

Bilateral toe syndactyly – short review based on a case report

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ABSTRACT

Non-syndromic toe syndactyly is a regular cause of foot malformation in children, bilateral form being less common. Syndactyly release procedures had few contraindications, as uncomplicated malformation or important patient comorbidities. Reported data show that corrective surgery using skin grafts is associated with an increased risk of infection, contractures, and web creep. Reconstruction surgical techniques, using flaps reduce morbidity, revision surgery, complication, may be associated with skin grafts and have superior aesthetic and functional results. We present a case of simple bilateral incomplete asymmetric toe syndactyly, released using a modified personalized local flaps reconstruction technique. The normal function and aesthetic of the feet was obtained, with no complications at one-year follow-up.

Keywords: toe syndactyly, reconstruction, flaps techniques, aesthetic

BACKGROUND AND EPIDEMIOLOGY

Foot malformations are routine consultation topic in children [1]. Syndactyly is a congenital anomaly represented by the unification of at least two alongside digits, as a failure of apoptosis at the time of embryologic development [2]. Hand or foot syndactyly has an incidence of 1/2,000-2,500 cases [3], and a prevalence of 3-10 cases/10,000 births, considering that lower limb can be four times more affected [4]. Nevertheless, there are some recent reports showing a higher incidence of upper limb syndactyly [5]. It appears to interest male patients twice frequent than female [3,6,7]. Around 40% of cases have a genetic inheritance [8].

There are some incriminating environmental factors associated with this malformation, like low mater-

nal nutritional state and socioeconomic status, smoking, increased egg and meat consumption during pregnancy [9,10]. Toe syndactyly can be congenital or acquired (trauma, burn) [11].

Toe syndactyly can be simple, involving only soft tissues, complex when bones are usually merged or complicated when accessory bones, muscles, tendons or nerves are present [2,12,13]. Incomplete or complete syndactyly (according to the degree of fusion) could also be noticed [14]. These are frequently isolated at one foot, appearing at the second interdigital web space, unilaterally, but it can also be syndromic syndactyly [1]. Bilateral foot involvement is reported to be two times less frequent than isolated toe syndactyly, the symmetric form being more common than the asymmetric one [3].

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Article History:

Received: 14 December 2021

Accepted: 20 December 2021

THERAPEUTIC MANAGEMENT

Indication and contraindication for a surgical management represents a fine balance between improved functionality, aesthetic aspect, and the relatively low risk associated with syndactyly release. Traditionally, it is considered that incomplete syndactyly with mild effect on normal function and the presence of important comorbidities represents the main contraindications [13,15].

Regarding the proper time for a reconstructive intervention, the general principle are that the intervention should be performed early in life to allow normal children growth but late enough to bypass the perioperative complications. In general practice, these interventions are performed after 12 months of age [13,16].

The therapeutic management of this type of malformation is to restore full functionality and range of motion, to create a normal web space and to restore the appearance of the involved fingers, in order to regain “normality” [13,17].

The primary steps of syndactyly reconstruction surgery are to split the digits, to recreate the interdigital space, then to cover the lateral digital aspects and to optimize the overall aspect [15]. Various techniques used for hand repair are modified to fit the foot anatomy [6,18,19].

Commonly, skin grafts have been used for digit reconstruction in order to cover the interdigital raw areas, but over the years, these techniques become less attractive due to increased morbidity: infections, hypertrophic scars, hyperpigmentation, abnormal hair growth, anaesthetic results and longer postoperative recovery [10,16,20].

Nowadays, microsurgical reconstructive techniques, such as advanced flaps, interdigitating zigzag flaps [21,22], reciprocal v-flaps [17], triangular flaps [23], trilobed flap [24], three-square-flap [25], dorsal V-Y metacarpal flap [26], reverse triangular V-Y flap [27] or dancing girl flap [28] are preferred. Flap design depends on surgeon’s preferences and can be modified to better fit every case [13].

Revision surgery involves the management of complications: contracture release, graft maceration, flap failure, ischemia or necrosis, correction of web space creep or nail deformity, bony surgery and excessive skin removal [13,17].

CASE PRESENTATION

We present a case of a 12 years-old female patient, with non-syndromic bilateral toe syndactyly. General examination revealed no syndromic features, hands had no malformation, and the diagnosis was simple bilateral incomplete asymmetric toe syndactyly. Under

general anaesthesia, she underwent two corrective surgery using personalized local flaps reconstruction procedures, as day case surgery. Initially, we operated the left foot (Figure 1), and after one month the right one (Figure 2). Both surgical interventions consisted in marking the triangular and square flaps on both ventral and dorsal sides of the digits, each one corresponding to a different area to cover on both sides of the fingers to be splinted (Figure 3). Surgical incision were made respecting the premarked lines, under tourniquet control and using surgical loupes magnification, with identification and preservation of digital vessels and nerves branches from both sides. The fingers were separated, the flaps were repositioned using simple sutures and a small defect of less than 1 cm² was covered using a full thickness skin graft, harvested from the groin area. The patient was presenting, besides incomplete asymmetric bilateral syndactyly, with bilateral ingrown big toe-



FIGURE 1. Anterior and posterior clinical aspect of the left foot with preoperative markings



FIGURE 2. Anterior and posterior clinical aspect of the right foot with preoperative markings



FIGURE 3. Intraoperative aspect of the skin flaps after splitting the toes



FIGURE 4. Clinical aspect during dressing changing 48 hours after the surgery



FIGURE 5. Postoperative clinical aspect of the left foot after removing stitches at 14 days



FIGURE 6. Clinical aspect of the right foot after one month

nail involving both nailfolds. Lateral slices of the vicious nail, nail matrix, bed and folds were surgically removed during the corrective surgery of the syndactyly. The nailfolds were reconstructed using inverting sutures, in order to correctly guide normal growth of the nail and prevent ingrowth. The dressing was changed every 2 to 3 days (Figure 4). The suturing material and the splint were removed after two weeks (Figure 5).

After 1-month, 6-months and 1-year follow-up period, the rate of motion and stability were within normal range, there was no abnormal scars and both the pa-

tient and the parent were delighted with the aesthetic result (Figure 6).

DISCUSSION

Although isolated foot syndactyly is more frequent than hand syndactyly, literature is scarce regarding this disease, methods of treatment or outcome, including the aesthetic aspect of this malformation. Various explanations can be highlighted. Initially, feet are usually not routinely displayed like the hands and so express less interest. Secondly, excluding bone involvement, toe syndactyly has lowest functional impairment. Finally, many parents do not know that it can be treated with great results and minimal recovery period.

Over the years, as microsurgical and reconstructive surgery developed, the surgical techniques used for syndactyly release had also evolved. From letting the raw area resulted from digit separation to heal “at air”, to cover it with skin graft and now to graft-free reconstruction using flaps, the functional and aesthetic results are exceptional, with negligible risk do to rapid surgical time and post-surgery recovery.

Regarding the therapeutic management of toe syndactyly, the normal function of the foot is not impaired by this malformation, ambulation and balance being rarely affected. Therefore, as in our case, the aesthetic aspect is the primary outcome of toe syndactyly reconstructive surgery [22]. Therefore, this type of intervention is usually performed at an older age, when it became an issue for the children.

But there are cases where reconstruction using flaps should be combined with skin grafts in order to obtain a normal aspect, such as complicated syndactyly with great scarce tissues, post-burn condition, revision surgery, malformation extended over the proximal interphalangeal joint [13,29]. Studies have shown that skin grafts are most often used in cases of complete syndactyly in order to cover the interdigital space [30,31]. Nevertheless, as this reported case shows, if a personalized flap technique is used, the circumferential coverage of the web space can be ensured, while the skin graft can be placed in order to cover a small area that is not affected by the motion of the finger.

CONCLUSIONS

Foot syndactyly is a condition with high incidence, but very poorly reported. Over the last years, the use of skin grafts without local flaps in the management of this malformation is less common, due to various complication and inferior local cosmetic results. As our presented case have shown, combining personalized flap techniques with full thickness skin graft for incomplete asymmetric bilateral toe syndactyly leads to superior aesthetic and functional results accompanied by patient satisfaction.

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