

# SURGICAL REPAIR OF CONGENITALLY SYNDACTYLIZED TOES

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Congenital syndactyly of the toes is a relatively common deformity. Its incidence has been estimated at between 1 in 2,000 to 3,000 live births. Syndactyly is most often an isolated congenital defect but may also occur as part of a syndrome such as Apert's or Poland's. Acquired syndactyly is a common manifestation of burns with the resultant cicatrix bridging the web between the involved digits.

Surgical literature addressing the repair of syndactylized digits has been primarily concerned with the fingers. Functional impairment is the major consideration for the hand with syndactylized digits, often necessitating surgical repair, while desyndactyly of the toes is often regarded as unnecessary. However, many patients may request repair of the syndactylized digit not only for cosmetic reasons but to prevent shoe irritation. The question is not whether the procedure should be offered, but rather how it should be performed in order to obtain the most gratifying cosmetic and functional result.

## CLASSIFICATION

Attempts to classify the types of syndactyly have been based on the morphology of the deformity, location, and the mode of genetic inheritance. Syndactyly as an isolated congenital deformity has been subdivided by Temtamy into five categories. All categories have been determined to be autosomal dominant based on pedigree studies by Temtamy and others.

### TYPE I

Type I syndactyly is described as being the most common digital anomaly. The second and third toes are the most frequently involved digits followed by the third and fourth fingers. Other digits may also be affected. Bilateral and symmetric involvement is typical but not requisite. This type of syndactyly has also been called zygodactyly, a name proposed by Weidenreich to describe conjoined digits with a shallow, membranous web. Presently the term zygodactyly is used to describe this common type of digital malformation regardless of web depth. However, the importance of the web depth

will be discussed under surgical technique. This deformity is generally asymptomatic and requires repair primarily for cosmetic reasons only.

### TYPE II

Termed synpolydactyly, this form of syndactyly is associated with duplication of a part or entire digit. The duplicated digit usually intervenes between two essentially normal digits. The third and fourth fingers are the most frequently involved followed by the fourth and fifth toes. In the case of foot malformation, the fifth digit is partially or completely duplicated. Synpolydactyly of the fourth and fifth toes is frequently associated with discomfort due to shoe irritation.

### TYPE III AND TYPE IV

Both Type III and Type IV are syndactylies of the fingers only and are identified for the sake of completeness. Further discussion is beyond the scope of this presentation.

### TYPE V

Syndactyly with concomitant with metatarsal or metacarpal synostosis typifies this type of congenital anomaly. Significant deformity is often present and multiple digits may be involved in the syndactyly.

## SURGICAL CONSIDERATIONS

Typically there are three scenarios that present to the foot surgeon for consideration. The Type I syndactyly of the second and third toes is by far the most common followed by the Type II synpolydactyly of the fourth and fifth toes. Finally, the syndactyly with duplication and/or synostosis of the metatarsal segment is a rare form of complex congenital deformity.

Considerations for surgical repair should always begin with determining the patient's chief reason for requesting the procedure. Typically, patients with syndactyl-

ized digits fall into one of three categories: the patient presenting with syndactyly as an incidental finding, the patient with a complaint of "ugly toes", and the patient with complaints of difficulty wearing shoes or with discomfort associated with their deformity.

The first category is a delicate situation since the surgeon can easily be drawn to the deformity and exhort the need for repair. Patients in this category with poor results are the most likely to be vindictive. Patients in the second category, seeking cosmetic improvement, should be counseled appropriately. Procedures of this type can produce very satisfying cosmetic results. However, the possibility of a poor cosmetic result should always be explained to the patient. The patient with a functional disability or discomfort associated with the syndactyly will often accept a greater degree of residual deformity if the discomfort can be alleviated. Therefore, the procedure chosen and performed will be greatly influenced by the presentation.

Methods of removing the intervening web and acquiring primary closure of the wounds have been devised utilizing various plastic techniques. Two typical cases will be presented utilizing the method proposed by Didot in 1849 for desyndactyly of the fingers. This method is rarely performed for finger desyndactyly due to restrictive scar formation. However, the toes do not require the same degree of flexibility and mobility as that of the fingers, therefore, this method has proven to be a simple and quite satisfactory procedure for toe desyndactylization.

The first and most typical case scenario shown in Figure 1 (A-H) is the Type I syndactyly. Note that the deformity was bilateral and symmetrical which is often the case in this type of syndactyly. Radiographs revealed no skeletal abnormality and the procedure was performed for cosmetic reasons.

Careful planning of the procedure is paramount since primary closure is the goal in these situations. Skin grafting is usually unnecessary if the incisions are properly placed. Careful dissection, through dermal tissue only, maintains the neurovascular supply to the toe. Connecting areolar tissue and veins are divided followed by flap placement and suturing. Usually, the base of the web will require additional flap coverage of some type. In this situation an advancement flap was devised of the dorsum of the foot and rotated into the web space to complete the primary coverage.



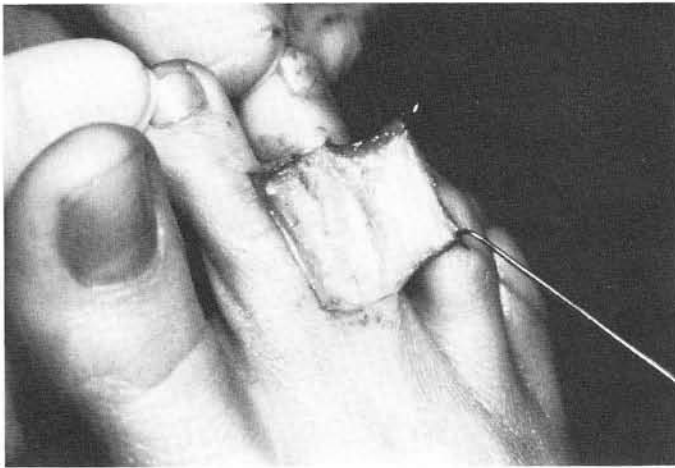
**Fig. 1A.** Bilateral symmetrical syndactyly of the 2nd and 3rd toes.



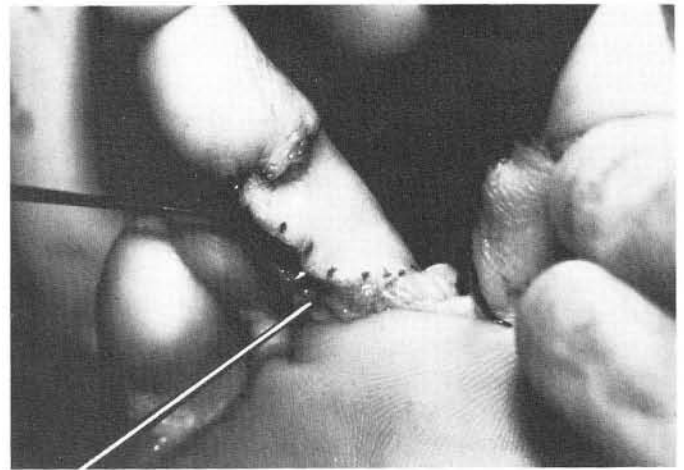
**Fig. 1B.** The dorsal flap is carefully plotted. The flap is based on the 3rd toe. Proximal nerve block is performed although epinephrine is not employed.



**Fig. 1C.** The plantar flap is based on the 2nd toe. This method was first described by Didot in 1849.



**Fig. 1D.** The flaps are raised at the level of the dermal-superficial fascial junction. Extreme care must be taken not to violate the neurovascular structures which course within the superficial fascia. The flaps themselves must be meticulously handled to prevent excessive edema and possible slough.



**Fig. 1E.** The flaps are folded into the web. The dorsal flap covers the medial aspect of the third toe as shown in this photograph. The lateral aspect of the second toe is covered by the plantar based flap.



**Fig. 1F.** The flaps are shown held in place by non-absorbable 6-0 nylon suture. The next step is planned based on the amount of coverage obtained. Note the triangular defect at the web base.

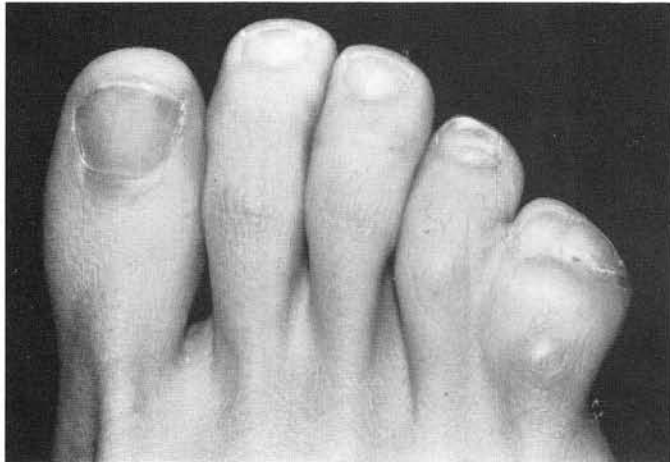


**Fig. 1G.** The base of the web is covered by a proximally based rotational flap from the dorsum of the foot. Again, the level of dissection is at the dermal-superficial fascial junction.



**Fig. 1H.** The immediate post-operative result is shown. The foot is bandaged with wet to dry dressing and the patient kept non-weight bearing for two weeks.

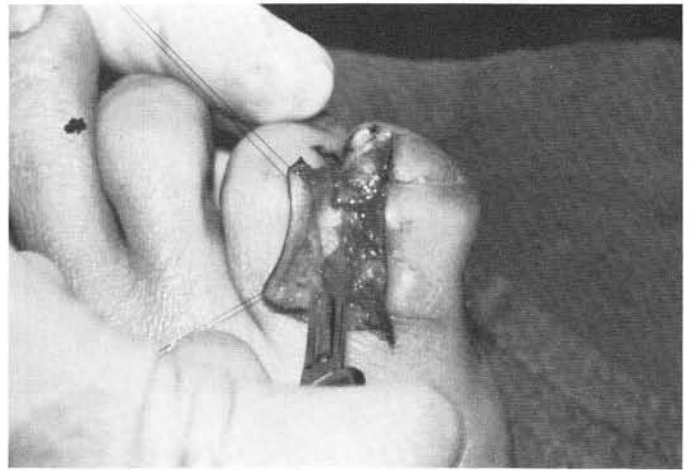
The second case (Fig. 2 A-E) represents the typical Type II syndactyly of the 4th and 5th digits with partial duplication of the 5th digit. Radiographs reveal duplication of the middle and distal phalanges of the 5th toe. Duplication of the toenail will often complicate the repair of the this type of syndactyly. The most frequent complication of this type of procedure is lateral drift of the fifth toe resulting in continued discomfort and deformity. For this reason capsulorrhaphy is usually performed at the medial aspect of the fifth metatarsophalangeal joint. In some



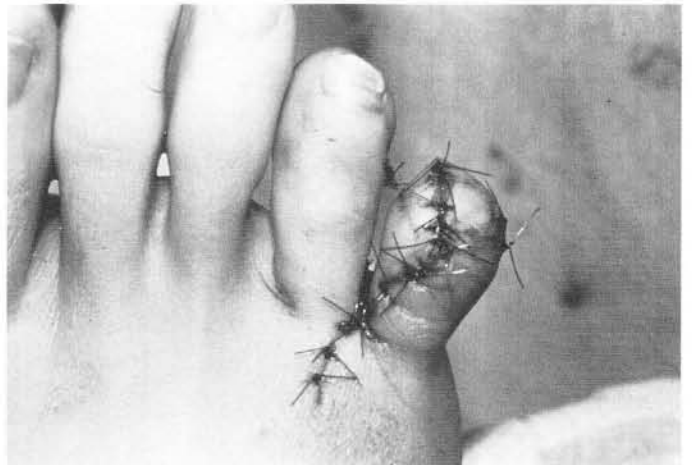
**Fig. 2A.** Type II synpolydactyly is shown in this photograph. The fifth toe is partially duplicated and syndactyly of the fourth and fifth toes is present.



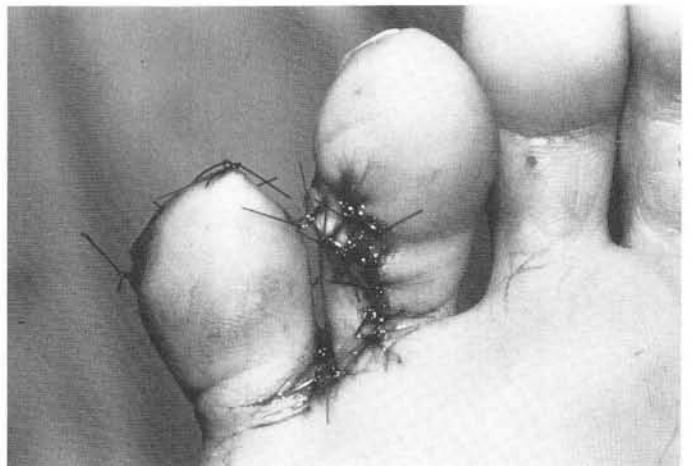
**Fig. 2B.** Radiographs reveal duplication of the middle and distal phalanges of the fifth digit. The repair will require excision of the redundant phalanges and capsulorrhaphy of the fifth metatarsophalangeal joint capsule to prevent lateral migration of the fifth toe.



**Fig. 2C.** The Didot flap design was again employed. Redundant nail tissue was excised at the dorsolateral corner of the flap.



**Fig. 2D.** Wound coverage was obtained primarily in all areas of the web. The fifth toe will be bandaged in a medial direction to prevent the lateral drift which may accompany this procedure.



**Fig. 2E.** Plantar aspect.

situations removal of the duplicated portion of the digit and resyndactyly may be preferred to maintain proper digital alignment.

## References

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