Case report

Salvage of failed ankle fracture fixation in non-compliant and morbidly obese patients using Ilizarov frame

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1. Introduction

Injuries involving ankle syndesmosis in morbidly obese patients pose a significant challenge to the orthopaedic surgeon. Traditional methods of fixation such as a plate supplemented with a trans-syndesmotic screw may fail particularly if the patient is morbidly obese and non-compliant to instructions regarding weight bearing. We describe our experience in managing two such patients. Extensive literature search revealed only one case report where a similar method of treatment was employed to salvage failed initial ankle fixation.4

2. Patient one

A 45-year-old obese Mediterranean gentleman weighing 114 kg (BMI 40 kg/m²) sustained an open (1 cm × 1 cm) comminuted ankle fracture involving both malleoli and the inferior tibiofibular syndesmosis. The wound was debrided. The ankle fractures were fixed using a 10-hole compression plate over the lateral malleolus and two 60 mm malleolar screws in medial malleolus after achieving good reduction. The syndesmosis was stabilised with a fully threaded 50 mm small-fragment cortical AO screw. Although the fractures united in due course, compliance to weight bearing advice remained doubtful during this period of treatment. At 6 months, the syndesmosis and malleolar screws were removed.

At 7 months follow-up, the patient developed significant right ankle swelling and pain, especially on weight bearing. However, there was no history suggestive of any recent trauma. There were no clinical signs of infection and inflammatory markers were normal. X-rays of the ankle at this stage revealed disruption of the syndesmosis with talar shift (Fig. 1).

The patient continued to be in significant pain and it was decided to reduce and stabilise the syndesmosis using an Ilizarov frame, particularly in view of his excessive body weight. A 180° two-ring frame construct was used. Closed reduction of the syndesmosis and talar shift was performed with two olive wires. This was achieved on the table by gradually tensioning the olive wires from one side to another (lateral to medial). Post-operatively, the patient was advised on daily pin care and came to our weekly frame clinic for pin site care. Weight bearing was not allowed for the first 4 weeks. Serial radiologic assessment showed a satisfactory position of the ankle mortise and the patient gradually progressed to full weight bearing after 4 weeks.

At 3 months follow-up the patient was painfree and full weight bearing. Check X-ray showed satisfactory position of the ankle mortise (Fig. 2). The frame was removed under image intensifier and the ankle joint was stable with no talar shift. At 6 months follow-up the patient remained painfree with a range of movement of flexion/extension of 40° and 10°, respectively.

3. Patient two

A 27-year-old white male, weighing 129 kg (BMI 40 kg/m²) sustained a Weber C fracture of his right ankle with significant talar shift in a motorcycle accident. The ankle mortise was successfully reduced under general anaesthetic and the fibular fracture fixed with a seven-hole dynamic compression plate. The inferior tibiofibular syndesmosis was stabilised with a 5 mm cortical screw just above the syndesmosis. Postoperatively, the ankle was supported in a non-weight bearing below knee cast.

However, the patient was not complaint with the advice not to bear weight and removed his plaster cast on several occasions.

He returned to the follow-up clinic 6 months later, complaining of pain, having missed several appointments. Check X-rays taken at this stage showed failure of fixation, non-union of fibular fracture and widening of the inferior tibiofibular syndesmosis with talar shift (Fig. 4).

At 7 months, taking into account the time period since the original injury, excessive body weight and poor compliance, the
ankle was stabilised using the Ilizarov fixator. A three-ring construct of the Ilizarov frame was used with two rings above the fracture and two below it. A foot plate was also applied to provide additional stabilisation but this was removed after 4 weeks so that the patient could progress to full weight bearing (Fig. 5).

The previously applied compression plate was left in situ but the syndesmotic screw was removed percutaneously at this stage. The hole from the syndesmosis screw was used to pass an olive wire and the weak entry point of the screw in the lateral cortex of lateral malleolus was protected with two washers whilst the olive wire was tensioned to reduce the mortise.

During the treatment period, the patient developed a superficial pin tract infection which was successfully controlled with oral antibiotics and meticulous pin site care.

The radiographs at 4 months showed satisfactory restoration of ankle syndesmosis and union of the fibular fracture. The Ilizarov frame was then removed under image intensifier. At his last appointment, 12 months following removal of frame, he was fully
weight bearing, without using any walking aids. There were no features suggestive of ankle instability and his range of movement in the ankle joint was 40° of flexion and 15° of extension/extension.

4. Discussion

The severity of ankle fractures seems to have a direct correlation with body mass index. Outcome of such fractures in obese individuals has remained a subject of controversy. The management of failed initial ankle fracture fixation is a complex problem as salvage options are limited. According to the literature, failures of ankle fracture fixation are common in diabetic feet. Many authors have therefore recommended supplemental fixation using devices such as transarticular Steinmann pins, external fixation or multiple syndesmotic screws. Perry et al. proposed the use of a 4.5 mm dynamic compression plate on the fibula and multiple 4.5 mm syndesmotic screws engaging two tibial cortices following successful treatment of six diabetic patients with non-union using this technique. However, all patients remained non-weight bearing after salvage surgery. Ankle arthrodesis has also been used for ankle fractures that have failed to unite successfully after initial conservative or operative intervention.

We successfully managed to stabilise the fibular fractures and ankle syndesmoses with Ilizarov frames in our patients. The congruity of the ankle mortise was also restored in both patients. The major advantage of using the circular frame is that the fracture and the disrupted syndesmosis can be effectively reduced ‘closed’ by ‘tensioned wires’ and the whole construct rigidly maintains the reduction while the fracture is healing. The enhanced stability conferred by the frame permits early full weight bearing mobilisation, especially in non-compliant patients, without disrupting healing or fixation.

Although both patients were overweight and non-compliant, the pattern of failure of ankle fixation differed. In the first case, the fibular fracture had united and primary failure was at the level of the syndesmosis leading to talar shift upon removal of the frame.
syndesmosis screw. However, in the second patient, there was also a non-union of the fibular fracture in addition to the failure at syndesmosis. Although the latter, was a more complex problem to treat due to fibular fracture non-union, both had a successful outcome following stabilisation with an Ilizarov frame.

Relwani et al.\textsuperscript{4} adopted the same method of treatment in the single case that they report. However, their patient only had syndesmotic disruption with no fibular fracture and they allowed full weight bearing mobilisation soon after frame application. In our cases, weight bearing was delayed for 4 weeks as a precaution to give the syndesmoses the best chance to heal. This was particularly important for the second patient because of the fracture non-union.

5. Conclusions

The frequency of ankle fracture fixation failure may rise as obesity is becoming a major health problem globally. We believe that salvage with Ilizarov fixator should be considered as an option for ankle fixations which have failed in poorly compliant patients, especially if surgical expertise for this technique is available. However, we realise that this treatment method needs to be evaluated by further studies.

References

6. Spaine LA, Bollen SR. The bigger they come... the relationship between body mass index and severity of ankle fractures. Injury 1996;27(December (10)):687–9.