TECHNICAL NOTE

Percutaneous correction of congenital overlapping fifth toe in paediatric patients

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Summary The various available surgical methods for correcting congenital overlapping fifth toe deformity consistently require a skin plasty step, which can result in complications (necrosis, tight scar, unbecoming appearance). Here, we describe a percutaneous technique involving extensor tenotomy combined with release of the dorso-medial capsule and ligaments. No skin plasty is required. Percutaneous osteotomy of the first phalanx can be performed if needed. From 2006 to 2010, we used this technique in 16 patients (27 toes) with a mean age of 12.6 years (range, 6–17 years). Mean follow-up at last evaluation was 2.1 years. Osteotomy of the first phalanx was performed for 13 toes. The outcome was very good for 21 toes and good for six toes. No relapses or complications were recorded. This simple and safe technique deserves consideration in children with congenital overlapping fifth toe.
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Introduction

Overlapping fifth toe is a common congenital deformity in children. Both sides are affected in about 25% of patients and familial aggregation is common, although the cause of this condition remains unknown. Additional forefoot deformities or neurological abnormalities are often present and should be sought routinely [1].

The initial abnormality responsible for the deformity involves the soft tissues. Tightness of the dorso-medial capsule and ligaments, together with brevity of the extensor tendon of the fifth toe, results in irreducible dorso-medial subluxation of the fifth metatarsophalangeal (MTP) joint. More superficially, the skin at the base of the fourth web space is abnormally tight. The fifth toe is fixed in hyperextension, varus, and external rotation and consequently overlaps the fourth toe [2] (Fig. 1).

Some patients also have bone deformities, such as valgus of the fifth metatarsal producing a lateral bump that rubs against the shoe. Minor abnormalities are found in some cases (e.g., nail dystrophy or toe hypoplasia).

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The various surgical techniques described to date for the treatment of overlapping fifth toe deformity involve release of the deep soft tissues (capsulotomy and tenotomy) and skin plasty, if needed in combination with a corrective osteotomy.

We have developed a simple percutaneous technique based on the principles described by De Prado [3] and adapted for use in paediatric patients. The procedure involves percutaneous correction of the deformity without skin plasty and is performed on an outpatient basis.

Operative technique

The patient is in the supine position on a standard operating table. We do not use a tourniquet. Although a trunk block (1% lidocaine) can be performed, general anaesthesia is usually preferred in paediatric patients. The extensor tendon of the fifth toe is identified, and a beaver scalpel is used to perform a skin incision medial to the tendon and over the fifth MTP joint (Fig. 2). We then put the toe in forced flexion to cause tension of the dorsal capsule and extensor. The blade is introduced lateral to the extensor tendon and into the joint. A supination movement is performed to cut the dorsal capsule and ligaments, as well as the extensor tendon. Then, the toe is placed in valgus to tighten the medial capsule and ligaments, which are cut in the same way. Percutaneous valgus osteotomy of the first phalanx using a powered burr (with mediotransverseclasty at a distance from the growth plate and under fluoroscopic guidance) can be performed in patients with persistent varus. The incision is closed using an adhesive strip or absorbable suture. Gauze pads and a bandage are used to stabilise the toe in a position of overcorrection (hyperflexion and valgus of the toe), in pronation and anteverision, for 4 weeks. A web space orthoplasty is then worn in the shoe for the next 12 weeks (Fig. 3). We do not use a pin to maintain the reduction, even after performing an osteotomy.

Case-series

Between 2006 and 2010, 16 patients underwent surgery for overlapping fifth toe deformity using the above-described technique, performed by a single surgeon (GK). Patients were selected for surgery based on difficulties with shoe fitting or dissatisfaction with the appearance of the foot. There were 13 girls and three boys (27 toes) with a mean age at surgery of 12.6 years (range, 6—17 years). Mean follow-up was 2.1 years (range, 1—4.1 years). Osteotomy of the first phalanx was performed for 13 toes. The outcome was assessed using a satisfaction rating scale (very satisfied, satisfied, somewhat dissatisfied, and dissatisfied). The patients were very satisfied for 21 toes and satisfied for 6. Revision surgery was not required in any of the cases (Figs. 4 and 5).

Discussion

Many techniques have been described for the treatment of overlapping fifth toe. Neither expectation without treatment (correction during growth in 15% of cases) nor
non-operative management (mobilisation, orthoses, strapping...) have been found effective [1].

Many studies have evaluated a variety of surgical techniques, most of which involve both deep tissue release and skin plasty. There is general agreement that reduction requires dorso-medial [4] or circumferential [5] release of the capsule and ligaments. Procedures to modify the extensor tendon include stabilisation, as performed by Lapidus [6] (transfer of the extensor to the abductor of the fifth toe) and by Tawil et al. [7] with good results but only at the cost of a large skin incision and a non-negligible risk of blood vessel injury [8]. Alternatively, the tendon can be lengthened [9]. We prefer tenotomy, which is the most widely used technique, as the stabilising effect of extensor tendon transfer is largely theoretical.

Osteotomy or arthroplastic resection of the head of the fifth metatarsal [10] are not included in our procedure, given the presence of the growth plate. In contrast, we perform valgus osteotomy of the first phalanx in patients with persistent phalangeal varus after the release procedure.

The most controversial point is the skin plasty step. Several methods have been described, with varying rates of failure due to tightness of the scars (particularly after isolated dorsal V-Y plasty, which is followed by a local relapse [11]). Nevertheless, skin plasty has been considered indispensable to avoid recurrences. Butler’s procedure [2,12,13] remains the technique of reference: a racquet incision is performed with a dorsal lengthening V-Y plasty and a planter Y-V shortening plasty. Black et al. [13] reported 30% of poor outcomes and a fairly high risk of injury to the pedicle with this method. A modified Butler’s procedure described by Derhy et al. [5] and involving only a dorsal lengthening V-Y plasty with no planter incision seems to produce good outcomes with no risk to the blood vessels but requires a skin incision. Z-plasty has been used with good results (5% failure rate) [3,8].

Syndactylisation as described by Marek et al. [14] produces good functional outcomes but at the cost of a cosmetic disability. Finally, the isolated incision at the base of the fourth web space described by Hulman [4] seems associated with wound healing difficulties.

The bandage plays a crucial role that is enhanced by the considerable elasticity of the skin in children. Thus, the bandage maintains the correction. We advocate bandaging for 4 weeks, which is longer than recommended by others.

Our percutaneous technique, described by De Prado [3] and adapted to paediatric patients is simple, reliable, rapid, and reproducible. The absence of skin plasty avoids complications due to vascular injury or scarring. The main point of our technique is correction of the deep-tissue contractions that are responsible for the deformity. Our results show that this percutaneous technique deserves consideration in paediatric patients with congenital overlapping fifth toe deformity.

**Conclusion**

Percutaneous correction of congenital overlapping fifth toe deformity is a good treatment option that ensures anatomic realignment of the fifth toe with no relapses and only a tiny scar. However, a prospective study in a larger sample size with a longer follow-up is needed.

**Disclosure of interest**

The authors declare that they have no conflicts of interest concerning this article.

**References**
