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CASE REPORT

Pleural effusion as a manifestation of multiple myeloma

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SUMMARY

Multiple myeloma is a clonal B-cell malignancy, characterised by proliferation of plasma cells and secretion of paraproteins. These plasma cells accumulate predominantly in the bone marrow; rarely, they invade other areas, especially the thorax. Myeloma presenting with a pleural effusion is rare and reported in only 6% of patients with myeloma. Such patients generally present late and have a poor prognosis. Here, we describe a patient presenting with a lung mass, renal failure and a massive unilateral pleural effusion due to multiple myeloma who was treated successfully.

BACKGROUND

Multiple myeloma (MM) is a haematological malignancy of, predominantly, the elderly. It is characterised by proliferation of malignant plasma cells and subsequent overproduction of monoclonal protein/immunoglobulins (M protein). The malignant cells primarily proliferate in the bone marrow. Rarely, they also invade other structures, particularly the chest.

Pleural effusions are rare in MM and are reported in about 6% of patients with myeloma.¹ The aetiology of such effusions is diverse. Broadly, these can be categorised into non-myelomatous and myelomatous pleural effusions (MPE). Common causes of non-myelomatous effusions in MM include infections, pulmonary embolism, congestive heart failure, nephrotic syndrome, secondary neoplasms and amyloidosis. In <1% of cases,² the effusions are a direct result of MM, termed as MPE.

Here, we report an MPE of IgG subtype. The patient presented with massive pleural effusion and lung mass, along with renal failure, was diagnosed with MM and MPE and was started on treatment with complete resolution of pleural effusion and significant improvement in renal function and lung mass.

CASE PRESENTATION

A 68-year-old man presented with a 6-month history of dyspnoea and orthopnoea. He also reported a history of 5 kg weight loss and backache during this period. Fever or cough was not reported. He was a lifelong non-smoker, with no known prior comorbid medical conditions.

On examination, he was in respiratory distress. Vitals were: blood pressure 135/85 mm Hg, pulse 110/min, respiratory rate 30/min, temperature 37.4°C and oxygen saturation 94% on 6 L of supplemental oxygen. On chest examination, a non-tender, 10×12 cm soft tissue mass was palpable on the

right anterolateral chest wall. There were decreased breathing sounds on the right side of the chest, with dullness to percussion. Jugular venous distension and pedal oedema were not detected. Cardiovascular, abdominal and neurological examinations were unremarkable. There was no cervical, axillary or inguinal lymphadenopathy.

INVESTIGATIONS

Chest X-ray revealed complete opacification of the right hemithorax with contralateral mediastinal shift suggestive of massive pleural effusion (figure 1). Complete blood count showed haemoglobin of 9.9 g/dL, haematocrit of 31.5%, white cell count of $10.5 \times 10^9/L$ with 63% neutrophils, blood urea nitrogen of 86 mg/dL, serum creatinine of 4.4 mg/dL and serum calcium (Ca) of 7.8 mg/dL. Thoracentesis revealed haemorrhagic, exudative effusion that was lymphocytic predominant (pleural fluid lactate dehydrogenase was 4812 IU/L, pleural fluid total leucocyte count was $6912/mm^3$ with 35% neutrophils and 65% lymphocytes, pleural fluid protein was 8.5 g/dL and pleural fluid glucose was 37 mg/dL). Pleural acid fast bacilli smear and culture and Genexpert/MTB were negative.

CT scan of the chest without contrast (figure 2) revealed a right-sided mass causing erosion of the adjacent fourth rib. Pleural fluid cytology showed atypical plasma cells consistent with MM. Biopsy of the lung mass, performed to rule out a concomitant secondary malignancy, demonstrated sheets of plasmacytoid cells that stained positive for *Mum-1*, *CD138* and *CD56*, features suggestive of a

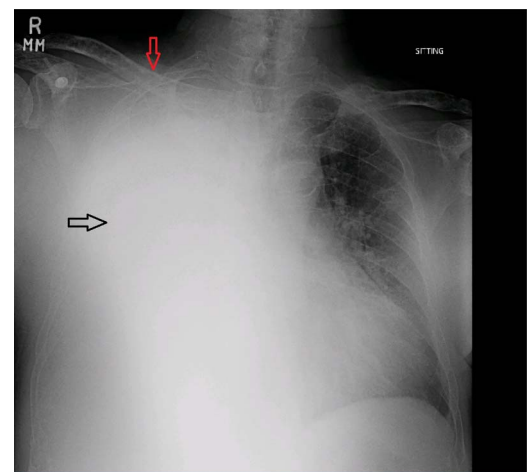


Figure 1 Chest X-ray showing right-sided effusion with mediastinal shifting. Lytic lesion visible on clavicles.



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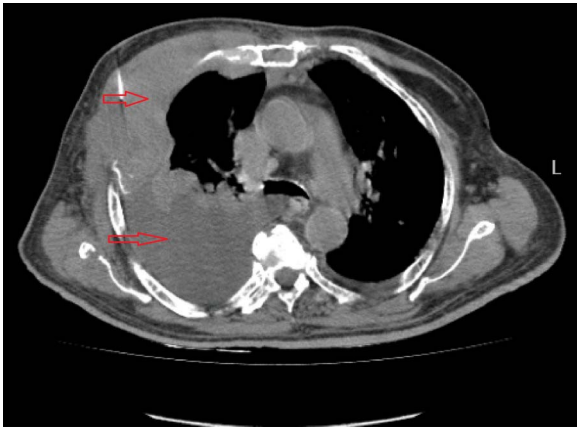


Figure 2 CT scan chest mediastinal window showing a mass causing erosion of right rib with underlying effusion.

plasmacytoma (figure 3A, B). Bone marrow examination revealed aggregates of malignant CD138 positive plasma cells. Skeletal survey displayed numerous lytic lesions scattered throughout the body, including the skull, mandibles, spine, scapula, radius, ulna and clavicles. Other test results included $\beta 2$ macroglobulin levels of 19 087 ng/mL, κ light chain of 86 g/dL, serum IgG of 46.17 g/L and a total protein of 10.7 g/dL (all significantly elevated) supporting the diagnosis of MM with MPE.

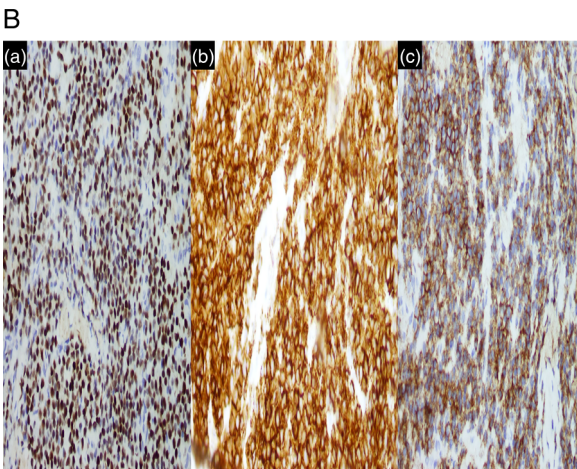
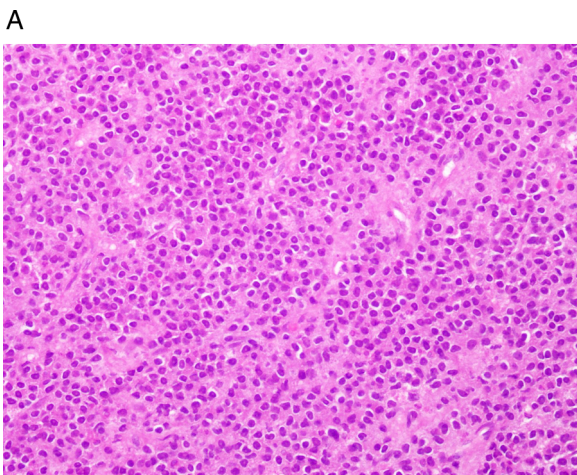


Figure 3 (A) High-power view of sheets of atypical plasmacytoid cells. (H&E stain, $\times 400$ magnification). (B) Immunohistochemical expression for (a) *Mum-1*, (b) CD138 and (c) CD56.

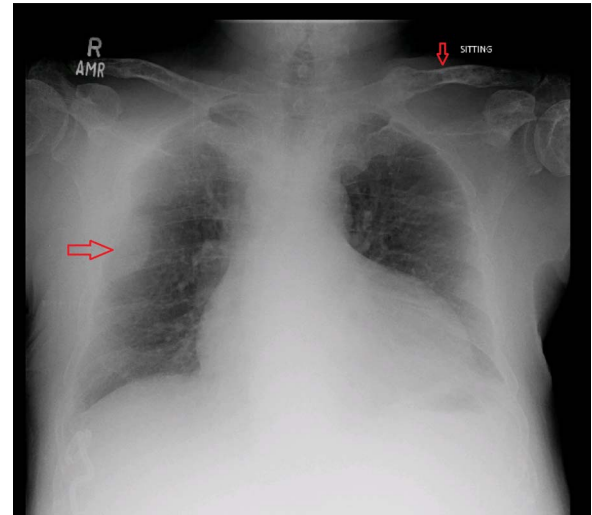


Figure 4 Chest X-ray at the time of discharge.

DIFFERENTIAL DIAGNOSIS

1. Pleural/pulmonary tuberculosis
2. Malignant pleural effusion
3. Fungal infection—(eg, actinomycosis)
4. Amyloidosis
5. Effusion due to renal failure

TREATMENT

The patient was started on dexamethasone, lenalidomide and bortezomib for MM.

OUTCOME AND FOLLOW-UP

Initially, the patient underwent multiple thoracenteses due to recurrent symptomatic MPE, followed by insertion of a pleural catheter for drainage. With time, in response to the chemotherapy, there was significant improvement in renal function (creatinine decreased from 4.4 to 1.9 mg/dL), reduction in the size of the lung mass and complete resolution of the pleural effusion (figure 4). The pleural catheter was hence removed. The patient's health improved steadily with resumption of daily physical activities. He was maintaining oxygen saturation on room air at the time of discharge and continues to do well, a year after diagnosis, when seen for routine follow-up as an outpatient.

DISCUSSION

Pleural effusions are uncommon in MM. The vast majority of pleural effusions in patients with myeloma are due to non-myelomatous causes; these include pneumonia, cardiomyopathy, nephrotic syndrome, renal failure, pulmonary embolism, secondary neoplasms and amyloidosis. Pleural effusions that occur due to involvement of the pleura by the malignant plasma cells (either because of direct pleural invasion, or from extension of bony lesions or from a lung mass/plasmacytoma), are termed as MPE. MPEs are mainly seen with IgA subtype of myeloma cases (~80% of MPEs occur in IgA MM) compared to other subtypes.³ They mostly occur on the left side of the chest^{1 4} and in general, present late in the course of the disease.⁵ MPEs are diagnosed when malignant plasma cells are seen on pleural fluid cytology or pleural biopsy or there is presence of M protein on pleural fluid electrophoresis.

Treatment is aimed at the underlying cause of the effusion in non-myelomatous effusions. For MPEs, no standardised therapy exists, probably due to the infrequent number of cases. Generally, systemic chemotherapy aimed at MM, in conjunction

with chest tube drainage or pleurodesis for palliation, is used. Prognosis is poor, with a median survival of 4 months.^{6–8}

The case reported above is unusual in a few ways. MPE, along with thoracic plasmacytoma (extramedullary plasmacytoma, like MPE is also rare and only occur in 4–6% of MM cases), was the initial presentation, which occurred in the right hemithorax and the myeloma was of the IgG subtype. The patient had an excellent response to chemotherapy (including bortezomib, a newer agent with proteasome inhibition properties and with promising results in a few case reports of MPEs),⁵ so that his chest tube was removed without pleurodesis, with no recurrence of the effusion. The patient is well with significant improvement of his mass and renal failure, 1 year after the diagnosis of myeloma.

Learning points

- ▶ Pleural effusion, though rare, can be a presenting feature in multiple myeloma (MM).
- ▶ MM should be considered as a possible diagnosis in a patient with pleural effusion, backache and renal failure, especially when the effusion has high protein content.
- ▶ Treatment of effusion in myeloma depends on the underlying aetiology.
- ▶ Prognosis is usually poor.
- ▶ Bortezomib therapy may be useful in myelomatous pleural effusion.

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Competing interests None declared.

Patient consent Obtained.

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