Case Report

A man with a fracture from minor trauma

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BACKGROUND: We commonly encounter fractures secondary to trauma on and off in our daily practice. While it is not uncommon to see fractures due to underlying pathology, we need to be on the alert when patients present atypically because the treatment for pathological fractures is far different from that for simple fractures.

METHODS: We presented a case of left clavicle fracture secondary to minor trauma, in which the initial X-ray shows suspicious lesion around the fracture site and further investigation reveals multiple myeloma. The patient received treatment at the clinical oncology department upon diagnosis. Since he was relatively young and fit, he was started on the induction therapy of VTD, which was followed by high dose melphalan and autologous stem cell transplant.

RESULTS: He is currently free from symptoms and on maintenance thalidomide.

CONCLUSIONS: Though multiple myeloma is not commonly encountered in emergency practice, earlier identification of relatively subtle symptoms can allow early treatment. Missing this diagnosis will delay treatment and produce severe outcome to the patient. We should be on the alert for such important condition.

KEY WORDS: Spontaneous fracture; Multiple myeloma; Neoplasm metastasis

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INTRODUCTION

The skeleton is the most common organ affected by metastatic cancer.^[1] Among various malignancies, multiple myeloma is the most frequent cancer involving the skeleton. There are up to 90% of patients with multiple myeloma who develop bone lesions,^[2] in contrast to two thirds to three quarters of patients with solid tumor, such as breast and prostate carcinoma, developing bone metastasis during the course of their disease^[3] (Table 1).

Table 1. Incidence of bone metastasis for various malignancies

Malignancies	Bone metastasis incidence (%)
Myeloma	70–95
Renal	20–25
Melanoma	14–45
Bladder	40
Thyroid	60
Lung	30–40
Breast	65–75
Prostate	65–75

Patients with bone metastasis commonly present with bone pain which is constant and persists into the night. They tend to have fracture with relatively minor trauma. Commonly involved sites include vertebra, skull, ribs and proximal bone of limbs. Spinal cord compression is one of the direct consequences from pathological fracture involving the spine. Hypercalcemia may also occur in advanced bone metastasis.

In this report, we presented a case of left clavicle fracture secondary to minor trauma, in which the initial X-ray shows a suspicious lesion around the fracture site and further investigation reveals multiple myeloma.

CASE REPORT

A forty-eight-year-old man visited our emergency department because of left shoulder pain after lifting heavy objects. He had no significant past health. He complained of hearing a crack sound, which was followed by pain

and swelling over the left shoulder. Physical examination showed tenderness and swelling at mid of the left clavicle. There was no neurovascular deficit on the left upper limb. X-ray of the left clavicle showed a fracture at medial 1/3 of the left clavicle with a suspicious osteolytic lesion at the inferior portion of middle 1/3 of the left clavicle (Figure 1). In view of the minor trauma and the suspicious lesion around the fracture site, pathological fracture was suspected. Further systemic review showed that the patient had no recent weight loss, no change in bowel habit or dysphagia. Chest, cardiovascular and abdominal

Figure 1. X-ray of the left clavicle showed a fracture at medial 1/3 of the left clavicle with a suspicious osteolytic lesion at the inferior portion of middle 1/3 of the left clavicle.

Figure 2. Chest X-ray showed no rib lesion apart from old fibrosis.

Figure 3. Skeletal survey revealed the presence of several lytic lesions on the skull.

examinations were unremarkable and rectal examination did not reveal any mass. Chest X-ray showed no rib lesion apart from old fibrosis (Figure 2).

Screening blood tests were done and results showed raised erythrocyte sedimentation rate of 65, mild anemia (microcytic, hypochromic) with a hemoglobin level of 11.8 g/dL and unremarkable liver and renal function tests. Serum and urine protein electrophoreses were done and results showed the presence of monoclonal protein band in the gamma region.

The patient was admitted to the medical department. Skeletal survey revealed the presence of several lytic lesions on the skull (Figure 3). Bone marrow aspiration showed the presence of 10% of plasma cells in bone marrow population, which was compatible with plasma cell myeloma.

DISCUSSION

Multiple myeloma is secondary to uncontrolled proliferation of plasma cells within bone marrow. Diagnosis is suggested from laboratory and radiographic findings: 1) Presence of more than 10% plasma cells in bone marrow (normally no more than 4% of the cells in bone marrow are plasma cells); 2) Generalized osteopenia and/or lytic bone deposits on plain film radiography; 3) Blood serum and/or urine containing an abnormal protein (M protein).

Multiple myeloma may present in various ways: malaise, anemia or recurrent infection due to bone marrow infiltration. Bone pain, pathological fractures and renal failure are relatively common. Less common presentations include symptomatic hypercalcaemia, hyperviscosity, coagulopathy, spinal cord compression and amyloidosis. Up to 30% of patients with multiple myeloma are asymptomatic and are found incidentally.^[4,5]

Bone involvement in multiple myeloma accounts for some of the most severe features of the disease. There are up to 60% of patients who present with bone pain at diagnosis while 60% of patients develop a pathological fracture throughout the course of their illness.^[6] Multiple myeloma patients with pathological fracture have at least 20% increase in risk of death compared to those patients without pathological fracture.^[7]

Primary radiographic investigation for suspected multiple myeloma is plain film skeletal survey. A skeletal survey has advantages of easy availability, convenience, the ability to image large areas of the skeleton as well as being a simple screening method for common bone

complications like fracture.

Around 75% of patients have radiological evidence of skeletal involvement at diagnosis.^[4] They primarily present in four different appearances: solitary deposit (plasmacytoma), multiple well-defined skeletal lesions (myelomatosis), generalized osteopenia, and sclerosing myeloma. The majority of myeloma lesions are small, well-defined lytic areas (size 20 mm) of bone destruction with no reactive bone formation.^[8] Though myeloma arises within the medulla, the progression of the disease may lead to infiltration of the cortex, invasion of the periosteum and even production of extraosseous soft tissue masses.

Views of conventional radiographic imaging acquired should include the chest (posterior-anterior), cervical spine (anterior-posterior, lateral views and open mouth view), thoracic spine, lumbar spine, humerus and femur, skull (anterior-posterior and lateral views) and pelvis (anterior-posterior and lateral view). Any other symptomatic area should also be imaged as well. Common sites include the vertebra, ribs, skull and pelvis. Distal bones involvement is uncommon.

For lesions involving long bones, Mirels' scoring system is used to predict the likelihood of fracture based on both clinical features and radiographic appearance of the bone lesion (Table 2).^[9,10]

The scoring system can be used to guide therapy. A score of ≤ 7 implies 5% probability of fracture and conservative management may be appropriate. A score of 8 implies 15% probability of fracture which is suggestive of impending fracture. The option of treatment adopted is based on individual patient condition. A score of ≥ 9 has a 33% probability of fracture. It is recommended that this group of patients should have prophylactic surgical fixation of the bone involved.

A major disadvantage of the skeletal survey is its relatively low sensitivity. In early disease stage, the role of plain radiograph is limited and myeloma deposits are often not visualized. It is estimated that lytic deposits will be visible only after at least 30% of the trabecular bone substance is lost.^[4,11,12] Lesions in the sternum, sacrum, scapulae and ribs are particularly difficult to be visualized. Generalized osteopenia may be the only

bone manifestation of multiple myeloma in up to 15% of patients. Such patients have less severe bone resorption by infiltrated plasma cells compared with those patients with lytic bone lesions.^[13] They usually present with vertebral body collapse and this can be confused with osteoporotic fracture that occurs in elderly patients.

Although plain radiography is the most commonly used initial investigation in symptomatic patients with a suspected fracture or destructive lesion, one should have a low threshold of proceeding to further imaging such as computed tomography, magnetic resonance imaging or positron emission tomography because of the low sensitivity of plain radiography and the need to use the latter in staging of disease. Magnetic resonance imaging is good at visualizing spinal cord compression or soft-tissue plasmacytomas. Computed tomography is more sensitive than conventional radiography for small lesions of long bone but it is not typically recommended for initial skeletal surveying. Although positron emission tomography with computed tomography is not the standard of care, it is used for staging and follow-up.

Multiple myeloma is relatively resistant to conventional chemotherapeutic agents. As most plasma cells do not divide, the cell-cycle-dependent cytotoxic agents are not very effective in targeting on these abnormal cells. Alkylating agents such as melphalan and cyclophosphamide and corticosteroids are the drugs of choice in treating multiple myeloma.

Treatment is not recommended for patients with asymptomatic multiple myeloma. Earlier treatment has no effect on mortality and may increase the risk of acute leukemia.^[14]

In patients who are symptomatic as defined by the CRAB criteria, i.e. hypercalcemia, renal failure, anemia and active bone lesions, and in those symptomatic patients due to underlying disease, treatment is recommended.

For young patients younger than 65 years or patients who are in good clinical condition, treatment starts with an induction therapy with a three-drug regimen e.g. VTD (velcade, thalidomide, dexamethasone), VAD (vincristine, adriamycin, dexamethasone), TAD (thalidomide, adriamycin, dexamethasone), which is followed by a high-dose (200 mg/m²) of melphalan and autologous stem cell transplantation.^[15] Following transplant, patients can be offered maintenance lenalidomide^[16] or thalidomide.^[17] However, this strategy may be poorly tolerated due to medication side effects and adverse impact on patient quality of life despite a clear improvement in progression-free survival.

For patients older than 65 years who are therefore

Table 2. Mirels' scoring system

Variables	Scores		
	1	2	3
Site	Upper limb	Lower limb	Peritrochanter
Pain	Mild	Moderate	Functional
Lesion	Blastic	Mixed	Lytic
Size	<1/3 diameter	1/3–2/3 diameter	>2/3 diameter

ineligible for a high dose of melphan, the mainstay of treatment for these patients is melphalan combined with prednisone plus a novel agent e.g. MPT (melphalan, prednisone, thalidomide) and VMP (velcade, melphalan, prednisone), or dexamethasone-based regimens e.g. lenalidomide combined with a low-dose of dexamethasone. The dexamethasone-based regimen is not commonly used in elderly patients because of the high toxicity in this age group.^[18]

In conclusion, our patient received treatment at the clinical oncology department upon diagnosis. Since he was relatively young and fit, he was started on the induction therapy of VTD, which was followed by a high dose of melphalan and autologous stem cell transplant. He is currently free from symptoms and on maintenance thalidomide.

Though multiple myeloma is not commonly encountered in emergency practice, earlier identification of relatively subtle symptoms can allow early treatment. Missing this diagnosis will delay treatment and produce severe outcome to the patient. We should be on the alert for such important condition.

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