR is now a well established and validated technique. However, no non-invasive imaging technique can always characterise an intracardiac mass with certainty. In cases where there is a remaining clinical doubt or where there have already been significant clinical consequences or concerns about possible embolism, surgical excision biopsy may be indicated.

We hypothesise that this case represents a localised thrombus at the Eustachian valve as a result of central catheter related trauma from Hickman line insertion and subsequent infusion of chemotherapy in an oncology patient with a prothrombotic milieu. This then acted as a nidus for recurrent episodes of sepsis. This thrombus subsequently gradually grew and became organised.

Learning points

- ▶ Common things are common and the commonest mass seen in the right heart is a thrombus.
- ▶ Malignancy is a prothrombotic condition and prophylactic low molecular weight heparin should be considered.
- ▶ Large right atrial masses may have to be surgically removed.

Acknowledgements The authors wish to thank Mr Uday Trevedi, Royal Sussex Hospital, Brighton, Consultant cardiac surgeon for his help and assistance and also would like to thank Professor Dudley Pannel, Brompton Hospital for the cardiac MR images.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Malaterre HR**, Kallee K, Périer Y. Eustachian valve mimicking a right atrial cystic tumor. *Int J Card Imaging* 2000;**16**:305–7.
2. **Yavuz T**, Nazli C, Kinay O, *et al*. Giant Eustachian valve with echocardiographic appearance of divided right atrium. *Tex Heart Inst J* 2002;**29**:336–8.
3. **Pellicelli AM**, Pino P, Terranova A, *et al*. Eustachian valve endocarditis: a rare localization of right side endocarditis. A case report and review of the literature. *Cardiovasc Ultrasound* 2005;**3**:30.

4. **Carson W**, Chiu SS. Image in cardiovascular medicine. Eustachian valve mimicking intracardiac mass. *Circulation* 1998;**97**:2188.
5. **Deluca G**, Correale M, Ieva R, *et al*. Voluminous mass adherent to the Eustachian valve. *Echocardiography* 2008;**25**:100–1.
6. **Bowers J**, Krinsky W, Gradon JD. The pitfalls of transthoracic echocardiography. A case of Eustachian valve endocarditis. *Text Heart Inst J* 2001;**28**:57–9.
7. **Maddury J**, Alla VM, Misra RC, *et al*. Thrombus on the Eustachian valve leading to recurrent pulmonary embolism: a rare problem requiring aggressive management. *Can J Cardiol* 2009;**25**:e422–3.
8. **Bonde P**, Sachithanandan A, Graham AN, *et al*. Right atrial myxoma originating from the Eustachian valve in a patient with colonic polyposis. *J Heart Valve Dis* 2002;**11**:601–2.
9. **Teoh KH**, Mulji A, Tomlinson CW, *et al*. Right atrial myxoma originating from the Eustachian valve. *Can J Cardiol* 1993;**9**:441–3.
10. **Shigemitsu O**, Hadama T, Mori Y, *et al*. Surgical treatment of right atrial papillary fibroelastoma, originated from the Eustachian valve – a case report. *Nippon Kyobu Geka Gakkai Zasshi* 1995;**43**:403–6.

This pdf has been created automatically from the final edited text and images.

Copyright 2011 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Thompson L, Khawaja Z, Dickinson K, McWilliams E. Right atrial mass in patient undergoing chemotherapy. *BMJ Case Reports* 2011;10.1136/bcr.08.2010.3297, date of publication

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow