Case report

Diaphyseal tibia and fibula fracture after a second injury with a reamed intramedullary locked tibia nail in-situ: A case report

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1. Introduction

Intramedullary (IM) nailing is standard care for the majority of displaced tibial shaft fractures. Its use avoids extensive surgical dissection, spares the extraosseous blood supply and creates a stable construct that allows early weight bearing. The use of reamed IM tibial nailing after closed injury has been shown to improve the rate of union, reduce subsequent complications and minimize the number of secondary procedures required. Although patients who have persistent pain in the region of an orthopedic implant may benefit from its removal, the routine extraction of implants to protect against allergy, carcinogenesis, or metal detection is not recommended. Retained intramedullary implants have been associated with stress shielding and a subsequent reduction in bone mineral density (BMD). Reduction in bone density may even persist beyond implant removal, and a fracture at the medial tibia plateau has been described 1 year after tibia nail removal. Shaft fractures of the tibia with a nail in place, however, have not been reported in literature. We present a case of a transverse diaphyseal tibial fracture that occurred around a retained IM tibial nail inserted 9 years previously to successfully treat an open tibial shaft fracture. The patient was informed of the interest of this finding and gave informed consent to the generation of this report and photographs for the publication.

2. Case report

A healthy 42-year-old premenopausal nurse presented following a low velocity twisting injury to her left lower limb during playful wrestling. Nine years prior to this injury the patient had sustained a Gustilo & Anderson grade 2 open fracture of the left tibia with an associated fibular fracture (OTA 42A3.2). Treatment consisted of irrigation and debridement of the wound within 6 h of injury with surgical stabilization of the tibial fracture using a reamed statically locked nail (Synthes, West Chester, PA, USA). The medullary canal was reamed to 10 mm to allow insertion of a 9 mm diameter nail and a single locking screw used proximally and distally. The wound underwent a subsequent 2nd debridement and delayed primary closure 2 days later. By 6 months both tibia and fibula fractures had united successfully. One year after injury the distal locking screw was removed due to prominence. At that stage the patient had resumed a full level of activity with no restrictions and minimal discomfort. The remaining hardware was therefore left in-situ.

Examination of the new injury revealed pain and swelling around both her knee and lower leg. The leg did not appear deformed (Fig. 1). Plain radiographs demonstrated an un-displaced transverse mid-diaphyseal fracture of the tibia and fibula (OTA 42A3.3). This had occurred around a previously inserted tibial IM nail. The hardware did not appear deformed or compromised on either of the initial radiographs (Fig. 2). This fracture was managed non-operatively without the application of a splint or cast. Full weight bearing was initiated 2 weeks after injury and was tolerated well. The patient was subsequently reviewed at 4, 10 and 18 weeks after injury with uneventful clinical and radiographic union. A knee MRI scan of the knee also revealed an isolated ACL rupture. She is due to be reviewed with regards to possible autologous graft reconstruction (Fig. 3).

3. Discussion

The tibial shaft is the most common long bone fracture seen in orthopaedic practice. Low-energy, torsion forces result in simple or comminuted spiral fractures, and these account for around two thirds of all fractures of the diaphyses of the tibia and fibula. A significant number of diaphyseal fractures are associated with higher energy mechanisms and have more bone comminution and a greater degree of concomitant soft-tissue injury. Templeman and Marder found 22% of tibial shaft fractures to have ipsilateral...
knee ligamentous injury when examined under anesthesia. The medial collateral ligament (MCL) was involved in all cases; with a lower frequency (2%) of ACL involvement. Thiagarajan et al. reported a near equal incidence of anterior cruciate and medial collateral ligament damage in association with open tibia shaft fractures. The mechanism of injury could be either hyperextension of the knee or an internal rotation of the tibia on the femur, resulting in tear of the anterior cruciate.

Our case presented with an ACL rupture and a concomitant transverse tibia and fibula shaft fracture after a low-energy rotation of her lower limb; probably a twist with a bend to get the fracture pattern present. In general, a transverse fracture pattern is thought to be associated with a greater amount of energy and is produced as a result of a direct bending force. Without excessive load, a transverse fracture pattern may indicate underlying bone insufficiency. The accuracy of BMD measurements in the presence of retained hardware can be variable. However, previous results would indicate that a retained tibial IM nail can act as a stress shielder and reduce bone mineral density. Allen et al. demonstrated a small, but statistically significant fall in BMD with healed tibial fractures treated with IM nails that were subsequently retained. Intramedullary reaming was also found to be a factor potentiating this bone density reduction in the long-term. The disruption of the endosteal blood supply after IM reaming may account for this persistent bone loss. To our knowledge, there have been no previously reported cases of mid diaphyseal long bone fractures around a previously implanted tibial IM nail. In this case, the bone may have been predisposed, due to weakening and reduced density caused by the long-term presence of the IM hardware.

References