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Stress fractures of proximal tibia - Surgical management technique with fibulectomy and open reduction and internal fixation with plating

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Abstract

Over the period of 8 years, seven proximal tibia stress fractures managed surgically at tertiary care center. The elderly patients were suffering from osteoporosis and osteoarthritis along with varus deformity in proximal tibia. These fractures were in postero-medial cortex of the tibia and managed with open reduction and internal fixation with precontoured proximal tibia plates. Fibulectomy done at the time of surgery. Fracture union assessed with sequential X-rays and Functional outcome measured at 2 years followup with Knee Society Score. Union of fracture seen in all the cases with average knee society score of 68 at final followup.

Keywords: stress fracture, osteoarthritis, osteoporosis, fibulectomy

Introduction

Proximal tibia stress fractures in elderly are usually associated with primary osteoarthritis of knee joint [1, 2]. It is more likely to be seen in patients with osteoporosis and rheumatoid arthritis [3]. The varus deformity results in most likely location of these stress fractures on medial side [4]. These stress fractures are insufficiency stress fractures over a weakened bone due to osteoporosis or the other metabolic disorders. These stress fractures should be suspected in an elderly patient with osteoarthritis of knee joint when the patient presents with severe pain and swelling over the proximal tibia without any significant history of trauma. There are multiple modalities of treatments described for the management like immobilization in cast, external fixators, internal fixation with plate and total knee replacement with long tibial stem [5].

Materials and methods

Between 2007 and 2015, seven proximal tibia stress fractures were operatively treated at Dr. Babasaheb Ambedkar Memorial Central Railway Hospital, Byculla, Mumbai. Ethical committee approval obtained before proceeding with the study. The patients presented with pain and swelling over the proximal tibia without significant trauma. X-rays were done suggested early osteoarthritis of knee joint with stress fractures at postero-medial cortex. The proper written & informed consents were taken from the patients. The patients were further investigated with BMD DEXA for osteoporosis. Along with other routine investigations, serum calcium, alkaline phosphatase, and vitamin D levels were examined. Tests were done for rheumatoid arthritis. All the patients were operated with open reduction internal fixation with proximal tibia plating (medial proximal tibia pre-contoured locking plates) and fibulectomy by senior surgeons. Postoperatively slab was kept for two weeks. Range of motion exercises started after slab removal. Weight-bearing started at signs of radiological union at fracture site. Xrays were done immediate post-op and every four weeks till radiological fracture healing. All patients were followed up for the period of two years. And they were assessed with knee society scores at final follow-up.

Surgical Technique

The surgeries were done under spinal anaesthesia and under tourniquet control. After draping, partial fibulectomy is done through incision over lateral side. Incision made over medial side of proximal tibia. Fracture reduction done and fixation done with precontoured proximal tibia plate. The reduction and fixation checked under C-Arm guided image intensifier in anteroposterior and lateral views.

After the closure, above knee plaster of paris slab applied. Dressing done on 2nd and 7th post operative day and suture removal done on 14th postoperative day. Slab removed at the end of second week.

Results

All the patients were women in postmenopausal age group. Age range from 48 to 57 years (average age 54 years). All of them found to be osteoporotic (BMD T score >-2.5) and low vitamin D levels. One lady was suffering from rheumatoid arthritis. All were presented with trivial trauma and, severe localized tenderness on palpation and localized swelling or peri-osteal thickening at the pain site and elevated local temperature. The X-rays showed early osteoarthritis with stress fracture at proximal tibia. Average surgical time in all patients was 50 minutes. There were no neurovascular complications in post-operative period. Knee and ankle range of motion exercises started as early as possible. Fracture radiological healing occurred at average duration of 12 weeks (Range 10 to 19 weeks). There was no tenderness at fracture site. They were started full weight bearing after fracture healing. Fracture united in all the cases with delayed union seen in rheumatoid arthritis patient. At final follow up at two years knee range of motion on average was 120 degrees with average extension lag of less than 10 degrees. Average knee society score is 68.

Discussion

Nonunion rate in proximal tibia stress fracture is significant. Sometimes these fractures need total knee replacement at initial stage [6]. Whereas in our case series fracture union was achieved in all the cases. Fibulectomy not only assist in union of tibial fractures but also in offloading of medial compartment and relieve the pain of osteoarthritis [7, 8, 9, 10]. So this technique achieves union at fracture site at the same time delays progression of osteoarthritis. So even the joint reconstruction surgeries like total knee replacement can be delayed. However the treatment for osteoporosis should be started immediately and even some underlying cause of metabolic bone disorder must be investigated.



Fig 1: Female patient, 56 years old with stress fracture proximal tibia

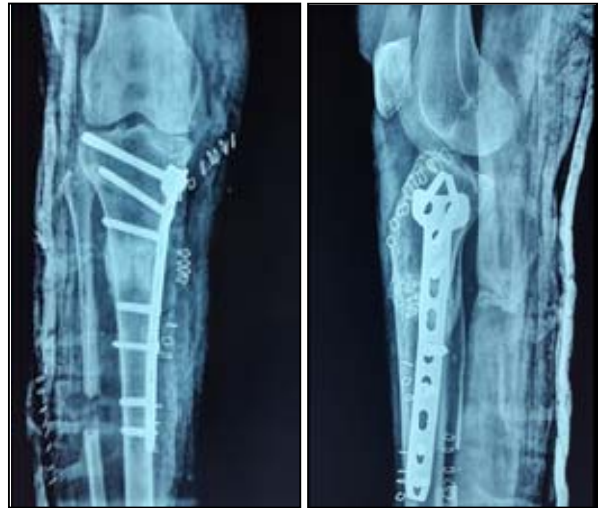


Fig 2 & Fig 3: Fibulectomy and fixation with medial plate AP view and lateral view



Fig 4 and 5: X-ray showing radiological union at fracture site AP and Lateral view

Conclusions

Successful fracture union can be achieved in proximal tibia stress fractures with fibulectomy and open reduction & internal fixation with plating. And procedures like joint replacements can be delayed. However a larger study with more data is needed to prove statistical significance.

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