CASE REPORT

Lateral foot pain following open reduction and internal fixation of the fracture of the fifth metatarsal tubercle: treated by arthroscopic arthrolysis and endoscopic tenolysis

Tun Hing Lui

Department of Orthopaedics and Traumatology, North District Hospital, Hong Kong, Hong Kong

Correspondence to
Dr Tun Hing Lui,
luithderek@yahoo.co.uk

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SUMMARY

We report a case of fracture of the tuberosity of the fifth metatarsal which was managed by tension band wiring and bone grafting. It was complicated by symptomatic fibrosis of the operated site involving the cubometatarsal joint, peroneus brevis tendon, peroneus tertius tendon and the long extensor tendon to the fifth toe. This was successfully managed by arthroscopic lysis of the involved joint and tendons.

BACKGROUND

Fracture of the proximal fifth metatarsal bone can be classified into fractures of tuberosity (zone I), proximal metadiaphysis (zone II) and diaphysis (zone III).^{1 2} It can be subdivided into acute fracture, delayed healing and a developed non-union.¹ Displaced intra-articular zone I and displaced zone II fractures of the proximal fifth metatarsal bone are frequently complicated by delayed non-union due to a vascular watershed.³

Non-operative treatment remains a viable choice in most of the acute cases, with union rate between 72% and 93%.^{1 2 4} Surgical intervention for the acute Jones fracture should be reserved for the athletic individual because there is a clear advantage in terms of time to return to sporting activity.^{5 6} Displacement of more than 2 mm or comminution of fractures of the tuberosity should be reduced. Fracture reduction and fixation should also be considered in fractures that involve more than 30% of the cubometatarsal joint.⁷ Non-acute diaphyseal stress fractures of the proximal fifth metatarsal and Jones fractures that develop into delayed unions and non-unions can both be managed with operative fixation.^{2 8}

We report a case of fracture of the tuberosity of the fifth metatarsal which was managed by tension band wiring and bone grafting. It was complicated by symptomatic fibrosis of the operated site and was successfully treated arthroscopically.

CASE PRESENTATION

A 43-year-old woman had an inversion sprain to her left foot resulting in fracture of the tubercle of her left fifth metatarsal (figure 1). She was treated with a short leg cast and non-weight bearing walking for 4 weeks and then partial weight bearing walking with a wooden base sandal. She reported persistent pain and swelling over the

Figure 1 Radiographs showed fracture of the tubercle of the patient's left fifth metatarsal.

fracture site. Radiographs taken 2 months after the injury showed widened fracture gap (figure 2). Open reduction, tension band wiring and autologous bone grafting of the fracture site were performed through dorsolateral wound (figure 3). The pain improved with healing of the fracture site. However, she noticed rest pain over the base of the

Figure 2 Radiographs taken 2 months after the injury showed widened fracture gap.

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Figure 3 Open reduction, tension band wiring and autologous bone grafting of the fracture site was performed. Chevron osteotomy of the first metatarsal was also performed to correct the hallux valgus deformity.

fifth metatarsal with increased pain and swelling after walking. Clinically, there was mild local tenderness without sign of local inflammation. She was diagnosed to be suffering from impingement pain by the implants. The implants were removed 8 months after the key operation (figure 4). However, the pain persisted and she was referred to our clinic for subsequent management. Clinically, there was tenderness over the fifth cubometatarsal joint, tubercle of the fifth metatarsal and the surgical scar. The pain can also be triggered by ankle plantarflexion, foot supination or plantarflexion of the fifth toe. The surgical scar was stuck to the bone and not mobile.

INVESTIGATIONS

MRI of her left foot did not reveal any significant pathology over the previously operated site (figure 5).

TREATMENT

The patient was treated with insole and physiotherapy of deep scar massage, active and passive mobilisation of joints of the toes and foot, ultrasound therapy and laser therapy for 4 months. However, the pain was not relieved. It was partly relieved with non-steroidal anti-inflammatory drugs. Arthroscopy of the fifth cubometatarsal joint was performed.⁹ There was fibrosis of the dorsal joint capsule and fibrosis around the insertion of the peroneus brevis tendon, the peroneus tertius tendon and the long extensor tendon to the fifth toe. The extra-articular part of the cartilage of the base of the fifth metatarsal was found to be fibrillation (figure 6). The intra-articular portion of the cartilage was normal. Arthroscopic lysis of the

Figure 4 Radiographs showed that all the implants were removed.

Figure 5 MRI did not reveal any significant pathology at the proximal fifth metatarsal.

tendons (figure 7) and the joint was performed. Postoperatively, she was advised on vigorous ankle and toe mobilisation.

OUTCOME AND FOLLOW-UP

The preoperative pain was subsided and there was no surgical complication noted. She remained asymptomatic 13 months after the operation.

DISCUSSION

The operation of the non-union or delayed union of the fracture of the proximal fifth metatarsal bone consists in resection of non-union and bone grafting.⁶ The optimal surgical fixation for these fractures has not been determined.^{5 7} The fixation options include percutaneous K wire fixation,⁶ tension band wiring,^{1 10} bicortical screw fixation,³ intramedullary screw,^{11–14} Ilizarov external minifixator,⁵ minifragment plate and screws⁶ and XS-nail.¹⁵ Tension band wiring was performed in this case in order to achieve interfragmental compression across the fracture site and compensate the tension applied to the proximal fragment through the peroneal tension.¹⁵

Surgical intervention can achieve a high rate of fracture union, but the complication rate of surgery is also high.⁴ Dehiscence of the wound,^{1 13} irritation by hardware^{1 11} implant failures,¹¹ intraoperative fracture,¹¹ refracture, delayed union or non-union,^{5 12} deep infection,^{5 13} nerve injury^{13 16} and joint subluxation⁵ have been reported. Our patient reported

Figure 6 (A) Cubometatarsal arthroscopy with 2.7 mm 30° arthroscope and 2.9 mm arthroscopic shaver. (B) Arthroscopic view after resection of the fibrous tissue. Cartilage fibrillation was seen in the non-articulated part of the base of fifth metatarsal. a: articulated part of the cartilage of the base of the fifth metatarsal; b: cartilage of the cuboid; c: peroneus brevis tendon. Arthroscopic images were overlapped in order to show the entire joint on different views.

Figure 7 (A) Arthroscopic lysis of the tendons. (B) Arthroscopic views showing the resection of the fibrous tissue around the long extensor tendon to the fifth toe (A) from proximal distally.

persistent pain over the operative site which was initially believed to be caused by implant impingement. However, the symptom persisted after the removal of the implants. The stiff surgical scar suggested extensive scarring at the operated site. Triggering of pain by ankle plantarflexion, foot supination or plantarflexion of the fifth toe suggested that the surrounding tendons namely peroneus brevis, peroneus tertius and long extensor tendon to the fifth toe were involved.⁶ We believed that the symptomatic fibrosis was a result of extensive soft tissue dissection during the previous operation and prolonged postoperative immobilisation. Although the implants were removed, no proper postoperative physiotherapy was given until she was referred to the clinic 4 months after the operation. The failure of relief of the symptoms was believed to be due to the delay of postoperative physiotherapy.

Although preoperative MRI did not suggest any cause of the symptoms, clinical examination suggested that the patient suffered from symptomatic fibrosis of the previous operated site. The arthroscopic approach can allow detailed assessment of the joint and tendons around the previous operated site. The cartilage fibrillation of the non-articulated part of the base of the fifth metatarsal was believed to be a result of previous operation and insertion of the K wires.

Arthroscopic lysis of arthrofibrosis and fibrosis around the tendons has been described in the foot and ankle.^{17–24} It was

Figure 8 Clinical photos taken 1 week after the operation showed that there was minimal soft tissue swelling and the toes and ankle can be plantarflexed to stretch the tendons without disruption to the small portal wounds.

performed because it was a minimally invasive approach and allowed early mobilisation of the foot and ankle (figure 8). This can minimise the chance of recurrence of symptoms.

Learning points

- ▶ If surgical intervention is indicated in fractures of the proximal fifth metatarsal, stable fixation with good interfragmental compression is needed to prevent late complications.
- ▶ Proper postoperative rehabilitation including early toe and ankle mobilisation and scar management will avoid development of symptomatic fibrosis of the operated site.
- ▶ Symptomatic fibrosis of the operated site is diagnosed mainly based on clinical examination.
- ▶ Arthroscopic lysis of the involved joint and tendons allows early postoperative mobilisation of the toe and ankle and prevent recurrence of symptoms.

Competing interests None.

Patient consent Obtained.

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