

Broken Intramedullary Nail Causing Vascular Injury

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Orthopedic implant used for fracture fixation, no matter how strong, is bound to fail if the fracture does not unite. Broken implants usually do not cause major damage but the surgeons have to improvise to remove them. We report a case of a broken intramedullary nail in non-united fracture femur which migrated out and caused vascular injury requiring surgical interference. The present report highlights the importance of early surgical intervention in an osteoporotic non-united fracture.

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Intramedullary interlocked nail gained immediate popularity among surgeons, so much so that it is now the gold standard in the management of femoral fractures, because they combine the advantage of closed fixation with a load sharing device, do not require periosteal stripping and easy to remove when the fracture unites¹. The result of such paradigm shift in management of femoral shaft fracture has been satisfactory to most surgeons. However, with the widespread use, various complications have been reported like pain, failure of implant (bending/breakage), malunion and malrotation. The rate of complication was found to be higher in osteoporotic bone, distal femoral fractures, pathological and comminuted fracture.

The importance of regular follow up and clinico-radiological assessment till the union is achieved cannot be overemphasized. If there is no progressive union was found, timely intervention and of exchange nail, grafting or other method must be undertaken because it is established fact that no matter how strong the fixation it is doomed to fail if fracture does not unite². Failure of such intervention has lead to breakage of the implant, making the task of retrieval of implant and achieving union a formidable challenge.

The aim of this report is to present an unusual complication where the distal part of broken nail migrated out of femoral canal and caused limb ischemia due to pressure on the popliteal artery.

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THE CASE

A sixty-year-old lady presented to the emergency department after sustaining trivial injury to her right thigh about 24 hours before admission. She further complained of progressive increase in pain and numbness in the right leg for the last four hours. History suggested that she had intra-medullary nailing of her right femur due to pathological fracture (Non-Hodgkin's Lymphoma) about 12 years ago. She was not regular in her follow up as she was able to carry on with daily indoor activities without any pain.

Clinical examination showed decrease temperature in the right leg with sensory deficit and absent distal pulses (both posterior tibial and dorsalis pedis). Plain radiograph of femur (antero-posterior and lateral views) showed non-union distal femoral fracture with broken nail and distal part migrating out of medullary canal and lying posteriorly, see figure 1 A and B). Computerized Tomography angiography with contrast confirmed the compression of popliteal artery by the distal portion of the broken nail, see figure 2 A and B.

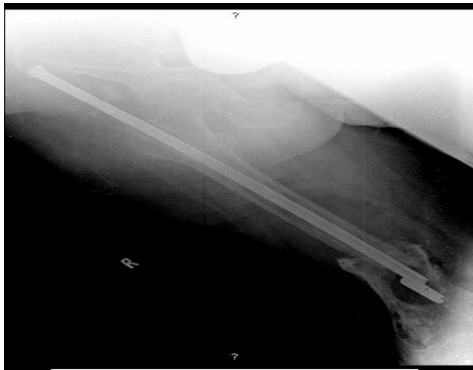


Figure 1 (A)



Figure 1 (B)

Figure 1 (A and B): Radiograph Showing the Broken Intra-Medullary Nail Displaced Posteriorly

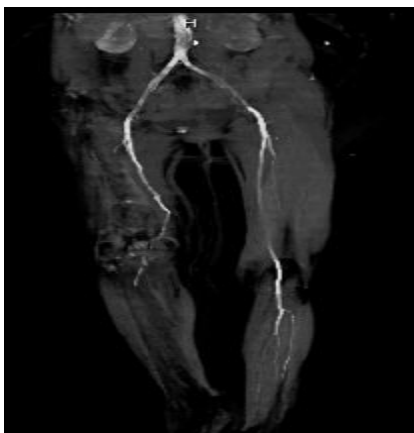


Figure 2 (A)



Figure 2 (B)

Figure 2 (A and B): CT Angiography Showing Interruption of the Popliteal Vessels

At emergency surgery, the broken nail was removed under direct vision and the distal part of the nail was found to have penetrated posterior cortex of the distal femur compressing the popliteal artery. The fracture was immobilized with external fixator and the popliteal vessels were explored. Popliteal artery was found to be injured and thrombosed. Embolectomy was performed and distal circulation was re-established. A full length fasciotomy of right leg was performed. On the operating table arterial pulsation distal to the knee and ankle joint were felt. The right lower limb recovered in post-operative period.

DISCUSSION

Despite the recent advances in the metallurgy and development of the new implant material, orthopaedic and trauma implants still break, migrate to other regions, making difficulties in removal and causing injuries. Orthopedic and trauma implants are usually made of austenitic stainless steel, cobalt-chromium alloy and titanium and its alloys, but irrespective of metal used, implants break due to fatigue, corrosion or other mechanical factors, the incidence is 1.2% - 3.1%³⁻⁵. Because of the current widespread use of intramedullary nail, as an internal fixation method, more cases have been reported with breakage of nail at two or even three places^{6,7,8}.

Bhat et al reported in their series of breakage of hardware, intramedullary nails to be the most common complication; 55% of these occurred distally, but no serious complications were reported⁹. The rate of such complications is found to be higher in distal femoral fracture because of the geometry and wider medullary canal¹⁰. Similarly, there is enough literature evidence of Kirschner's wires, which are often used in trauma practice, breaking and migrating to lungs, heart and spinal canal causing serious injuries^{11,12}.

Despite all the risk factors of breakage, intramedullary nails are still the most common implant used for treatment of diaphyseal fractures of lower extremity because it allows micro-movement at the fracture site to induce fracture healing and provides early weight bearing. Nevertheless, there is always a race against time between fatigue of the implant and union of the fracture. Our patient was osteoporotic, with non-united fracture and a loose nail, had all the concoction for implant failure leading to breakage.

Various complications follow after the implant is broken; the present case is probably the first of its type where the broken part of the nail migrated into the path of the popliteal vessels. There are probably two reasons why the injury to the vessels occurred. First, the nail was loose and abnormal stress occurred at the nail to break and second the femur was osteoporotic, hence it allowed the nail to penetrate the posterior cortex.

One lesson which can be learned from our patient is that the non-union in any patient and particularly in osteoporotic patient should be treated early to avoid complications such as we have seen in our patient.

CONCLUSION

We believe that the loose Implant should be removed and it become mandatory for removal if the patient is suffering from osteoporosis and nonunion in order to prevent breakage of the implant, migration and serious complication.

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