CASE REPORT

Wide complex ventricular tachycardia presenting sign of metastatic pleural mesothelioma

Ashmeet Bhatia, Tokunbo Ajayi

Department of Medicine,
NSMC, Salem, Massachusetts,
USA

Correspondence to
Dr Ashmeet Bhatia,
drashmeet@gmail.com

SUMMARY

Malignant mesothelioma is an uncommon neoplasm of serosal surfaces, such as the pleura, the peritoneum, less frequently pericardium and tunica vaginalis. It usually spreads locally to the lungs and mediastinum. We describe a case of malignant mesothelioma with metastasis to the heart. The patient presented with syncope, chest pain and light-headedness. He was found to have wide complex ventricular tachycardia (Vtach). He was cardioverted and then noted to have multiple (more than 20) similar episodes during the hospital course. He was treated with multiple antiarrhythmic medications. A CT scan of the chest revealed a circumferential rind of soft tissue in the right hemithorax and invasion of the pericardium. The repeated Vtach episodes were secondary to the metastasis of the pericardium. Oncology was involved and as there were no further treatment options available, the patient was discharged home with hospice care. The disease is a huge economic burden and early recognition can lead to better outcomes.

BACKGROUND

Malignant mesothelioma (MM) is a rare condition, but when present, it is not detected till late stages in the disease. Early recognition and treatment can lead to better outcomes. A detailed history might provide clues for asbestos exposure. Unresolving

chest pain and pleural effusion should raise suspicion for this condition.

CASE PRESENTATION

A 56-year-old man with MM, diagnosed 6 months ago, on chemotherapy was brought to the emergency room (ER) after witnessed syncope at home, preceded by chest discomfort, light-headedness and blurry vision. Emergency medical service found him unresponsive. A cardiac monitor revealed wide complex ventricular tachycardia (Vtach; figures 1–3). Defibrillation was performed with return of spontaneous circulation (ROSC) and sinus rhythm. A second episode of syncope and Vtach occurred on arrival to the ER. Shock was delivered and ROSC followed. A third episode of syncope and Vtach recurred with conversion to torsade de pointe. A third shock was delivered followed by magnesium infusion. The patient was intubated for airway protection. A total of 30 episodes of Vtach occurred which were treated with cardioversion along with lidocaine and amiodarone infusions. ROSC was accompanied by sinus rhythm. After 12 h of management in the intensive care unit and resolution of Vtach, patient was successfully extubated without complications. No neurological deficits developed. Therefore, hypothermia protocol was not pursued. The patient was treated with infusions of antiarrhythmics lidocaine and amiodarone for 4 days, but he continued to have refractory arrhythmias.

Figure 1 Arrhythmia on telemetry.

Figure 2 Arrhythmia on telemetry.

CrossMark

To cite: Bhatia A, Ajayi T.
BMJ Case Rep Published
online: [please include Day
Month Year] doi:10.1136/
bcr-2013-200654

Figure 3 Arrhythmia on telemetry.

INVESTIGATIONS

Blood work revealed a complete blood count, basic metabolic panel, calcium and magnesium within normal limits. Creatine kinase (CK) trended up as high as 915 IU/L. Two sets of troponin enzymes were negative. ECG (figure 4) showed normal sinus rhythm and therefore ischaemia was ruled out. Chest X-ray (figure 5) revealed a recurrent right pleural effusion. CT of the chest (figures 6 and 7) disclosed interval increase in thickness of a circumferential rind of soft tissue in the right hemithorax, with evidence of extension to the left pleura, and new mild pleural thickening and nodularity along the left major fissure. The cardiac chambers are normal in size with involvement of the right pericardium. New and enlarging right mediastinal, subpectoral, internal mammary and inferior/supraclavicular lymphadenopathy were noted. There was also evidence of transdiaphragmatic spread, with soft tissue seen around the liver. Positron emission tomography (PET; figure 8) showed increased uptake in the right hemithorax. Echocardiogram showed normal study, with normal left ventricle and ejection fraction. There were no septal defects and pericardium, pericardial space was normal. As the investigations for a primary cardiac cause were normal, and with CT scan showing progression of the tumour to the right pericardium, the aetiology of the repeated arrhythmias was considered to be due to the mesothelioma invading the pericardium.

TREATMENT

There is no definite standard of care, and curative therapy is for only a handful of patients.

1. Surgery: Surgical resection of the diseased area is the preferred choice but not possible in widespread disease. Cytoreduction is used and histologically negative margins are obtained. For palliative purposes VATS talc pleurodesis and pleurectomy or decortication can be carried out. The most aggressive and complete cytoreductive surgery is extrapleural pneumonectomy. It involves en bloc resection of the pleura and involved portion of the lung, lymph nodes, diaphragm and pericardium.
2. Chemotherapy: Recent studies have established the role of chemotherapy agents such as cisplatin and pemetrexed. In a study the patients treated with both the agents had a longer overall survival compared with those treated with cisplatin alone.¹ Other agents used are: gemcitabine, doxorubicin (alone or with cisplatin), vinorelbine, methotrexate. MM has the high levels of VEGF and therefore bevacizumab has generated promise.
3. Radiotherapy: It is used mainly for palliative reasons, and its role is not well defined. Studies have shown benefit in symptom improvement with radiation. It should be combined with surgery to reduce recurrence and failure. Recent reports have shown promising results for intensity-modulated radiotherapy, when used after surgical resection of MM.²
4. Multimodality treatment approach: Any single therapy has not shown clear benefit, and as this is a rare disease with grave prognosis, multidisciplinary approach should be used. Local control has been improved by combining cytoreductive surgery with chemotherapy or radiation. Many trials are ongoing to support this approach.

Figure 4 Electrocardiogram.

Figure 5 Chest X-ray.

OUTCOME AND FOLLOW-UP

The patient was seen by a multidisciplinary team, and was discharged on hospice care. He travelled back to his home country, as he wanted to meet his family.

DISCUSSION

MM is a rare and aggressive tumour. Its incidence is increasing worldwide recently probably as a result of widespread exposure to asbestos, a factor with which it is associated. Median survival is 8–18 months.³ MM annually occurs in 2500 cases, and 80% are men in sixth to eighth decade. It was first recognised in 1870 and it was linked to asbestos in 1960 in South Africa. The two principal form of asbestos are amphiboles (thin fibres) and chrysotil (feathery fibres). The serpentine are more common in the USA and are less carcinogenic. Asbestos is used in the insulation of buildings and as a fire retardant. Another controversial factor linked to development of MM is Simian virus 40 (SV40),

Figure 7 CT scan axial view.

a DNA virus, which acts by blocking tumour suppressor genes. Rarely can it be caused by radiation.⁴

It usually manifests as progressive dyspnoea associated with pleural effusion and chest wall pain. Other symptoms could be cough, weight loss, fever, fatigue and is more common unilaterally. It frequently invades structures lying near the lungs and is rarely benign and can be surgically resected in those cases. The tumour tends to progress locally, invading the pleural surfaces, pericardium and the mediastinum. Cardiac involvement can be as pericardial invasion, myocardial and endocardial metastatic deposits. Millitary spread can also occur.⁵ The cases are usually diagnosed months after the initial onset of symptoms as the disease spreads silently and on invasion becomes evident clinically. Physical examination and chest X-ray can reveal pleural effusion in majority of the patients. A CT scan of the chest with contrast is more sensitive and will show pleural effusion, lymph nodes involvement and maybe pleural mass forming a rind of tissue encasing the lung. Also chest wall extension can be noted. MRI is more sensitive than a CT. PET is used for detecting disease extent and its metastatic extent, hence used for staging.

Figure 6 CT scan coronal view.

Figure 8 Positron emission tomography scan.

Figure 9 More eosinophilic cells, H&E $\times 20$.

Serum markers like SMRP are also elevated in around 80% patients. Cytology can be obtained by performing a CT-guided biopsy (figure 9). Special immunohistochemical stains are used to differentiate the MM from adenocarcinoma of the lung. The stains are calretinin (figure 10) which determines mesothelial origin, EMA (epithelial membrane antigen) which determines if the tumour is malignant, WT1, cytokeratin 5/6 and mesothelin, further confirmed by electron microscopy (figures 11 and 12).

Any patient presenting with unresolving pleural effusion and pleuritic chest pain, with chest X-ray suggestive of plural effusion should be evaluated carefully for this rare cause. Cardiac symptomatology is difficult to differentiate from symptoms of pleuropulmonary disease. Cardiac involvement in patients with pleural mesothelioma is an imminent complication. It infiltrates pericardium as well as myocardium. Arrhythmias and conduction abnormalities are the usual manifestation. However, Vtach has not been described in prior literature. In a study carried out by Walder *et al*, there were 64 patients with biopsy proven diffuse pleural mesothelioma and their EKG and echocardiogram findings were reviewed. They reviewed the autopsy specimens of patients with cardiac events and documented the following methods of cardiac involvement—by direct extension of the tumour and pericardial involvement, by haematogenous spread and by lymphatic spread. On autopsy findings, pericardial involvement has been linked to arrhythmias. In a total of 64 cases,

Figure 10 Calretinin $\times 40$.

Figure 11 WT1 $\times 40$.

89% had abnormal EKGs including: *Arrhythmias* 60% (most common—sinus tachycardia), conduction defects 37% (most common—incomplete right bundle branch block) myocardial hypertrophy 18% (most common—left ventricular hypertrophy) and non-specific ECG findings 45%.⁶

In a review article by Bussani *et al*, it is mentioned that mesothelioma is the most common tumour with metastasis to the heart (48.4%), melanoma (27.8%), lung adenocarcinoma (21%), undifferentiated carcinoma (19.5%) and breast (15.5%). The various forms could be pericardial invasion, metastases to or direct invasion of myocardium involving one or more chambers, infiltration of the coronary sinus, metastatic lesions in the endocardium.⁵

Prognosis

Patients with MM have a poor prognosis with median survival of 12 months from time of diagnosis.⁷ It has worse outcomes in men, in patients with widespread disease, poor performance status, elevated white cell count and sarcomatoid features on histology.

Staging can be carried out using any of the several available staging systems like the Butchart system (oldest); Brigham staging system (tells about the surgical resectability and stages 1 and 2 are resectable), and the most commonly used system is the tumour-node-metastasis system developed by the International Mesothelioma Interest Group.

Figure 12 Keratin 5–6 $\times 40$.

This includes four stages, and stages 1–3 are resectable and stage 4 is widespread disease and is not resectable.⁸

Learning points

- ▶ The clinicians should suspect mesothelioma when there is unexplained pleural effusion with pleuritic chest pain.
- ▶ Fatal cardiac complications can occur early in the disease course. Ventricular tachycardia can be the presenting sign of locally advanced mesothelioma.
- ▶ The gold standard for the diagnosis of mesothelioma is histopathology combined with immunohistochemical analysis.
- ▶ This disease has poor survival prognosis and multimodality treatment approach should be followed.

Acknowledgements Authors would like to thank Dr Laura Amorese and Dr Ajit S Puri.

Contributors AB was responsible for patient care, gathering of the data, follow-up of the patient and manuscript writing. LA was responsible for patient care and data collection. TA contributed in gathering data and image collection.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Vogelzang NJ, Rusthoven JJ, Symanowski J, *et al.* Phase III study of pemetrexed in combination with cisplatin versus cisplatin alone in patients with malignant pleural mesothelioma. *J Clin Oncol* 2003;21:2636–44.
- 2 Ahamad A, Stevens CW, Smythe WR, *et al.* Promising early local control of malignant pleural mesothelioma following postoperative intensity modulated radiotherapy (IMRT) to the chest. *Cancer J* 2003;9:476–84.
- 3 Robinson BW, Lake RA. Advances in malignant mesothelioma. *N Engl J Med* 2005;353:1591–603.
- 4 MacLachlan DS. SV40 in human tumors: new documents shed light on the apparent controversy. *Anticancer Res* 2002;22:3495–9.
- 5 Musk AW, Dewar J, Shilkin KB, *et al.* Miliary spread of malignant pleural mesothelioma without a clinically identifiable pleural tumour. *Aust N Z J Med* 1991;21:460–2.
- 6 Wadler S, Chahinian P, Slater W, *et al.* Cardiac abnormalities in patients with diffuse malignant pleural mesothelioma. *Cancer* 1986;58:2744–50.
- 7 Scott B, Mukherjee S, Lake R, *et al.* *Textbook of lung cancer*. Martin Dunitz, 2000.
- 8 Rusch VW. A proposed new international TNM staging system for malignant pleural mesothelioma from the International Mesothelioma Interest Group. *Lung Cancer* 1996;14:1–12.

Copyright 2013 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.

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