

# Abnormal Bone Thickening along an Intramedullary Nail away from Fracture Site Could Be a Broken Nail

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**Abstract:** *A Broken Implant was almost evident in a radiograph. In few cases there is no evidence of IM nail rupture or break in radiographs but intraoperatively found broken. Inadequate planning and preparation for removal of broken IM nail leads to complicated surgery and non - retrieval of implants was a major concern for patient satisfaction. During elective implant removal of a 6 years old short PFN for united intertrochanteric fracture, we unexpectedly found Implant breakage distally during surgery which successfully removed through a retrograde reamer from distal femur entry. On retrospective examination of radiographs, it shows characteristic abnormal bone thickening at the same site of Implant rupture. This sign was also observed in another similar case and other four cases from literature. From these observations, we conclude abnormal bone thickening away from a fracture site along an IM nail with an united primary fracture as a strong predictor of Implant breakage or rupture at that site.*

**Keywords:** Broken PFN, Abnormal Bone Thickening, Implant Rupture, Self Dynamisation of PFN

## 1. Introduction

Implant removal is often a tough job for an orthopaedic surgeon. An unexpected implant breakage or rupture during an elective Implant removal makes surgery complicated. An adequate and logical preoperative planning and preparation was required in such cases. Most cases of Implant breakage could be seen clearly in radiograph with nonunion or delayed union but sometime an Intact implant with clear bone union without any signs of rupture could be found broken intraoperatively. No definitive bony signs described in literature to predict implant break preoperatively. In an united fracture with apparently Intact implant, we constantly observed abnormal bone thickening away from fracture site is an important predictor of implant breakage. we are presenting a case of 6years old intertrochanteric fracture with short proximal femur nail which had this sign of abnormal bone thickening distally and unexpectedly found Implant broken at that level during elective implant removal.

## 2. Case History

A 60 years male without any comorbidities attended to orthopaedic OPD with history of vague pain and discomfort over left thigh since 1 year. He sustained an intertrochanteric fracture of left femur after accidental fall at home for which he undergone closed reduction and internal fixation with short femur nail. He was able to bear weight with walker support after 3 months postop, without support after 6months postop. No history of fever or recent trauma.

On examination there was healed scars over left hip and thigh region. Deep tenderness present over the mid thigh region. Rest of the examination is normal with normal hip range of motion. A preoperative radiograph shows a well united left trochanteric fracture with short proximal femoral nail Insitu with two screws proximally and single static screw

distally. There is abnormal bone thickening at level of distal screw. Post operative radiograph 6 years before shows an intertrochanteric fracture with short PFN, no fracture is seen at level of distal shaft. No further radiological investigations performed due to financial constraints of the patient.



**Figure 1:** Preoperative radiograph showing united fracture, intact implant with no signs of rupture and abnormal spindle shaped bone thickening around distal screw



**Figure 2:** Immediate post operative x ray six years before showing No bone fracture distally, no bone thickening distally and intact implant (PFN)

Patient is posted for elective implant removal. Intraoperatively the buried proximal and distal screws removed with difficulty but all the screws were Intact. While retrieving nail with proximal jig, only half of nail came out. We found break of nail at level of distal screw. By taking an informed consent from patient attenders, The remaining portion of distal nail removed through retrograde reamer from distal femur. Bone biopsy taken from thickened portion of bone distally found normal on histopathology.



**Figure 3:** (A) retrieved implant, screws intact but nail broken at distal screw site. (B) removing distal broken nail part through retrograde reamer from distal femur. (C) post operative x ray showing well united fracture with no implant retained in bone.

### 3. Discussion

IM nail breakage is a rare form of mechanical failure that mostly occurs in unstable peritrochanteric femoral fractures with suboptimal reduction, Incorrect placement of IM nail and delayed or nonunion. The reported incidence of nail breakage in literature was 2.9 - 5.7%. More than 95% of nail breakage occurs due to abnormal mechanical stresses in context of delayed or nonunion (implant failure) of bone around 6 months postoperatively which further requires revision procedures to attain bone union. Very few cases may exhibit both union and IM nail breakage.

Most of the IM nail breakage shows evidence of angler deformity, lateral displacement, or a fracture line of nail in radiography. But sometimes implant appears intact and shows no evidence of breakage on radiography. It leads to unexpected complications during surgery including complete non-retrieval of implants. The reason for nail breakage with united fracture was that IM nails might have

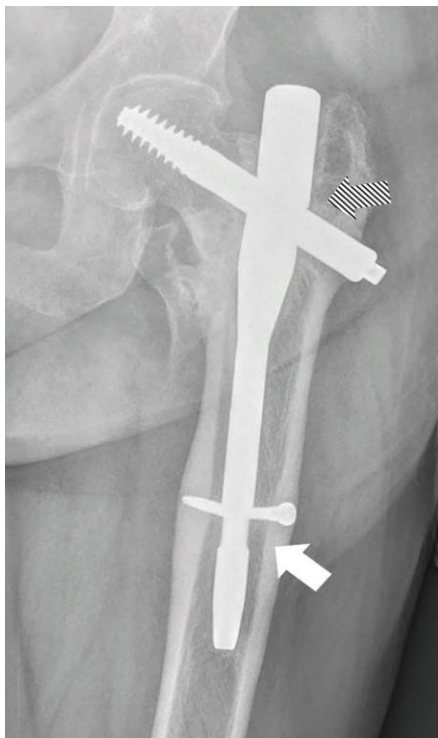
broken incompletely or completely but without displacement when fracture achieved bone union. This broken implant may exhibit displacement either due to secondary trauma or else found unexpectedly during elective implant removal.

The case in present study shows no evidence of implant breakage in preoperative radiograph but shows an abnormal bone thickening at site of distal static screw. It was found unexpectedly broken exactly at the same site of bone thickening. It was assumed that this bone thickening might be due to implant breakage at that site. Another similar case of 4 years old PFN with united intertrochanteric fracture came with hip and thigh pain on operated limb. The implant rupture clearly seen in x ray proximal to distal screw. It also shows abnormal bone thickening at that site (figure 4). Based on these two cases and the literature review found another 4 cases of united trochanteric fractures with intact implant which were found broken intraoperatively. The radiograph reported by pingfei li et al., in article named - "characteristics of intramedullary nail breakage in

perthrochanteric fractures”, also shows this abnormal bone thickening at nail break site distally away from united fracture site (figure 5). In a case report by yoshino et al., named - “Implant failure of long gamma nail in a patient with intertrochanteric - subtrochanteric fracture“, preoperatively they suspected distal nail breakage but unexpectedly they found nail broken proximally and no break distally. There is no sign of bone thickening at distal part of nail where they initially expected an implant breakage.



**Figure 4:** Another case of united trochanteric fracture with short PFN. Nail was broken proximal to shaft and there was bone thickening around it.



**Figure 5:** The white arrow showing bone thickening around implant rupture site distally. Also nail was broken at proximal aperture.

The exact reason why the IM nail breaks in a healed fracture is unknown. In the current case the nail might have broken

after healing of bone but undisplaced, later due to abnormal stresses at that area the bone might shows abnormal thickening. Self dynamization of IM nail might be another reason for implant breakage distally.

#### 4. Conclusion

A broken IM nail especially undisplaced may not always seen in radiography. Presence of abnormal bone thickening along IM Nail away from a healed fracture should consider the possibility of nail breakage at that area. It should further investigate, planned and adequate preparation needed to avoid unexpected complications during an elective implant removal.

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