CASE REPORT

Non-union of the great toe in a 4-year-old child

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SUMMARY

Phalangeal fractures of the foot are very rare in children. They are treated with closed reduction and splinting. Cases reported of non-union in children are rare. We report on treatment of a 4-year-old child with non-union of the proximal phalanx of the great toe foot following an open fracture caused by a motor vehicle accident 4 months prior. No graft was used. We present this case with good clinical outcome at 1 year follow-up.

BACKGROUND

Phalangeal fractures of the foot are very rare in children. Non-union in this group is very rare.

CASE PRESENTATION

A 4-year-old child presented with pain and deformity of her right great toe. She had been hit by a motor vehicle 4 months prior and had suffered a crush injury to her right foot and open fracture of her first proximal phalanx. Her wound had been irrigated and sutured, the fracture had been reduced and a short leg splint had been placed. After her wounds had healed, the patient was lost to follow-up for 4 months.

She did not have accompanying diseases. She had a transverse wound scar on the dorsum of her right forefoot. Her proximal phalanx was deformed and painful on palpation. Her laboratory tests were normal. X-ray of the foot revealed non-union of the proximal phalanx of the great toe (figure 1).

The patient was operated under general anaesthesia. The non-union site was approached through an incision on the dorsomedial aspect of the toe.

Fibrous tissue was removed and fracture ends were curetted. Following reduction, the fracture was fixed with two cross-pins (Kirschner wires). No graft was used (figure 2). A short leg plaster swab was applied for 1 month. The Kirschner wires were removed at the end of 1 month when union was evident (figure 3). A solid and well-aligned union was evident at 1-year follow-up (figure 4).

TREATMENT

We applied non-union surgery.

OUTCOME AND FOLLOW-UP

One year.

DISCUSSION

Foot trauma is common in children. Injuries usually involve the soft tissues and nail bed. Phalangeal fractures are rare. Proximal phalanx of the great toe is most often involved. This usually results from direct trauma such as from dropping objects onto the area or deep cuts to it by a sharp object. Open fractures usually occur distally around the nail. The initial step in treatment of an open phalanx fracture is debridement and suturing of the wound, and antibiotherapy. The fracture is then reduced and immobilised with a cast or buddy taping. Full weight-bearing is allowed 4–6 weeks later.^{1 2}

Figure 1 Preoperative foot X-ray.

Figure 2 One month postoperative foot X-ray.

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Figure 3 One month postoperative, after Kirschner wires (kws) were removed.

A normal gait cycle involves complex foot motions where body weight acting on the heel is gradually transferred to the forefoot. Forces acting on the great toe are twice the sum of forces acting on the other phalanges.³ Deformities and diseases of the foot impair normal walking. Since load transfer takes place mostly on the medial side of the foot, disorders of the great toe are extremely important and need to be treated.⁴

Fracture union in a child is less problematic due to presence of a thick periosteum, good circulation and considerable remodelling capacity. Risk of non-union increases with open fractures, open reduction techniques, infection and inadequate reduction or stabilisation.⁵ Most studies on paediatric non-union have been either retrospective or case reports. There is only one report on paediatric non-union of phalanges of the foot. Kramer² reported on a 15-year-old boy who had an intra-articular fracture of the great toe. Standard treatment of a non-union is curettage, grafting and stabilisation. In a retrospective study,^{1 5-8} Shrader *et al*¹ reported 43 cases of non-union over a 15-year period. Forty-seven per cent of these fractures were around the elbow and 27% occurred following an open fracture. Fernandez *et al*⁵ treated six cases of non-union of forearm shaft fractures in children after intramedullary nailing. Behr *et al*⁶ reported seven cases of scaphoid, Cortes *et al*⁷ treated one case of non-union following subtrochanteric femoral fracture in a child. Pourtaheri⁸ reported one case of clavicle non-union. These cases were all treated using autograft and fixation.

In our case, the patient presented with non-union of the great toe 4 months after initial treatment. Curettage of the fracture ends and fixation with two cross-pins were performed.

Figure 4 One year postoperative foot X-ray.

Although standard for the treatment of non-union, graft usage was avoided due to good perfusion of the fracture site, minimal bone defect and the young age of the patient, and considering donor site morbidity.⁹ Union was evident in the first month. The fracture was fully healed and the patient was symptom-free at 1-year follow-up.

Consequently, our case is rare. We believe that such non-unions may be treated without bone graft in cases where fracture ends are well perfused and bone defect is minimal. This will prevent donor site morbidity.

Learning points

- Phalangeal fractures of the foot are very rare in children.
- Non-union is very rare in children.
- Such non-unions may be treated without bone graft in cases where fracture ends are well.
- Perfused and bone defect is minimal so this will prevent donor site morbidity.

Contributors FG was the writer and performed the surgery. CE was involved in the design and editing of the paper. UHG was responsible for surgery. BK participated in translation and surgery.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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