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CLINICAL STUDY IN THE MANAGEMENT OF SYNDACTYLY

Plastic Surgery

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ABSTRACT

Background: Syndactyly is one of the most common congenital differences in the extremities. Syndactyly is the digital malformation in which adjacent fingers and/or toes are webbed because they fail to separate during limb development. **Methods:** This was a prospective study conducted in the department of plastic and reconstructive surgery, Osmania general hospital, Hyderabad from February 2021 to February 2023. Patients with congenital and secondary syndactyly were included in the study. Outcomes post-surgery were studied. **Results:** Total of 30 patients were included in the study. 22 patients (73%) presented with congenital syndactyly, 6 patients (20%) presented with post burn syndactyly, 2 patients (7%) presented with post traumatic syndactyly. The most common complications were hyperpigmentation of graft (7%), graft loss (6%), web creep (2%) and hypertrophic scar (2%). **Conclusion:** Primary syndactyly is more common than secondary syndactyly. In this study, the primary goal is separation of fused digits/toes and covering the web space with a flap or thick graft and covering the separated digits/ toes with graft, create a functional hand and produce an aesthetically pleasant web and fingers with fewest complications and fewest surgical corrections. Hence most of the primary syndactyly were managed with flap cover for creation of webspace and full thickness graft for coverage of separated syndactylous digits. Although repeat surgery is relatively uncommon, it is important to discuss with the family about the complications such as scar formation and contracture, webspace creep, possible devascularization of the digit, and digital nerve injury.

KEYWORDS

syndactyly, congenital, hand anomalies, fingers, digits

INTRODUCTION

The hand is incredibly designed structure with complex anatomy and precise biomechanics. The hand must be able to produce an adequate force to allow performance of activities in daily living. Furthermore, it must ensure coordination of fingers for precise prehension and fine motor tasks.

Finally, the human hand serves as an important creative tool in various activities that include surgery, dance, sculpture, sign language and playing music.

Syndactyly is one of the most common congenital anomalies of the extremities. Syndactyly is a digital malformation in which adjacent fingers and/or toes are webbed because they fail to separate during limb development, due to failure of apoptosis. (Greek Syn=together; Dactylos=digit).

MATERIAL & METHODS

The prospective clinical study is conducted in the Department of Plastic and Reconstructive surgery,Osmania general hospital, Hyderabad in the period between February 2021 to February 2023. Thirty patients with congenital syndactyly and post burn syndactyly of fingers were included in this study.

Inclusion criteria

1.All cases from age group 1 to 60 years of congenital syndactyly
2.Syndactyly due to burns (post burn syndactyly)
3. Post traumatic Syndactyly.

Exclusion criteria

1.Patients unfit for anesthesia.
2.Patients not willing to participate in the study.

Syndactyly repair has no gold standard operation and the innumerable variety of operations available employ a common set of techniques such as dividing the fingers, commissure reconstruction and resurfacing borders of the separated digits that any surgeon must be comfortable with before attempting a repair.

Once the patients come to the Outpatient department – clinical assessment done, work up and thorough analysis for exclusion of other anomalies, pre anesthetic evaluation for surgery are done, patient's parents are counseled in detail regarding the operative procedure, complications, prognosis and further management. Patient' demographic information, including age and sex, and the clinical features of syndactyly were evaluated, including features such as partial or complete, simple or complex, and unilateral or bilateral involvement. In nonsyndromic cases, the involved web distribution was analyzed. Functional outcome and postoperative complications such as web creep, scar quality, flexion contractures, angulation deformity and functional outcomes were assessed.

Preclinical assessment for syndactyly surgery

Clinical examination will make it possible to distinguish between simple, complex and complicated syndactyly. Plain X-ray examination of the affected hand is done in the primary assessment to reveal any synostoses, or other skeletal deformities, and is particularly important in complex and complicated syndactyly. Complete blood picture and necessary investigations needed for anaesthesia are done for surgery.[2]

Syndactyly surgical steps are designed dorsally to have its medial and lateral base borders at the mid sagittal line of the contiguous digits, starting at the metacarpophalangeal joints. Distally borders of the flap are tapered slightly toward each other to accommodate the width of the proximal phalanges on either side after the flap is inset. Making the flap length approximately two thirds the length of the proximal phalanx provides a palmar commissure edge approximately. [2]

The dorsal flap is marked like a rectangle or with slightly inverted v shaped like a projection to minimize scarring at the commissure border between the dorsal and palmar skin. A reciprocal V-shaped incision is then marked on the palmar surface of the proposed new web space to accommodate this flap. It is important that the created commissure slope in the proximal-dorsal to distal-palmar direction. Starting at the distal tip of the dart, the dorsal incision is extended in a zigzag fashion from the mid sagittal line of one digit to that of the adjacent digit. If two separate nails are present, the dorsal incision is extended distally, bisecting the two fingertips.

In a complex syndactyly, the nail matrix and nail bed is divided in line with the division of the distal phalanges. The nail bed, matrix, and nail may be narrowed in preparation for coverage with a double flap. The palmar incision for the syndactyly release is drawn by visually projecting the apices of the dorsal zigzag flaps to the palmar mid sagittal line of each digit. These marks become the geometric center of the bases of the corresponding flaps to be designed on the palmar side. The palmar zigzag incision is then drawn. Proximally, this line meets the center of the previously drawn V- shaped palmar anchor line, which is located2 approximately at the junction between the proximal and middle third of the proximal phalanges. The incision is first taken distally between the nails. . The interdigital soft tissue is carefully divided to protect the neurovascular structures. All of this is done under tourniquet control & loupe magnification to avoid injury to digital nerves and vessels.[2]

If the common digital nerves and arteries bifurcate proximal to the new commissure, as is commonly the case, they are not separated and will not impede in setting the dorsal commissure flap. The digital nerves are carefully separated from distal to proximal. the digital arteries bifurcate distally, the smaller of the two arteries can be ligated if there is only a simple web space syndactyly, because both digits still will have an arterial supply based on the opposite side of the finger. 2

Syndactyly of the central digit is less an issue when both sides of the digit are not operated simultaneously. Alternatively, clamp a vessel, deflate the tourniquet, the resultant blood flow is evaluated before ligating the artery in question. Vascular complications are rare when only one side of a digit is operated on at a time.[2]

Before securing the flaps, excess subcutaneous fat is trimmed until only approximately 1 to 1.5 mm of thickness remains. This decreases postoperative edema and the risk of a tight closure.

Usually one finger may be closed completely with skin flaps, whereas the other requires an FTSG or thick SSG . Harvesting the FTSG lateral to the femoral artery prevents future pubic hair growth on the flaps. Other donor sites include the antecubital fossa and the medial aspect (i.e., instep) of the foot. Care must be taken to obtain an accurate template of the total area of skin defect to be covered. This template is transferred to the proposed donor site before harvesting the FTSG. The skin graft also requires defatting before being applied to the digits to prevent fat necrosis and graft loss.[2]

The dressing consists of paraffin gauze, flavine wool soaked cotton wool, gauze, soft undercast padding, an above elbow soft club cast with the elbow flexed past 110° should be used to protect the fingers from excessive motion while the skin graft is consolidating and crepe bandage. A sleeve made of elasticated tubular bandage is used to secure the arm to the chest in children under 3 years old. As a final check, the vascularity of the digits must be evaluated before splinting with POP to ensure that the gauze placed between them will not constrict arterial flow.[2]

Postoperative care to allow the wound to be examined, the splint can be changed at 10 days and then reapplied for 1 week or more. Other than careful attention to the postoperative dressing and immobilization, most children do not require extensive therapy after the 2 to 4 weeks of immobilization required for wound healing. This is also true for aftercare of complex syndactyly reconstruction.

RESULTS

Thirty patients with Syndactyly were taken from the age group of 1 to 60 years. Among 30 cases of this study 15 patients (50%) were men while 15 patients (50%) were women. The ratio of male: female is 1:1. Average age of patient who was treated is 12.7 years of age. Majority of the patients belong to age group 1 to 20 years (23 patients – 77%), as most of the patients presented to us are congenital syndactyly and they are operated at an early age.

Table 1: Sex distribution in present study.

	No.	%
Male	15	50
Female	15	50
Total	30	100

There were equal number of males and females in the study.

Table 2: Age distribution in present study.

Age in years	NO.	%
1 to 20	23	77
21-40	5	17
41-60	2	6

23 patients were in the age group of 1-20 years (77%), 5 patients were in the age group of 21-40 years (17%) and 2 patients were of 41-60 years (6%).

Table 3: Type of Syndactyly

Type of syndactyly	NO.	%
Primary/congenital	22	73
Post burn	6	20
Post traumatic	2	7

22 patients (73%) presented with primary syndactyly, 6 patients (20%) had post burn syndactyly and only 2 patients (7%) presented with post traumatic syndactyly.

Table 4: Type of Syndactyly in present study

Form	NO.	%
Simple syndactyly	22	73
Complex syndactyly	8	27

22 patients (73%) had simple syndactyly and 8 patients (27%) had complex syndactyly.

Table 5: DISTRIBUTION OF SYNDACTYLY IN STUDY SUBJECTS OF PRESENT STUDY INVOLVEMENT IN THE UPPER LIMB

Part	No.	%
Right hand	10	33
Left hand	9	30
Both hands	5	17

Right hand involvement was seen in 11 patients (41%), left hand in 10 patients (37%) and both hands in 6 patients (22%).

INVOLVEMENT IN THE LOWER LIMB

PART	NO.	%
Right foot	3	10
Left foot	2	7
Both foot	1	3

Right foot involvement was seen in 3 patients (10%), left foot in 2

patients (7%) and both hands in 1 patient (3%).

TREATMENT OF SYNDACTYLY IN PRESENT STUDY

Treatment	No.	Percentage %
Dorsal rectangular flap method	15	50
Dorsal double wing flap	5	18
Dorsal flap with a slit	3	10
Dorsal bilobed flap	3	10
Four flap z plasty	2	6
Separation of digits and skin graft	2	6

Dorsal rectangular flap method was used for web space reconstruction in 15 patients (50%), dorsal double wing flap in and dorsal flap with slit in 5 patients each (18%), dorsal flap with slit in 3 patients (10) dorsal bilobed flap in 3 patients (10%), separation of digits and skin graft in 2 patients (6%) and four flap z plasty in 2 patients (6%).

Postoperative complications- syndactyly surgery

Postoperative complications	Number of webs involved
Skin infection	0 (0%)
Necrosis of flap	0 (0%)
Graft loss(partial)	3 (10%)
Web creep	1 (3%)
Hypertrophic scar	1 (3%)
Hyper pigmentation of graft	4 (14%)
Contracture	1 (3%)
No complications	20 (67%)

Postoperative complications such as skin infection, necrosis of flap, graft loss, web creep, contracture, hypertrophic scar, hyper pigmentation of skin graft, recurrence were assessed over period of 3 to 6 months. No complications were noted in 20 syndactylies (67%). Partial graft loss was seen in 3 syndactylies (10%), which were managed conservatively and healed by secondary intention. Web creep in 1 (3%), Hypertrophic scar in 1 (3%), Hyper pigmentation of graft in 4 (14%), Contracture in 1 (3%) syndactylies were noted.

There were no intra operative complications and no cases had any neurovascular compromise. The overall results are considered good. The integrity of dorsal and volar flaps, quality of scars, aesthetic aspects of fingers are reasonably good in almost all the cases.

DISCUSSION

The overall goal of syndactyly release is to produce a hand with as many independent , cosmetically pleasant and functional digits as possible with the fewest number of surgical corrections and complications. Many techniques have been described to accomplish this goal. The methods have varied in respect of separation of the digits and reconstruction of the web space. It is accepted that long-term stability of the newly created web space is best achieved when the web space is reconstructed using a flap. Traditional surgical approaches to syndactyly repair have used flaps from the dorsum of the involved fingers and dorsal and palmar interdigitating flaps. But, this is not always possible as in case of post burn syndactyly where the availability of local tissues for flap cover is limited. In such cases the goal is to achieve better functional outcome with reasonable coverage and acceptable appearance with at least split skin graft.

Conclusions and recommendations:

Primary syndactyly is more common than secondary syndactyly. In this study the primary goal is separation of fused digits/toes and covering the web space with a flap or thick graft, covering the separated digits/ toes with a graft, create a functional hand and produce an aesthetically pleasing web with fewest complications and fewest surgical corrections. Hence most of the primary syndactyly were managed with flap cover for creation of webspace and full thickness graft/thick split thicknes graft for coverage of separated syndactylous digits.

It is important to discuss with parents if and when surgery is necessary. Surgery is indicated for syndactyly if it is felt that the function and appearance of the affected extremity can be improved.

Although repeat surgery is relatively uncommon, it is important to discuss with the family complications such as scar formation and contracture, webspace creep, possible devascularization of the digit, and digital nerve injury.

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