



## Incarcerated Fragment- A Challenge That's Faced While Doing An Im Nailing

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### Abstract

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### Introduction

In the recent past, in femoral and tibial shaft fractures, Intramedullary (IM) nailing has become the standard mode of treatment. Nowadays, IM nailing has become a popular technique in the treatment of humeral shaft fractures.<sup>(1-7)</sup>In comminuted long bone fractures, a cortical fragment that block the intramedullary canal poses a challenge in the treatment.

Though uncommon, if not addressed prior, then the presence of such a fragment can obstruct the passage of the guide wire, reamer or nail, and cause significant problems. Also, if bypassed unknowingly

or successfully that fragment can effectively act as an obstacle and cause an iatrogenic fracture or may act as a blocking screw or wedge and may lead to malreduction.

We present a case series of five cases where intramedullary incarcerated fragment has led to complications viz malreduction, delayed union.

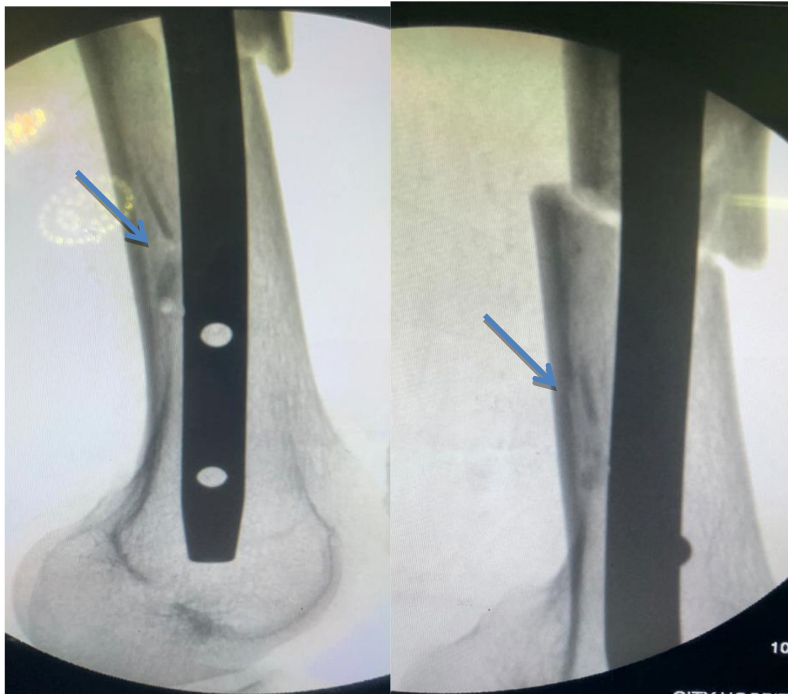
### Case Series

#### CASE 1

Incarcerated bone fragments in a case of shaft of femur fracture. When they were not removed, they had led to malreduction after IM Nail insertion.



**Fig 1.** AP & Lateral intra-op C-Arm images showing Intramedullary Incarcerated bone fragments



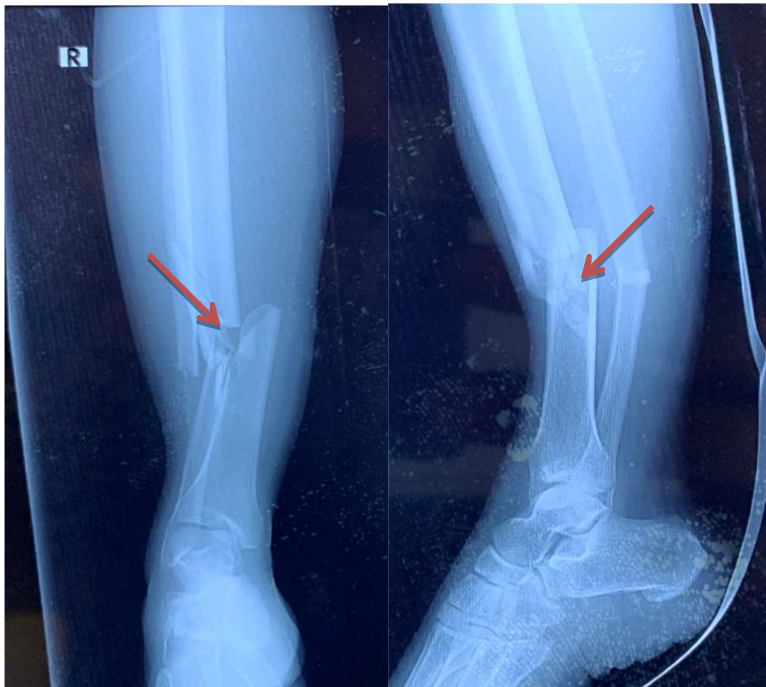
**Fig 2.** Incarcerated fragments causing malreduction after nail passage



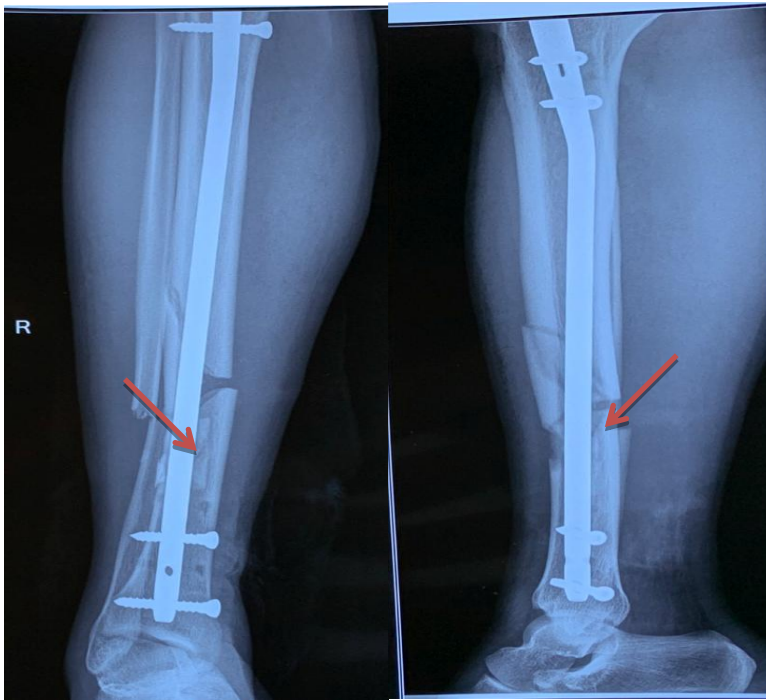
**Fig 3. Post Op X-ray showing Malreduction**

**CASE 2**

Incarcerated bone fragments in a case of comminuted shaft of tibia fracture operated elsewhere. They had not removed the incarcerated fragments, which had led to malreduction & Non-union



**Fig 4. Pre op X-ray**



**Fig 5. Post op X-ray showing malreduction due to the presence of intramedullary incarcerated fragments**



**Fig 6. 9months post op showing Non-union of tibia**

### CASE 3

Intramedullary incarcerated fragment in a case of distal third tibia shaft fracture, which was not removed and had lead to malreduction & angulation at the fracture site.



**Fig 7. Pre op X-ray showing intramedullary incarcerated fragment**



**Fig 8. Post op X-ray showing Malreduction & angulation at the fracture site.**

#### **CASE 4**

Incarcerated fragment in a case of tibial shaft fracture, prevented the passage of guide wire, which was then removed with an artery forceps and then guide wire & reamer could be passed & good reduction was achieved after IM nail insertion.



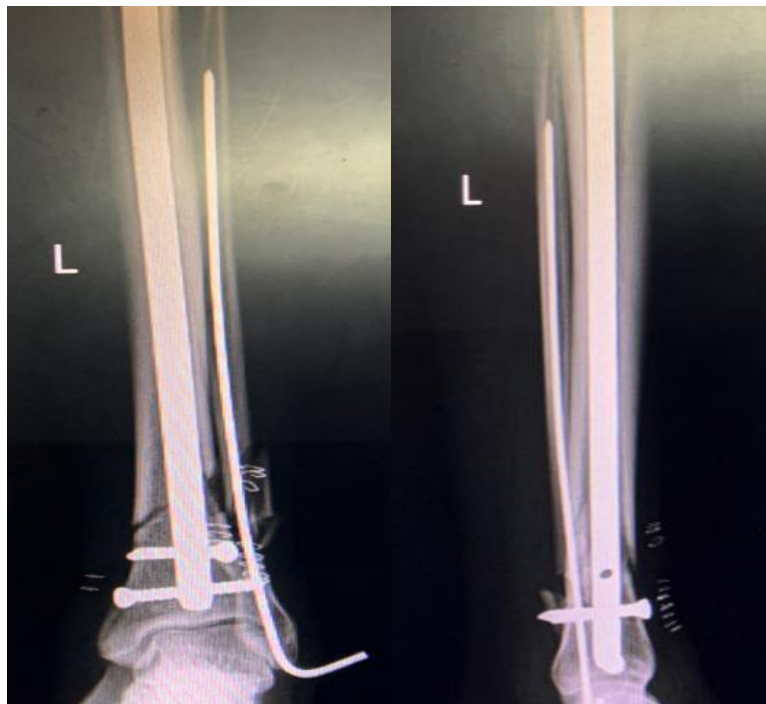
**Fig 9. Intra op C-Arm image showing the incarcerated fragment**



**Fig 10. Incarcerated fragment was removed with artery forceps**



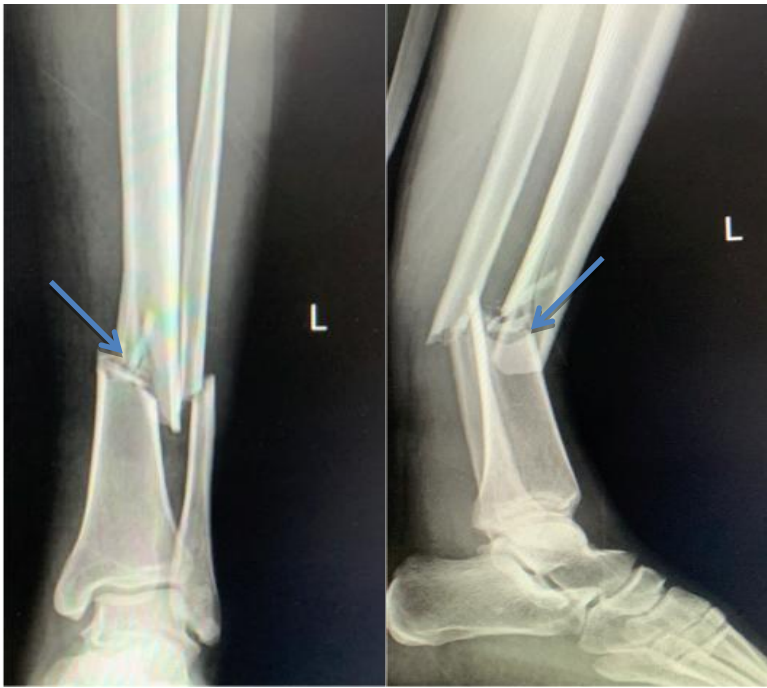
**Fig 11.** After removal of the fragment, guide wire and reamer could be easily passed.



**Fig 12.** Post op X-ray showing good reduction

#### **CASE 5**

Large incarcerated fragment in a case of shaft of tibia fracture was removed with an artery forceps & hence, good reduction was achieved.

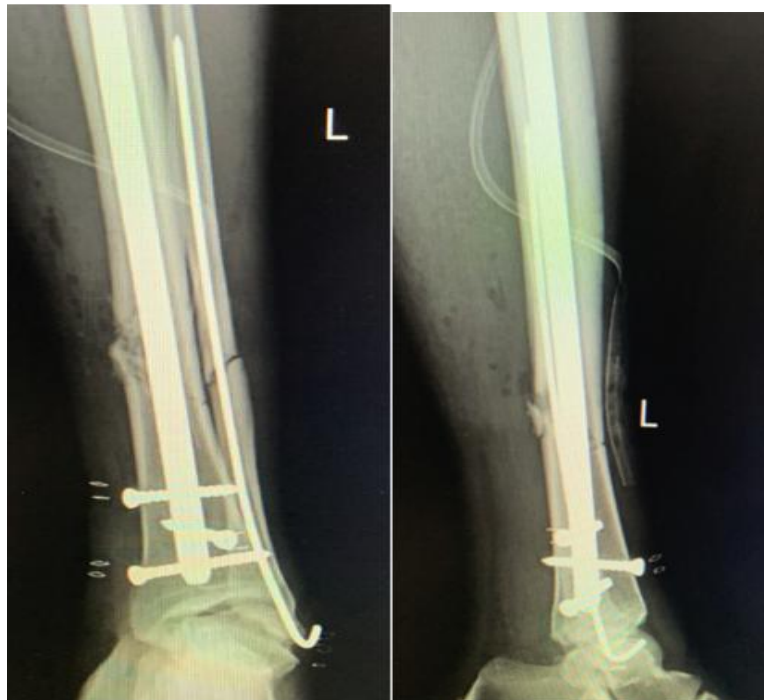


**Fig 13. Pre Op X-ray showing incarcerated fragment in the intramedullary canal**



**Fig 14. Intra op C-arm image showing the removal of incarcerated fragment with artery forceps**





**Fig 15. Post op X-ray showing good reduction after removal of the intramedullary fragment**

### Discussion

Complications that occur due to the presence of an incarcerated fragment in the intramedullary canal has been published earlier. In 1996, Darren L Johnson et al.<sup>(8)</sup> described a rare and severe complication of the fragment penetration into the distal joint. In 2007, Salamon and Finkemeier<sup>(9)</sup> documented a fragment that obstructed the passage of their guide wire, and their solution was direct open dissection to the fracture site to manually remove the fragment and allow nail passage. In 2009, Srinivasa Rajappa et al.<sup>(10)</sup> reported a case of inadvertent penetration of the tibio-talar joint by the smooth guide wire, caused by incarceration of a fracture fragment between the nail and the guide wire at the time of insertion. In 2010, Nag et al.<sup>(11)</sup> attempted to force a nail past a fragment but caused a fracture of the posterior cortex of the distal fragment. In 2015, Jonathan G. Eastman et al.<sup>(12)</sup> used a long, narrow endoscopic grasper for extraction of the intramedullary fragment.

### Conclusion

If the guide wire cannot be passed easily across a reduced fracture during the operation, the surgeon should be suspicious of an incarcerated fragment blocking the reduction before forcing the guide wire or nail past the obstruction. When a bone fragment obstructs the medullary canal, the surgeon should

carefully consider open retrieval of the fragment because forcing the wire distally may wedge an incarcerated fragment deeper and more securely into the canal.

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