Treatment of medial malleolus fracture in skeletally immature patient with bioabsorbable screws

Dolnák, A., Béder, I., Sýkora, Ľ., Jáger, R., *Haas, I.

Pediatric Trauma Center, Dpt. of Pediatric Surgery
National Institute of Children’s Diseases, Bratislava, Slovakia
*Pharmacare Slovakia, s.r.o.
Introduction

Fractures around immature ankle are relative common. In the literature, the incidence is approximately 5% of all skeletal fractures. (58, 68) The physeal growth plate is an important structure and deserves special attention. Complete distal tibia epiphysis closure can be observed between 12-17 year of age. In consideration of this we can find several types of injuries typical for childhood (physeal injuries), adolescent or transition age (Tillaux, Triplane fractures) and subsequently adult-like fractures (bimalleolar, trimalleolar fractures)

Keywords
bimalleolar fracture, adolescent, surgical treatment, bioabsorbable screw.

Case presentation

The patient, 16-year old healthy adolescent boy who suffered wedge simple adult-like bimalleolar fracture after distorsion of ankle while walking. After initial examinations (Fig. 1) and oedema resorption admitted 6 days after injury for surgical treatment at our Department of pediatric surgery.

Figure 1: Injury X-ray: adult-like bimalleolar fracture – dislocated wedge fracture of medial malleolus (disappearing physis) and transverse suprasyndesmotic fracture of distal fibula
Materials and operative technique

At preoperative planning we decided for stable fixation of both fractured malleoli (medial and lateral). Bioabsorbable screws, ActivaScrew™s, manufactured from poly(L-lactide-co-glycolide) (85L/15G) were chosen.

The patient was positioned supine with injured leg elevated on foamblock. 5cm curved incision over medial malleolus, preparation and revision of fracture were done. After anatomic reduction and temporary fixation with one K-wire, a 2.7 mm drill bit was used to drill the holes for screws. The holes at distal fragment were predrilled with 3.5 mm drill bit as gliding hole - lag screw principles. (Fig. 2)

Figure 2: Preliminary fixation with K-wire. Measuring device inserted into the one dorsal hole.
The holes were then tapped with instrument to form threads (Fig. 3). After measuring the drill depth two bioabsorbable full threaded screws (45 mm) were put and tightened into the bone with adequate force (Fig. 4-5).

Figure 3

Figure 4

Figure 5
Distal fibula fracture was stabilised by open reduction and fixation with titanium compression plate. Syndesmotic rupture was treated with titanium suprasyndesmal 3.5mm cortical screw. (Fig. 7) The ligament, subcutis, and skin were closed in layers. Bioabsorbable screws not used for suprasyndesmal fixation – lack of required screw length on hand.

Figure 7: bioabsorbable screws not visible at images – circle

Screws invisible on fluoroscopy or plain X-ray. (Fig. 7, 8)
CT - fracture and screws visualisation

Postoperative CT was done for syndesmotic congruence control. Only drilled canals are visible at CT scans. (Fig 9-11)

Figures 9-11

Postoperative care and conditions

A splint cast was changed to a thermoplastic orthosis after sutures extraction. No weight bearing was indicated for 6 weeks postoperatively till suprasyndesmal positioning screw was ambulatory removed from mini-incision. After short rehabilitation the patient returned for follow-up 3 and 6 months after surgery with full range of motions. There were no subjective or objective local problems and the patient was satisfied. Titanium implants removal will be suggested 1-1,5 years postoperatively.
Conclusion

Bioabsorbable screws offer a good stability with simple application. These products are suitable for children and adolescents. These implants do not need extraction. We find these implants applicable in childhood and adolescent age to frequent fractures in the zones near the growth plate and intra-articular areas: Examples of indications for lower extremities in Triplane, Tillaux, Marmori, Kleiger, distal femur, proximal tibia and for upper extremities in intercondylar, radial condyle fractures.

Discussion

This case report indicates that PLGA screws /poly(lactic-co-glycolic acid) are an alternative choice for surgical treatment of medial malleolar fractures. These screws allow for technically easy fixation. A second procedure to remove the implant can be avoided by using bioabsorbable screw fixation.

Contact Information Concerning the Case

Andrej Dolnášk, MD.
Department of Pediatric Surgery
National Institute of Children’s Diseases Bratislava, Slovakia