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**Chest pain without a clue—ultrasound to rescue occult multiple myeloma: A case report**

Chawla G *et al*. Ultrasound to diagnose occult multiple myeloma

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**Abstract**

***BACKGROUND***

Chest pain is one of the most common symptoms with which a patient presents to a doctor. Differentials include, but are not limited to cardiac, pulmonary, gastrointestinal, psychosomatic and musculoskeletal causes. In our case, ultrasound of chest wall paved the way for the diagnosis of multiple myeloma which occultly presented with chronic chest pain.

***CASE SUMMARY***

Here we report a case of 50-year-old man with chronic chest pain without anaemia or renal failure who was diagnosed as multiple myeloma despite negative bence jones protein and M band electrophoresis. Ultrasound of chest wall showed cortical irregularities along with hypoechoic mass in sternum and left 5th rib which helped us in clinching the diagnosis.

***CONCLUSION***

Ultrasound of bone at times can help in reaching the diagnosis indirectly if not directly.

**Key words:** Case Report; Ultrasound; Multiple myeloma; Chest pain

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**Core tip:** Multiple myeloma is notorious to present in atypical ways one should have high index of suspicion for the same. Ultrasound of bone at times can help in reaching the diagnosis indirectly if not directly.

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**INTRODUCTION**

Chest pain is one of the most common symptoms with which a patient presents to a doctor. Etiology is wide, it ranges from acute and life threatening diseases like acute coronary syndrome and pulmonary embolism to conditions with favourable prognosis like myalgia and constochondritis[1]. It is important to know the relevant aetiologies and their respective frequencies.

Bone pain is one of the most common presentation of multiple myeloma (70%-80%) and 90% of cases will present with lumbar spine or rib pain. Plain films are only 80%-90% sensitive at detecting lytic bone lesions, due to an inability to detect lesions with less than 30%-50% trabecular bone loss. By the time this degree of sternal/rib bone loss occurs, patients are at high risk for fracture, which can result in serious complications such as flail chest and acute hypoxic respiratory failure[2].

Because early treatment with chemotherapy and zolendronic acid reduces vertebral fractures and skeletal events, multiple myeloma is an important disease to keep on a differential for persistent atypical chest pain, especially when anaemia and renal injury is present.

**CASE PRESENTATION**

***Chief complaints***

A 50-year-old banker presented with complaints of chest pain for 2 mo.

***History of present illness***

Chest pain was parasternal, non-radiating and continuous in nature. There was no history of trauma, cough, breathlessness, loss of weight, loss of appetite and fever.

***History of past illness***

There was no major medical or surgical illness in the past.

***Physical examination***

Examination of chest was with in normal limits apart from left parasternal tenderness.

***Laboratory examinations***

He had normal hemogram and erythrocyte sedimentation rate was 35 mm in the first hour. He was worked up for metabolic causes of chest pain, his vitamin D was within normal limits and serum calcium was 10.42 mg/dL. Urine examination showed trace proteins. Urine for Bence jones proteins and blood electrophoresis were found to be negative for multiple myeloma.

***Imaging examinations***

Chest X-ray was within normal limits. Electrocardiograph, 2D echocardiography and treadmill test were within normal limits. He even underwent coronary angiography considering troublesome nature of chest pain which was also normal. Upper gastrointestinal endoscopy was done to rule out reflux disease and gastroeosophageal ulcers, which was again normal. Patient was referred to psychiatry and underwent cognitive behaviour therapy but that too was of no avail. He was also being worked up for musculoskeletal causes and was started on non-steroidal anti-inflammatory drugs suspecting costochondritis, but he was still uncomfortable (Table 1).

To rule out sternal and rib lesions he was screened with ultrasound of chest wall which showed cortical irregularities along with hypoechoic mass in sternum and left 5th rib (Figure1). Considering the cortical irregularities, differential of bone neoplasms, metastasis and multiple myeloma were kept in consideration. He underwent magnetic resonance imaging (MRI) of spine which showed multiple well defined T1/T2 hypointense lesions of varying sizes in the dorso lumber vertebra at multiple levels, body of sternum and posterior aspect of left 4th rib. Whole body positron emission tomogram (PET scan) was done to rule out any primary which showed multiple fluorodeoxyglucose avid lesions in axial and appendicular skeleton (Figure 2). To confirm the diagnosis bone marrow aspiration and biopsy were performed which showed increased immature as well as mature plasma cells. Marrow was slightly hypercellular for age and showed all haematopoietic components. There was a marked interstitial prominence of plasma cells along with definitive presence of sheets of plasma cells.

This is a very rare case where chest pain was the only initial symptom of multiple myeloma and how screening ultrasonography helped in leading us to the diagnosis. There is no evidence of any such case where multiple myeloma was diagnosed using ultrasonography reported in any literature.

**FINAL DIAGNOSIS**

Multiple myeloma.

**TREATMENT**

He was started on brotezomib, leflunomide and dexamethasone.

**OUTCOME AND FOLLOW-UP**

After mere 2 cycles of chemotherapy, he showed drastic improvement in painwherein his Visual Analogue Score dropped from 7/10 to 2/10.

**DISCUSSION**

Chronic chest pain has been broadly classified as cardiogenic and non-cardiogenic chest pain (NCP). The etiology of NCP can be pulmonary, gastrointestinal, musculoskeletal or psychosomatic. At times it becomes very difficult to search the etiology of chest pain[3,4].

Multiple myeloma is clonal condition of B cells where there is uncontrolled proliferation of abnormal plasma cells. Clinical features can either be directly due to proliferation or indirectly due to substances released by these cells. It results in suppression of erythropoiesis along with multiple osteolytic lesions which results in hypercalcemia, skeletal pain and pathological fractures. It also cause accumulation of monoclonal immunoglobulin’s (Igs) along with other regulating substances. These circulating monoclonal Igs or their subunits are the reason behind proteinuria, renal tubular damage and amyloid deposition[5].

They have varied presentation, 10%-40% are asymptomatic and 50%-70% have bone pain due to lytic lesions and pathological fractures. About 1%-5% cases may not demonstrate Igs or their subunits in serum or urine (non-secretory multiple myeloma)[6].

This is a unique case where initial work up, consisting of complete hemogram, serum calcium, erythrocyte sedimentation rate, chest radiology, urine bence jones proteins and serum electrophoresis were normal. This misguided us to search for other causes of chest pain. However later during ultrasound screening for musculoskeletal cause, we came across multiple cortical irregularities over ribs which helped us in clinching the diagnosis.

Ultrasound of bone has not been used much in past. It has been used as diagnostic tool in the evaluation of costochondral cartilage deformities in children of anterior chest wall mass where there was negative radiography[7] and has been used in bone tumours like chondrosarcoma and fractures where painful area shows fragmented cortical bone and at times subperiosteal hematoma[8].

Chest wall is known to get involved either by direct extension of tumor mass, metastases or hematologic malignancy like multiple myeloma. In this region metastases are mainly from breast, thyroid, kidney, lung and prostate cancer along with plasma cell myeloma. The vast majority of such tumors are osteolytic. Ultrasound detection of osseous defects is possible only after the damage of the anterior compact substance[9].

Paik *et al*[10] has shown ultrasonography to be better than conventional radiography (39%) for the diagnosis of such tumors. These were characterized by cortical defects or an irregular cortical edge or a mass invading local soft tissues, including pleura in some cases.Lee *et al*[11] compared a group of patients with rib metastases from renal cancer and prostate cancer metastases and they showed that the irregular surface of the costal cortex in the absence of fracture or the presence of masses within the soft tissue represented the only sonographic feature of osteoblastic foci of prostate cancer.

While for multiple myeloma it has never been used in literature, we found cortical irregularities along with focal bone destruction (Figure 1), which was later confirmed with MRI by the presence of multiple osteolytic lesions. PET computed tomography ruled out it to be from kidney, thyroid or lung and also helped in assessing disease burden and identification of extramedullary involvement. Bone marrow biopsy sealed the diagnosis. Apart from atypical presentation and unconventional way of diagnosing, our case was unique as patient was having normal haemoglobin, absent bence jones proteins and negative M band on electrophoresis *i.e*., patient was having non secretory multiple myeloma which is even difficult to diagnose.

**CONCLUSION**

Multiple myeloma is notorious to present in atypical ways, one should have high index of suspicion for the same. Ultrasound of bone at times can help in reaching the diagnosis indirectly if not directly. Being a non-invasive, bed side and an easily available investigation it really is a patient friendly approach to find clues in difficult cases.

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**Table 1 Timeline**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Presentation, day 0-2 mo** | **3rd month** | **4th month** | **4th month** | **5th month** |
| Worked up for various causes of chest pain  | Tread mill test, coronary angiography, upper gastrointestinal endoscopy | Metabolic causes ruled out  | Ultrasonography chest, clue to Bone lesion | Magnetic resonance imaging, positron emission technology, bone marrow biopsy  |



**Figure 1 Ultrasound of sternum showing cortical irregularities (arrow) with central hypoechoic area (arrow head).**



A B

**Figure 2 Magnetic resonance imaging and positron emission technology scan.** A: Magnetic resonance imaging showing multiple osteolytic lesions (arrows); B: Positron emission technology scan showing multiple osteolytic lesions with high fluorodeoxyglucose avidity (arrows).