

Elderly patients with pathological fractures in distal third femur treated with intramedullary nailing: A case series

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Abstract

Introduction: Pathological fractures of femur are rare and are difficult to manage. Proximal weight bearing portion is more common site for these fractures and are least common in distal third of shaft. Depending on the location and origin of primary tumor or benign lesion, we decide the management. At risk, bone with impending fracture can be managed conservatively. Displaced fractures need surgical intervention. MIREL scoring is used to decide plan of management. Closed technique like intramedullary nailing is preferred over the open technique and gives good results without post-operative morbidity. Radiological investigations are necessary to find out the primary tumor source in metastatic lesions these includes plain radiographs, CT scan, MRI and PET scan. Lab investigations also aid in finding source of primary tumor.

Case Series: This is a case series of 3 patients who had a pathological fracture of the distal third shaft of femur. These patients had metastasis from primary tumor elsewhere in body. All the patients were operated with intramedullary nailing and fixation was done with the aim of reducing pain, avoiding complications such as bed sore, infection, deep venous thrombosis, and regaining the functional outcome as much as possible and improves the quality of life.

Conclusion: All 3 patients with a pathological femur fracture operated with intramedullary nailing were shown to have a significant reduction of pain, regaining of the range of motion of the knee joint and a better quality of life with improvement in performance of activities of daily living.

Keywords: Bony metastasis, pathological fracture, intra-medullary nail, palliative surgery.

Introduction

Pathological fractures in patients with primary and metastatic bone tumors possess many difficulties to the most experienced surgeons. Fractures are more common in proximal bones such as humerus and femur and in these bones fractures are common in proximal weight bearing areas. Femoral pathological fracture is a dreaded complication of carcinomas and other primary tumors accounting to increased morbidity and mortality. Among femur metastasis, 50% of the lesions occur in the femoral neck, 30% in subtrochanteric region and 20% in the intertrochanteric region [1]. 4% of all metastatic bone lesions ultimately result in pathologic fracture. Nonoperative management may be an alternative if symptoms and osseous stability permit. Mirels scoring system is used to decide plan of management in patients at risk for

pathological fracture [2].

Lung, liver, and bone are the most common sites involved by metastatic lesions. Primary origin being breast, thyroid and prostate cancer or multiple myeloma [3]. Tumor-related secretion of factors such as IL-11, IL-8, PTHrP stimulate osteoclast-mediated bone resorption, this helps in colonization of tumor cells to bone. Osteolytic process liberates active TGF- β from the bone matrix, which helps tumor cells to maintain the secretion of osteoclast-stimulating factors, thus establishing a self-feeding cycle seen in destructive bone lesions [4].

One must consider finding the primary source of tumor based on thorough clinical evaluation of patient and investigations such as CT scan, MRI, PET scan, tumor markers, and biopsy whenever possible. The treatment is planned based on the life expectancy, age, extent of lesion, prognosis of primary tumor,

and involvement of other organs or bones.

Most distal femur pathological fractures owing to presence of metastasis pose difficult challenge for conservative care with traction or immobilization. Chemotherapy will alter wound and bone healing after start during palliative care. Quality Care in bed needs prolonged hospitalization causing dependency and financial burden on care giver as well as psychological problems associated with prolonged hospitalization. Complications warrant treating orthopedic surgeon to undertake surgical stabilization for pain relief and early functional recovery.

Case Series

Here is a case series of three patients who had sustained a pathological fracture of the distal femur shaft. Who were operated with intramedullary nailing. Fixation was done with the aim of reducing pain, regaining the

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Figure 1: (a and b) Lesion in distal part of left femur shaft AP and lateral view. (c) Follow-up X-ray at 4 months with bridging callus around fracture.

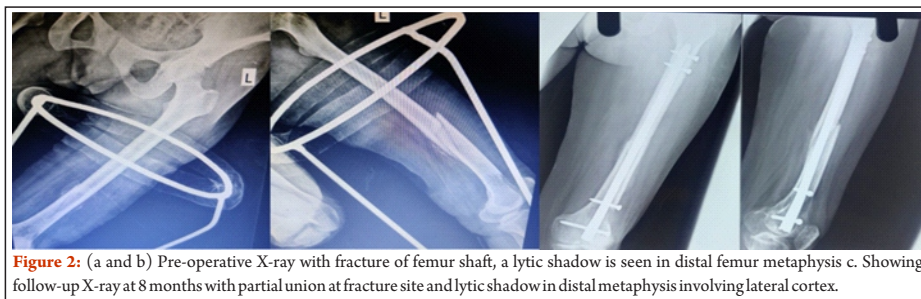


Figure 2: (a and b) Pre-operative X-ray with fracture of femur shaft, a lytic shadow is seen in distal femur metaphysis. (c) Showing follow-up X-ray at 8 months with partial union at fracture site and lytic shadow in distal metaphysis involving lateral cortex.

functional outcome and improves the quality of life by making patient ambulatory.

Case 1

A 62-year-old male patient presented with complaint of pain in the left thigh since 5 months without any history of trauma. On plain radiographs distal third femur shaft fracture seen (Fig. 1A-B). MRI suggestive of metastatic lesion differential being lymphoma. PET scan was done to see the extent of metastasis, there was no involvement of other organs or bones other than affected femur. Patient was operated with antegrade intra-medullary interlock nail. Reaming was not done so as to reduce the risk of dissemination. After the fixation was done, mini-open biopsy from the fracture site lesion was taken and was sent for histopathological examination. Biopsy was not confirmation of any specific lesion but suggested atypical cells and altered cell morphology. Patient was mobilized with Walker from day 2 and partial weight bearing is continued. There was significant reduction in the pain. The follow-up X-ray after 4 months of surgery showed some signs of bridging callus over the lesion and the patient is still under treatment. (Fig. 1C).

Case 2

A 55-year-old female patient presented 2 months after diagnosis of follicular carcinoma of thyroid (biopsy proven). PET scan was done and metastasis was noted in the left femur shaft and in distal metaphysical region, X-ray (Figs. 2A-B). The patient had undergone total thyroidectomy following which she was scheduled for radioactive

iodine therapy. She gave history of trivial trauma to the left thigh while walking. After getting an appropriate fitness, the patient was planned for an operative intervention. The patient was operated in a supine position with retrograde nailing with a distal femoral nail <DFN>. Patient mobilized from day 2 with Walker with partial weight bearing. The patient reported significant reduction in the pain. Follow-up X-ray after 8 months post-operative showed signs of union at the fracture site (Fig. 2C) and patient is under

treatment for thyroid carcinoma (radioactive iodine therapy).

Case 3

A 57-year-old male patient presented with pain and swelling over the right thigh after a trivial trauma. On examination, tenderness and swelling was present. X-ray showed minimal displaced fracture of distal third femur shaft with lytic shadow and medial cortex is thinned out due to expansile lytic lesion breaching cortex (Fig. 4A). Patient was planned for biopsy of lesion and fixation surgery. Patient was operated in supine position and retrograde femur nailing was done. Distally 3 screws placed and nail was fitting snugly in isthmus, X-ray (Figs 4B-C). Small incision taken for biopsy and samples sent for culture and histopathological analysis, biopsy suggestive of unicameral bone cyst. Patient was mobilized from day 2 with partial weight bearing. At 9 months post-operative, there is healing seen at fracture site in form of callus and restored cortical continuity (Fig. 5).

Discussion

Options for distal femur pathological fracture depends on location of metastasis, and it



Figure 3: (a) Lesion at lateral cortex, this was encountered during distal screw placement. (b) Showing lesion after curettage and biopsy sampling.



Figure 4: (a) a cystic lesion with breaching of cortex and minimally displaced pathological fracture at distal femur shaft, (b and c) Post op X-rays with retrograde nailing.

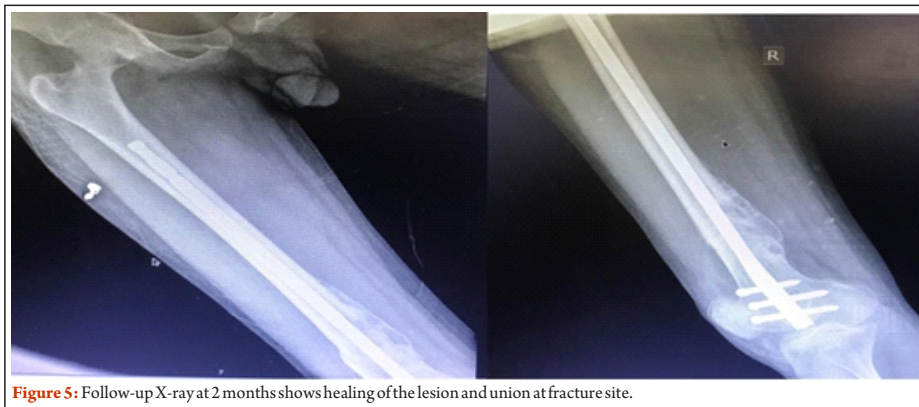


Figure 5: Follow-up X-ray at 2 months shows healing of the lesion and union at fracture site.

includes retrograde or anterograde nailing with or without intralesional curettage, wide local excision, and prosthetic replacement. Whenever curettage is performed it is preferred to put PMMA bone cement, it gives early pain relief, early mobilization and weight bearing strength and maintains structural continuity of bone [5]. The chances of dissemination of tumor cells to local tissue or through blood are considered as negligible in presence of systemic metastasis [6]. Another option for osteolytic lesions include percutaneous femoroplasty using PMMA bone cement which gives stability and structural support to the bone, causes thermal necrosis of nearby tumor cells, and nerve endings in periosteum are damaged which gives pain relief [7].

At present, most of the studies on management of pathological fractures are based on retrospective data and guidelines are formed based on the same. Closed intramedullary fixation, favors the idea of minimal surgical morbidity over open reduction and fixation technique or prosthetic replacement, since the closed technique is less invasive, produces less morbidity, and facilitates early post-operative rehabilitation [8].

In the paper published by Ruggieri et al., they retrospectively analyzed 122 cases of pathological fractures managed by either internal fixation or resection and mega prosthesis reconstruction and gave their protocol for management of pathological fractures which we have followed for these three patients in our series and did fixation rather than excision [9].

Pathological fractures of diaphysis can be managed with intramedullary nailing or open reduction and plate fixation with or without use of PMMA cement. Large lesion with >6 cm size can be managed by curettage and nailing with cement adjuvant, multiple lesions when present can be managed with nailing, when lesion is smaller open reduction and fixation with plate and use of PMMA cement can be done. When it is extending into metaphysis, prosthetic reconstruction is the preferred treatment [10].

In the retrospective study of 142 patients with pathological femur fractures by Sarahrudi et al. 94 patients were managed with intramedullary device, 22 with extra medullary and arthroplasty in 23 patients. Complications were least in patient operated with intramedullary fixation (3.2%) and were

maximum in patients operated with extra-medullary device (20%) [11]. In our study, we have operated with intramedullary device only and no post-operative complications were noted.

Our study is limited by number of cases, inclusion of only fracture cases and excluding at risk patients. In our study, all patients are, at present, under treatment for primary tumor and had no post-operative complications and no failure of implant seen. Bony union of the fracture is achieved in all three patients.

Conclusion

All the three patients had a pathological fracture of distal femur and were operated with intramedullary nailing. Follow-up post-operative X-rays showed signs of union in the form of bridging callus and patients showed significant reduction of pain, improvement in the functional activities of daily living and better quality of life. The orthopedic intervention in such patients is effective adjuvant form of treatment along with chemotherapy and/or radiotherapy as decided by the treating oncologist.

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