Unusual presentation of more common disease/injury

Solitary atrial metastases: a rare clinical challenge

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This case describes a 55-year-old lady presenting with lethargy, migraines and a cardiac mass on a background history of breast cancer. She had been treated initially with a mastectomy, axillary node clearance, reconstruction and hormone manipulation followed by chemotherapy and high dose radiotherapy for an isolated supraclavicular metastases. She was disease free for 5 years when she complained of lethargy and migraines. A CT confirmed an isolated cardiac lesion, confirmed on echocardiogram. A percutaneous atrial biopsy revealed an atrial metastases from breast carcinoma. She was treated with chemotherapy achieving a good response but was still deemed inoperable after treatment. She currently is receiving letrozole.

BACKGROUND

This is a very rare presentation of metastatic breast cancer and was originally thought to be an atrial myxoma. It is also the first case to document migraines as a presenting symptom of an atrial mass. The differential diagnosis of a solitary atrial mass is wide and this case illustrates the complexity of investigations and diagnosis in such a case.

CASE PRESENTATION

A 46-year-old female presented with a T1N1M0 oestrogen receptor (ER) positive, progesterone receptor positive, human epidermal growth factor receptor 2 (HER2) negative, infiltrating ductal breast carcinoma. Initial surgical treatment included a left mastectomy, axillary node clearance and reconstruction. The patient declined chemotherapy

and received hormone manipulation with tamoxifen 20 mg daily. Four years later, while continuing adjuvant tamoxifen, she developed an isolated left supraclavicular nodal metastasis. This was confirmed histologically, the tumour remaining ER positive and HER2 negative. Six cycles of epirubicin chemotherapy and high dose nodal radiotherapy achieved a complete response. She remained in remission for a further 5 years, but then presented with progressively worsening lethargy, anorexia, migraines and cough for 7 months.

INVESTIGATIONS

A whole body CT demonstrated a 6.0 cm×5.0 cm lobulated soft tissue density mass sitting astride the interatrial septum (figure 1). No lymphadenopathy or other masses were seen.

Subsequent transthoracic and transoesophageal echocardiograms (TOEs) were performed, confirming the mass to have a broad based attachment to the interatrial septum on both its right and left atrial aspects, the majority of the mass being within the left atrium (figure 2). No associated valvular abnormality was seen and Doppler interrogation indicated blood flow within the lesion. Impaired diastolic filling of the right atrium was noted. Coronary angiography identified the mass had a blood supply from both the left and right coronary arteries (figure 3) making a neoplastic lesion most likely. Percutaneous, catheter-directed atrial biopsy was performed, confirming malignancy, histologically identical to the primary breast lesion excised 9 years previously. This cardiac secondary maintained the original receptor profile of ER positive (figure 4) and HER2 negative.

DIFFERENTIAL DIAGNOSIS

Thrombosis
Coronary vegetation/abscess
Atrial myxoma
Primary sarcoma
Secondary malignant tumour.

Figure 1 Axial CT image showing atrial mass lesion (red arrow).

Figure 2 Echocardiogram showing large atrial mass straddling the interatrial septum (red arrow). Transoesophageal echocardiogram (top). Prechemo transthoracic echocardiography (TTE) (bottom left). Postchemo TTE (bottom right).

TREATMENT

The patient was commenced on docetaxel chemotherapy to achieve tumour shrinkage and symptom control. She was started on letrozole on completion of her cytotoxic therapy.

OUTCOME AND FOLLOW-UP

To monitor the effectiveness of treatment, 2-weekly transthoracic echocardiograms were performed. A dramatic reduction in the size of tumour occurred after only 2 weeks of chemotherapy (figure 2) and the patient's symptoms of lethargy and migraines improved significantly. Follow-up CT after four cycles confirmed shrinkage of the tumour with the maximum diameter of 3.9 cm from 6 cm. On completion of chemotherapy the patient was started on letrozole 2.5 mg daily. Recent cardiac review confirms continued shrinkage of the tumour and a positron emission tomography scan has confirmed no other metastatic disease. Cardiothoracic opinion was sought but despite the absence of other metastasis, the tumour was deemed inoperable.

DISCUSSION

In patients with known malignant disease, secondary spread to the heart is a distinctly unusual complication although occasional postmortem studies have shown a higher rate than clinically suspected.¹ The most common offending primary site is the lung.² Usually, cardiac secondaries are silent with symptoms from other metastatic disease more prominent. When deposits are multiple the diagnosis, in the clinical context, is straight forward but if the cardiac lesion is solitary – a range of differential diagnoses apply. Principal alternatives include thrombosis,

Figure 3 Right coronary angiogram (top); left coronary angiogram (bottom). Red arrows point to tumour blood vessels.

vegetations or primary tumours.^{1 3} Considering the latter, atrial myxomas and primary sarcomas are the commonest. Cardiac metastases are rarely a solitary phenomenon, but here we report such a case.

Metastatic disease in breast cancer is not uncommon and usually affects the skeletal system, liver and lungs and, more commonly in triple negative and HER2 positive disease, the brain. A single cardiac secondary without other visceral deposits is most unusual. Right-sided cardiac lesions are more suspicious for malignancy because metastatic disease spreads to the right heart due to the venous drainage.^{1 4} Clinical features of cardiac secondaries vary according to their position within the heart. Intracavitary tumours can cause embolic phenomena, constitutional symptoms such as fever, fatigue and weight loss and obstructive symptoms, such as syncope, whereas myocardial tumours cause atrial or ventricular arrhythmias and even sudden death.^{1 3} Pericardial involvement can lead to pericardial effusion and tamponade causing the patient to

Figure 4 Slide demonstrating oestrogen receptor staining of the cardiac biopsy.

experience significant clinical symptoms.^{1 3 5} Migraines are not documented as a clinical symptom from cardiac masses and our report is therefore the first to document such an occurrence.

For cardiac lesions, echocardiogram is the first diagnostic test of choice. It is non-invasive, does not expose the patient to ionising radiation, allows real time analysis and can be allied to functional and haemodynamic assessments with Doppler. When the lesion is located in one or both of the atria, TOE is often beneficial as in this case.³ Our patient had a CT first which was useful in searching for distant metastases, assessing local infiltration of the cardiac mass and can provide an alternative view if echocardiography is technically challenging.^{3 5}

Despite our recognition that CT was most useful in this case we did use echocardiograms regularly initially to assess tumour response and cardiac function. This was a quick, instant, non-invasive method of monitoring and enabled us to rule out pericardial effusion and obstruction of the atrioventricular valves.

The percutaneous biopsy, being the only approach available to obtain a tissue diagnosis, was performed to rule out atrial myxoma. Solid nests of mild to moderately pleomorphic cells with small nuclei were seen amidst fragments of

the myocardium. Immunohistochemistry was performed to distinguish the source of these tumour cells and MNF116 was positive, indicating an epithelial origin.⁶ Nuclear staining was seen for the ER and the cells were negative for thyroid transcription factor 1, synaptophysin and WT-1, all of which is compatible with metastases from a breast carcinoma.⁶

As in all cases of metastatic breast cancer, systemic treatment was the modality of choice in a fit patient. The size and position of the tumour made surgery and radiotherapy impossible. The patient had previously progressed through hormonal treatment and had responded well to epirubicin. Single agent taxane chemotherapy was therefore given. After the first cycle of chemotherapy her migraines had become significantly less frequent, her energy and appetite improved.

Learning points

- ▶ Biopsy is vital in confirming diagnosis of an atrial mass
- ▶ Cardiac metastases are relatively common and as clinicians we should be more aware of these as they can cause a significant range of symptoms including migraine
- ▶ A multidisciplinary approach to a complex case is essential for diagnosis and management.

Competing interests None.

Patient consent Obtained.

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