



Case Report

Multiple bone fractures with a hidden etiology- A case report

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ABSTRACT

A patient presented with fracture of multiple bones, on investigations, showed primary hyperparathyroidism due to an adenoma in the inferior parathyroid gland. The bones showed typical changes of hyperparathyroidism in the form of osteitis fibrosa. The cause for the bone lesion was not evident initially and the patient had to undergo extensive investigations for myeloma and metastatic deposit since the parathyroid cause was not at all suspected by the clinician. This case indicates that whenever one deals with bone pathology, parathyroid lesions as a cause should also be thought of and appropriate workup should be done for an early diagnosis and treatment.

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INTRODUCTION

The most common cause of bone fracture is trauma to the bones and osteoporosis.¹ Bone fracture can occur due to various diseases, designated as pathological fracture, whereby the affected bone is weakened by an underlying pathology in the body. The causes can be primary bone lesions like osteomyelitis, and others including tumors and cysts of the bone. Secondary causes of pathological fracture are metabolic diseases like increased parathyroid activity due to a hyperplasia or neoplasms of the gland, osteoporosis, bone marrow diseases like myeloma, lymphoma, or metastatic deposits from malignancies of other organs in the body. The most common primary tumor sites causing bone metastasis are the breast, kidney, lung, thyroid, and prostate.

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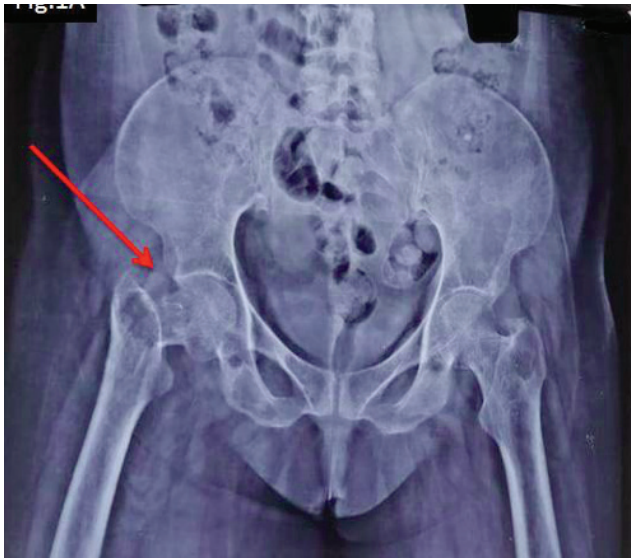


Figure 1:(a) Xray-Fracture neck of right femur



Figure 1:(b) Xray-Fracture tibia & fibula

Here, we are describing a case of fracture of multiple bones in a female patient for which, after extensive investigations, the cause was detected as a parathyroid adenoma.

CASE REPORT

A 45-year female patient having mild mental retardation, presented with difficulty in walking for the last 2 years. She complained of pain in the right hip and left lower leg of recent onset after trivial trauma. On investigation, X-ray showed an inter-trochanteric fracture of the neck of the right

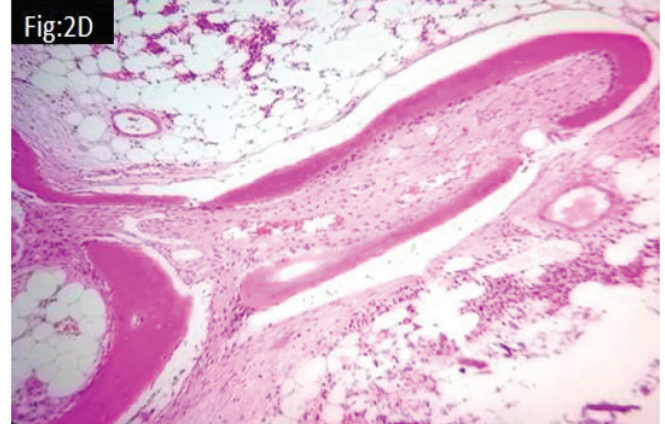
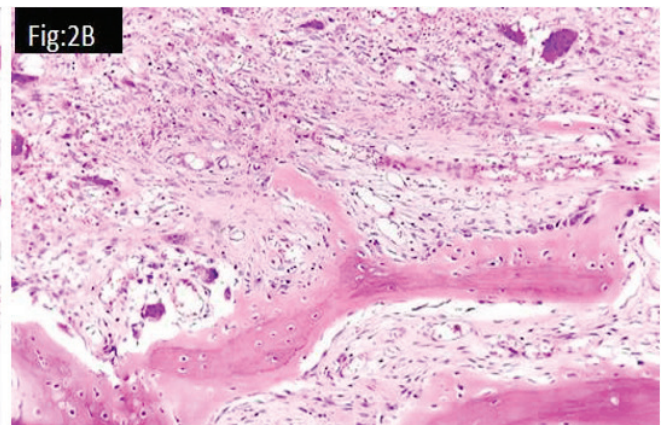
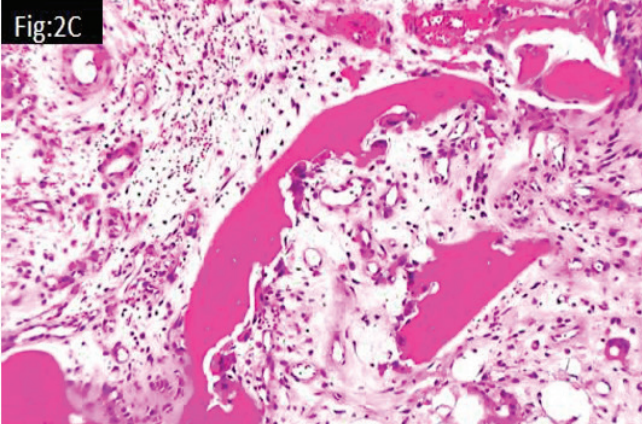
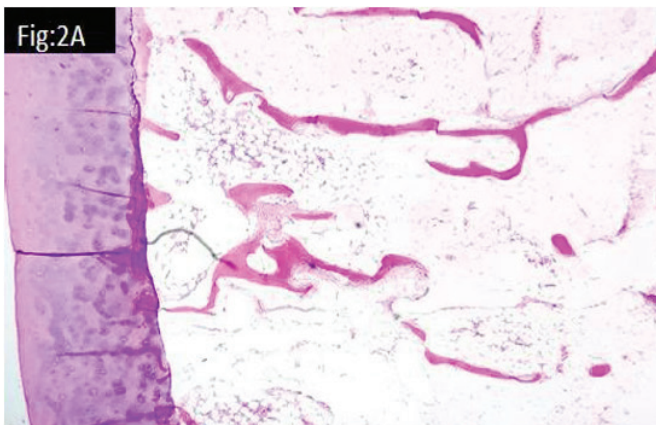


Figure 2 (A) - Histology of head of femur - Cartilaginous cap with underlying bony trabeculae. (H&E stain x 100)

Figure 2 (B) - Intertrabecular proliferation of fibrovascular tissue. (H&E stain x 100)

Figure 2 (C) - Irregular destruction of the bony trabeculae-dissecting osteitis (H&E stain x400)

Figure 2 (D) - Fibrovascular tissue dissecting the trabeculae-tram track /rail road appearance. (H&E stain x400)

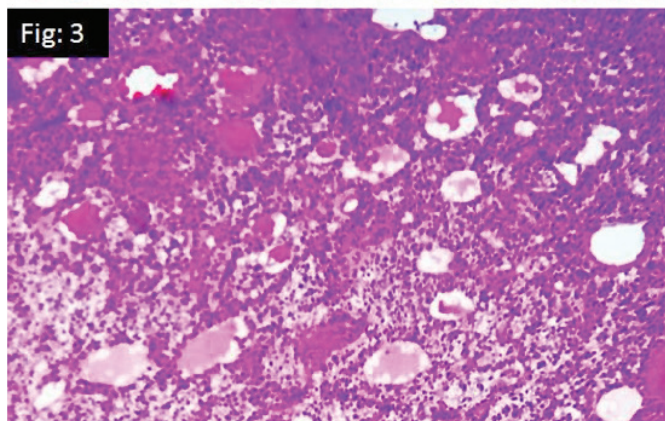
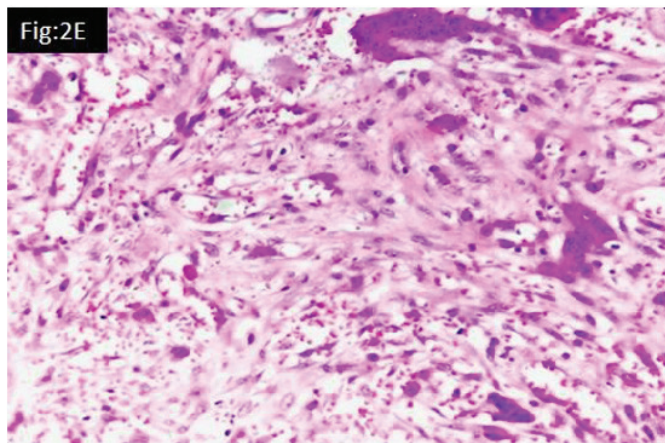


Figure 2(E): Inflammatory infiltrate with areas of hemorrhage (HE stain, x100)

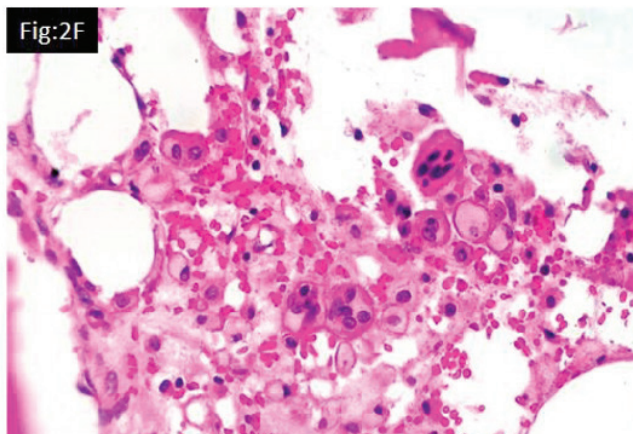
Figure 2(F): Osteoclastic giant cells with foam cells in the infiltrate (HE stain, x400)

Figure 3: Parathyroid adenoma (HE stain, x400)

femur (fig.1A) & fracture of the shaft of the left tibia and fibula towards the lower third (fig.1B).

The patient was initially investigated for a pathological fracture due to myeloma or metastatic deposit from a carcinoma elsewhere in the body since the fracture was after trivial trauma. But myeloma workup turned out to be negative and clinical examination did not indicate any symptoms or signs of a primary malignancy anywhere in the body.

Routine blood examination showed a mildly elevated serum calcium (13.9 mg/dL) (normal 8.5-10.5 mg/dL), and serum phosphorus-1.59 mg/dL (normal 2.7-4.5 mg/dL), serum creatinine 0.7mg/dL(normal 0.6-1.2mg/dL). Since myeloma and a metastatic deposit had been ruled out, a parathyroid cause was suspected and a parathyroid hormone (PTH) assay was done. PTH level was markedly elevated (1787pg/ml) (normal up to 65 pg/ml). Elevated PTH with hypercalcemia and hypophosphatemia along with multiple bone fractures indicated a bone lesion due to a parathyroid lesion. An ultrasonogram of the neck was done which showed an enlarged left inferior parathyroid gland with a heterogeneously hypoechoic lesion with moderate



vascularity measuring 2 cm in greatest dimension. All the other three parathyroid glands were of normal size in ultrasonogram.

The patient underwent a left inferior parathyroid excision. There were no adhesions or invasion into the adjacent structures. All the other three parathyroid were normal preoperatively. Head of the femur excision was done for the intertrochanteric fracture of the right femur with hemiarthroplasty and cemented bipolar prosthesis. Correction of the tibia and fibula fractures was done by closed reduction and internal fixation with interlocking nails. All these were done in one sitting under general anesthesia. Twenty minutes post-operatively after removal of the parathyroid gland, the PTH level dropped to 97.5pg/ml and serum calcium was 6.9mg/dL. The postoperative hypocalcemia was treated accordingly and the patient was supported with oral calcium 1000mg 4 times daily initially for 7 days, reducing to 500mg three times daily for the next three months. The patient was discharged from the hospital on the 10th postoperative day and at that time, the calcium level was 7mg/dL and PTH was 80.5pg/ml. The patient is symptomatically better now and is under regular follow-up.

We received in the pathology department, the specimen of parathyroid for frozen section examination followed by routine H&E study. Head of the femur was also received for routine histopathological examination. The head of the femur received measured 5x4x3 cm and soft tissue aggregate measured 6.5x6x2 cms. Microscopy showed bony tissue capped by cartilage (fig. 2A). Intertrabecular spaces were replaced by fibrovascular loose connective tissue with a focal collection of osteoclastic giant cells (fig. 2B).

The bony trabeculae showed irregular destruction in the form of dissecting osteitis (fig. 2C). Areas with tram track/railroad appearance (fig. 2D), cone cutting, and moth-eaten appearance were seen.

Hemorrhage with hemosiderin deposits (fig. 2E) and sheets of foamy macrophages (fig. 2F) were noted. Some of the bony trabeculae were necrotic. Some of the intertrabecular

spaces showed hemopoietic cells. The adjacent area showed fibro collagenous and tendinous tissue. The bone findings were typical of the diffuse bone lesion in parathyroid neoplasms and were reported as Osteitis fibrosa.

The parathyroid lesion was received as a dark brown nodular tissue weighing 4.4 gm and measuring 2x2x1.5 cm. Cut section showed a circumscribed lesion with a thin capsule and homogenous pale brown surface showing faint lobulations and measuring 1.8x1x0.2cm. Adjacent areas were dark brown. Scrape cytology, frozen section study, and routine H&E study were done on the sections. Microscopy showed compressed parathyroid tissue with an encapsulated neoplasm with cells arranged in sheets, trabeculae, and in the follicular pattern. The tumor cells were predominantly composed of chief cells with clear cytoplasm, round to oval nuclei, and inconspicuous nucleoli. Scattered cells showing endocrine atypia were noted but there was no marked cellular/nuclear pleomorphism. A focal collection of oncocyctic cells were present. Numerous congested vascular channels were present. There was no mitosis or necrosis or prominence of fibrous bands. No capsular/vascular/perineural invasion was noted. All the histologic features indicating malignancy like pleomorphism a increased mitotic rate with atypical forms, macronucleoli and invasion into adjacent tissue were absent in the present case and the lesion was reported as parathyroid adenoma (Figure 3). Only one parathyroid gland was enlarged and the other three were normal in size. Histologically, the lesion was well encapsulated with compressed parathyroid tissue outside the capsule, ruling out the possibility of parathyroid hyperplasia.

DISCUSSION

Bone manifestations due to primary hyperparathyroidism caused by a neoplasm or hyperplasia are well known to produce either diffuse bone changes affecting multiple bones resulting in osteitis fibrosa cystica (OFC) or a localized tumor-like lesion known as a brown tumor. Classical skeletal involvement can be the first sign of primary hyperparathyroidism, but is not recognized because it is not usually included, in the differential diagnosis of this manifestation of skeletal disease.² In these cases, one has to keep the possibility of primary hyperparathyroidism (PHPT) also as a differential. Because in the majority of the cases of bone fractures, the parathyroid lesion is revealed only when investigated with a clinical suspicion of the parathyroid lesion as a cause. Hence a PTH assay should always be done for the investigation of pathological fracture of the bone. PTH level will be markedly elevated in a parathyroid cause, hypercalcemia with a lytic bone lesion may be seen in primary and metastatic bone malignancies also. The most important way to distinguish these skeletal manifestations of advanced PHPT from malignancy is by biochemical analysis.² In bone metastatic deposits from other organs an increased serum PTH level will never be

seen. In the present case, parathyroid screening was done because of the markedly elevated blood PTH level. The elevated serum calcium and decreased phosphorus level led to the estimation of serum PTH level.

Primary hyperparathyroidism is defined as hypercalcemia from the overproduction of parathyroid hormone by one or more hyperfunctioning parathyroid glands.³ It is typically described as “a disease of bones, stones, abdominal groans, and psychic overtones”⁴ because of the classical presentation with bone lesions, renal stones, abdominal pain due to symptoms of indigestion and cerebral manifestations like lethargy, depression, psychosis, leading even to delirium and coma. It can be caused by a solitary adenoma in 80% of patients, parathyroid hyperplasia in 15%, multiple adenomas in 5%, and parathyroid carcinoma in less than 5% of patients.⁵ Osteitis fibrosa cystica was first reported by von Recklinghausen in 1891, hence is also known as von Recklinghausen of bone. OFC is rare in developed countries due to the early detection of hypercalcemia and its subsequent treatment.⁶

In our patient, the OFC was caused by an adenoma in the inferior parathyroid gland. The patient might have been suffering from the bone lesions of PHPT for last 2 years, but since the patient was mentally retarded, she could not have properly expressed the symptoms. Only when the pain of multiple fractured bones started, the patient was aware of it.

Localized bone change of PHPT referred to as brown tumor is a tumor-like lesion in any bone, usually clavicle, tibia, etc. which derives its name from the presence of brown hemosiderin deposit due to repeated hemorrhage in the lesion. This will show microscopically a localized area of bone destruction with hemorrhage, chronic inflammatory cells including lymphocytes, foam cells, osteoclast-like giant cells, fibrovascular tissue, and hemosiderin deposits. All features are similar as in osteitis fibrosa cystica but in localized area. Histologically it is sometimes difficult to differentiate from other giant cell bone lesions like an aneurysmal bone cyst, non-ossifying fibroma, etc.

Treatment of OFC is the surgical removal of the parathyroid adenomas. Bone lesions tend to recover spontaneously after correction of the PTH level, and surgical removal of OFC is usually unnecessary.⁷ In our patient, excision of the parathyroid adenoma, excision of the head of the femur and correction of tibial and fibula fracture was done. The postoperative period was uneventful. The patient is symptomatically better now.

CONCLUSIONS

A typical case of bone manifestation in the form of osteitis fibrosa cystica of the advanced stage of a parathyroid adenoma is presented. The parathyroid lesion was

undetected and was only revealed on investigation for the bone fracture. Hence, in all cases of pathological fractures, biochemical analysis for serum calcium and phosphorous is to be done and if indicated PTH level also has to be estimated to rule out a parathyroid cause.

Conflict of interest: None

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