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Clinical Profile of Congenital Clasped Thumb: A Case Series

Bhaskaranand Kumar[1], Ashwath M Acharya[2], Himanshu R Prasad[3], S M Venugopal[1]

Abstract

Purpose: Congenital clasped thumb is a rare deformity and not much has been described in literature about it. The aim of this study was to evaluate clinical profile of congenital clasped thumb, examine peroperative pathoanatomy, and evaluate the results of the treatment of such cases.

Methods: A prospective study on 57 patients [106 hands] was done and their data recorded from the medical case records. A thorough clinical and radiological assessment was performed. Patients were classified using the Tsuyuguchi classification. Splinting program was initially started and patients not responding to it and those older than 10 years underwent contracture release, joint stabilization, and local flap cover with or without tendon transfers. All patients were assessed by Gilbert's grading after 1 year.

Results: There were 43 males and 14 females. The average age was 33 months [range 0–21 years]. At presentation, 51% [54/106] of hands were classified as severe with syndromic pattern [Type III]. About 61% [35/57] of the patients presented at the age <5 years and 21% after 10 years including three adults. About 41% of these patients [23/57] had a history of consanguinity and 27% [15/57] had a family history of a similar or associated congenital deformity. Splinting program showed excellent results in type I. An a-la-Carté release of soft tissues, joint stabilization with K-wire, and ligament reconstruction with local flap cover gave good to excellent results in 73% of our patients. Nine patients had features of web creep at first web space.

Conclusion: Congenital clasp thumb showed a strong genetic predisposition. There was no difference between type II and type III variants with respect to the pathoanatomy, treatment protocol, operative procedures, and results. Splinting program in mild deformity and surgical correction with reconstruction in more severe cases gave satisfactory results.

Keywords: Congenital adducted thumb, congenital clasped thumb, first web space contracture.

Introduction

Congenital clasped thumb is a spectrum of thumb deformities ranging from mild defects in the extensor mechanism of thumb progressing to severe deficiency of the thenar muscles and soft tissues, first web space, and metacarpophalangeal (MP) joint contracture and associated instability [1, 2]. These deformities have also been commonly referred as congenital adducted thumb, congenital thumb in palm deformity, pollex varus, persistent thumb-clutched hand [1, 2, 3]. The diagnosis of this condition is of exclusion and is clinical rather than based on investigations [1, 2, 3]. It is characterized by the hallmark absence of active extension at the MP joint in all forms with abnormalities affecting skin, muscles, tendons, and joints of the thumb of varying degree of severity [2] (Fig. 1). The diagnosis is often delayed since the infant holds the thumb within the palm for most of the time in the first 4 months [1, 2]. This deformity is often associated with multiple congenital contractures, Freeman–Sheldon syndrome, and digitotalar dysmorphism [1,2].

There are very few references available in the literature for this condition, most of which are based on either surgical technique or syndromic association [1,2, 3, 4]. The epidemiological data from Indian subcontinent have not been reported. The aim of our study was to characterize clinical profile of patients and describe the associated anomalies,

[1]Department of Orthopaedics, Balaji Institute of Surgery, Research and Rehabilitation for the Disabled, Tirupati, Andhra Pradesh, India,
2Department of Hand Surgery, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India,
3Department of Orthopaedic Surgeon, Sunshine Hospital, Hyderabad, Telangana, India

Address of Correspondence
Dr. Ashwath M Acharya,
Department of Hand Surgery, Kasturba Medical College, Manipal Academy of Higher Education, Manipal - 576 104, Karnataka, India.
E-mail: anmacharya@gmail.com

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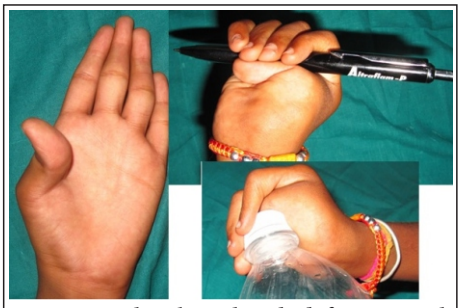

Figure 1: The clasp thumb deformity with typical flexion deformity at the metacarpophalangeal joint of the thumb. The thumb in palm deformity interferes with the activities of daily living.

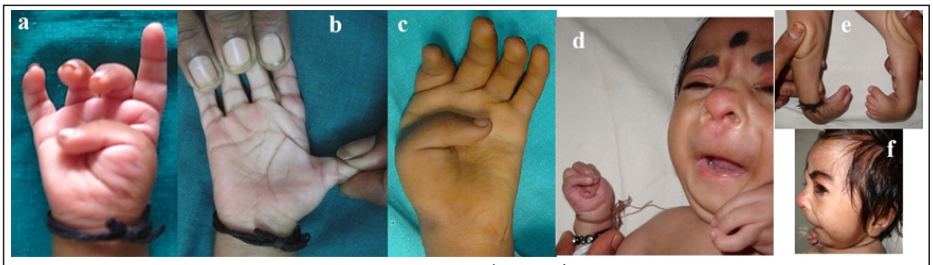

Figure 2: The Tsuyuguchi classification Type 1; (a and b) presence of normal passive range of movement of the thumb. (c) The Type 2 deformity where there is severe restriction of passive range of movement of the thumb. (d-f) The Type 3 clasp thumb in a child with Freeman-Sheldon syndrome.

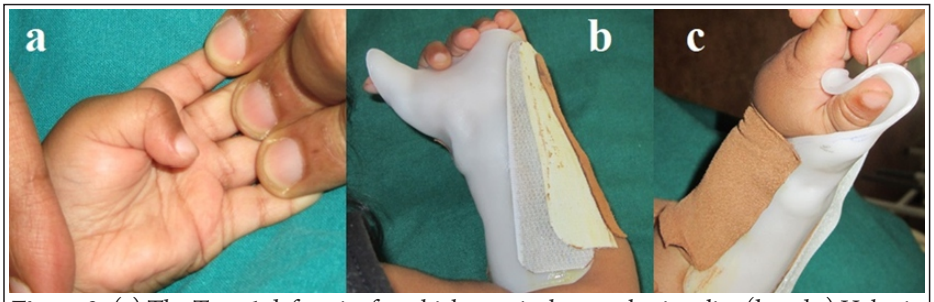

Figure 3: (a) The Type 1 deformity for which a static thermoplastic splint (b and c) Helps in maintaining the corrected position.

surgical findings, as well as the results of our technique of correction for the spectrum presentation of this unique and rare condition in our subset of population.

Methods

A prospective study on the clinical profile of congenital clasp thumb was done over a period from 2010 to 2021 at a tertiary referral orthopedic reconstructive and rehabilitation hospital. The patients were evaluated at the outpatient clinic and during admission if surgery was needed. A thorough assessment including the family and birth history as well as clinical examination was done by a pediatrician followed by the orthopedic team. Radiographic assessment of the affected limb, associated axial skeleton, lower extremity, and other relevant investigations such as ultrasonography and echocardiography were done if required to identify any other congenital difference or syndromic features (Table 1). In the later part of the study, 18 patients older than a year were subjected to a pre-operative dynamic ultrasound examination of the hand for the evaluation of the long extensor and flexor tendons. The thumbs were classified according to Tsuyuguchi classification into three groups: Group 1 had no soft-tissue contractures without any additional digital anomalies and could be passively abducted and extended against the resistance of the antagonists; Group 2 had palmar side contracture with or without other digital anomalies and could not be passively abducted and extended; and Group 3 were part of arthrogryposis or syndromic associations [3] (Fig. 2).

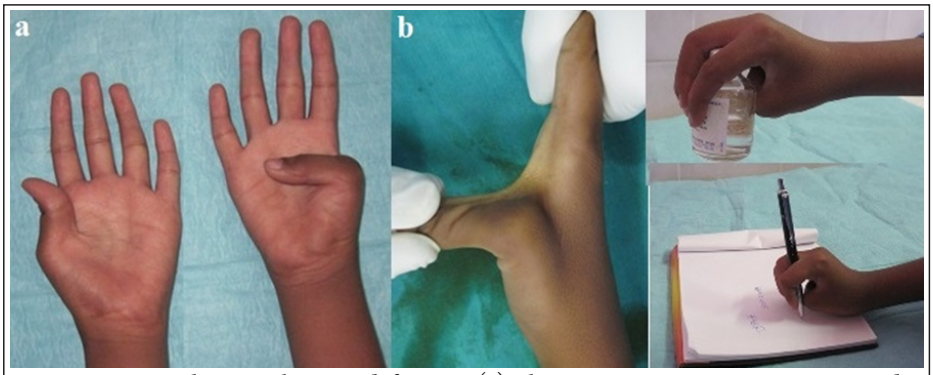

Figure 4: Notice the typical Type 2 deformity; (a) where passive movements are restricted at the metacarpophalangeal and carpometacarpal joints (b) which results in significant disability (c and d).

Management protocol

Patients less 1 year of age were managed by non-operative methods.

Non-operative option

Following a detailed evaluation, the child was subjected to passive stretching exercises of the thumb till 4–6 weeks. Once the size of the hand became adequate, full time splinting was also added (Fig. 3). The period of splinting continued till adequate correction or till a minimum of 1 year of age. Children presenting after 1 year of age were also put on a splinting program for 3–4 months till it was felt no longer amenable for splinting. The splint was made of thermoplastic material and was molded onto the deformed hands. The aim of splinting and stretching exercises was to make the deformity pliable and thus to prevent the progression of the deformity. Patients were assessed at regular intervals of 6 weeks. Once deformity correction was achieved, active extension and

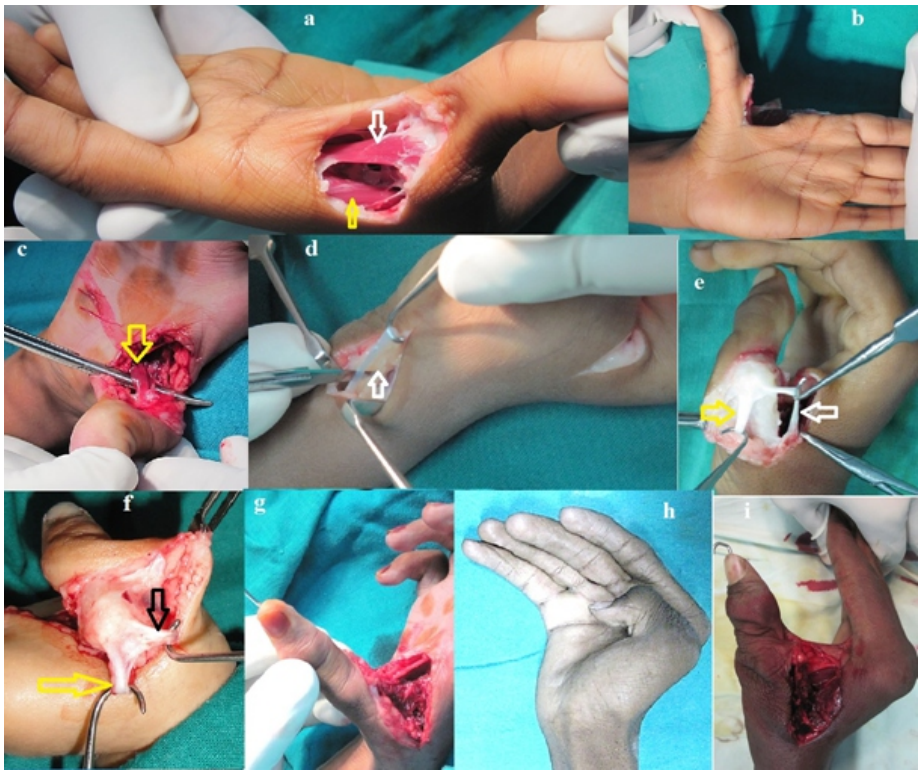

Figure 5: (a) The incision for the first web space, white arrow shows the adductor pollicis and yellow arrow shows the 1st dorsal interossei. (b) The palmar side of the incision. This may extend more proximally along the thenar crease. (c) Yellow arrow showing the flexor pollicis brevis release. (d) White arrow shows the release of the flexor pollicis brevis. (e) White arrow shows the extensor pollicis longus (EPL) and the yellow arrow shows the extensor pollicis brevis (EPB). It may be well developed as in this case or (f) poorly developed as shown in this case (yellow arrow – EPL and black arrow – EPB). (g) The K-wire stabilization of the thumb in palmar abduction and extension after soft-tissue release. (h) The neglected deformity in an adult and its correction in (i) where arthrodesis of metacarpophalangeal joint is always required. Note the first web space defect which now requires a flap cover.

abduction exercises of thumb were started along with night splinting which was continued for 6 months. If the deformity seemed severe and unresponsive to non-operative management, patients were selected for surgical treatment (Fig. 4).

Operative steps

Surgical option was offered only to patients more than 1 year of age. A severe [Type II and III] deformity, adolescent patients, bilateral hand deformities, and failed non-operative management were the indications. Procedures varied based on severity of first web contracture, instability at MP joint, and muscle or tendon deficiency. The dominant hand was operated first. Intraoperatively, the pathoanatomy of the deformity was studied and documented. The aim of the surgery was to widen the first web space with either Z-plasty or local flap cover, release the tight soft-tissue structures, position the thumb in functional abducted position [with or without stabilization with K-wires], and tendon transfer if the thumb extensors were absent. The procedure was addressed in a step wise manner starting from skin and proceeding to the MP and carpometacarpal (CMC) joints at the end.

Skin contracture

The problem is observed in two planes. In the milder deformities, there is deficiency in the plane of the palm, that is, in the range of flexion and extension. The four-flap Z-plasty was done for such deformities. In more severe deformity, additional contracture in the plane perpendicular to that of the palm, that is, in the range of abduction and adduction is observed (Figs. 5a,b). This was addressed with the modified Brand's dorsal rotation sliding flap which includes skin from the radial aspect of the index finger. Split skin graft is used if the defect is significantly large.

Intrinsic muscle contracture

A subsequent step wise release is done starting from the tight subcutaneous fascia till the affected joints [1, 4] (Figs. 5a-g). The dissection is deepened through the overlying fascia of intrinsic muscles carefully protecting the neurovascular bundles to the index finger and the thumb. Access to the heads of the adductor pollicis, first dorsal interossei, and the thenar muscles is possible through this approach which are then released sequentially [1, 2, 4] (Fig. 5a). The origins of the transverse head of adductor pollicis are released from the third metacarpal while protecting its motor branch with gentle retraction. It is important to carefully visualize the terminal branch of the ulnar nerve and the deep palmar arch which lie in the interval between the two heads. Similarly, the oblique head is also released [2]. The thenar muscles are then carefully released from the transverse carpal ligament leaving the ligament intact. The motor branch to the thenar muscles from the median nerve should be carefully identified and protected [2]. The flexor pollicis brevis [FBP] is an important source of contracture and must be released completely from its origin from the flexor retinaculum (Fig. 5c). The flexor pollicis longus (FPL) tendon is retracted and the deep fibers of the short flexor and opponens pollicis are released. This release will permit the thumb to be brought into adequate abduction.

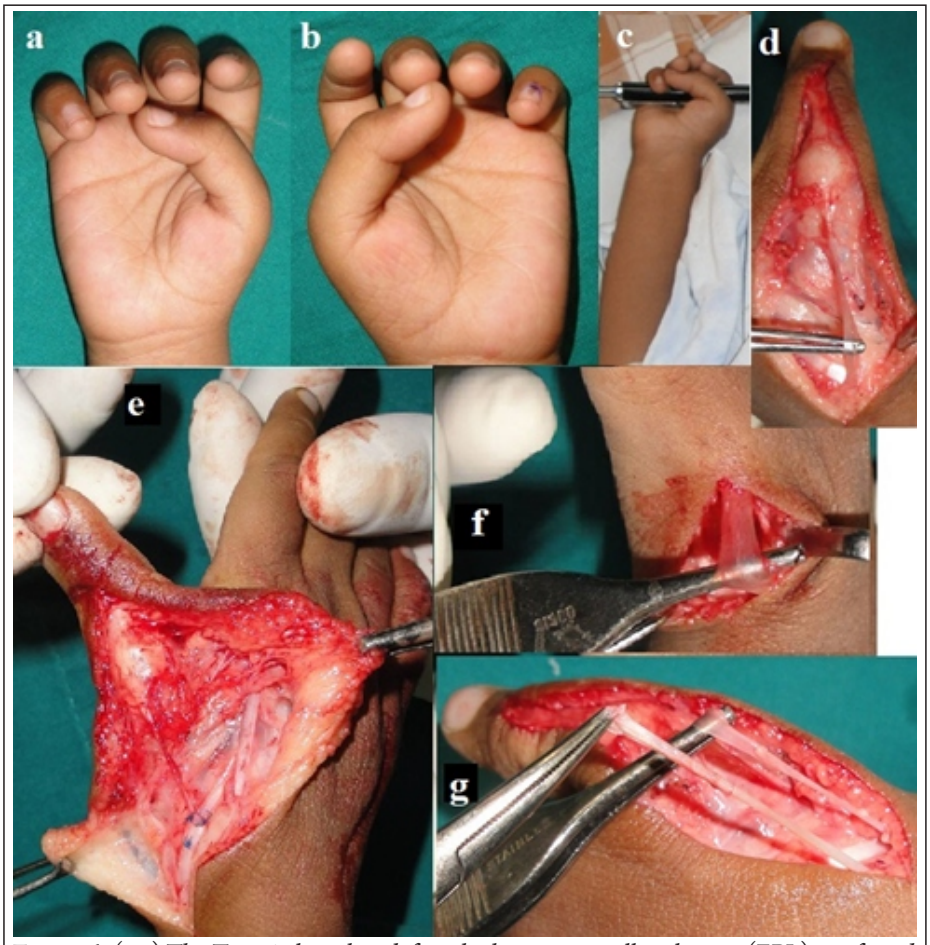

Figure 6: (a-c) The Type 1 clasp thumb for which extensor pollicis longus (EPL) was found to be hypoplastic. (d and e) EPL has been transferred to extensor indicis. Other option is to harvest the extensor digiti minimi (e and f).

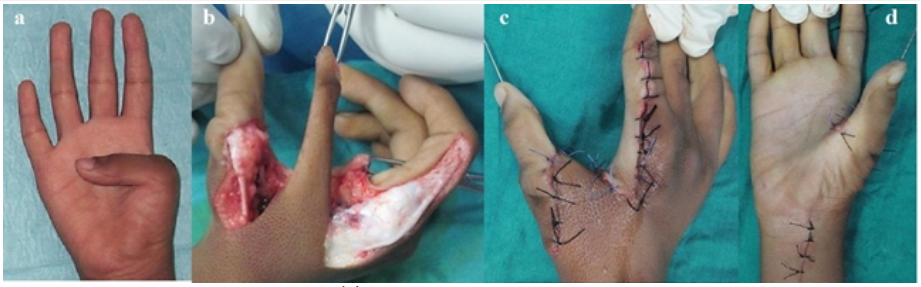

Figure 7: A Type 2 clasp thumb (a) after soft-tissue release and the flap harvested from the index finger dorsoradial side based on the first dorsal metacarpal vessels. (b-d) The dorsal and palmar side after primary closure of the defect.

MP and CMC joints

If necessary, the CMC joint capsule is released. At this point, the thumb usually demonstrates adequate passive abduction at the CMC joint. This is followed by addressing the MP joint. In severe deformities, soft-tissue release will occasionally be unable to overcome the MP joint flexed position. In such situations, the flexor pollicis may need Z-plasty lengthening at the level of forearm (Fig. 5d). In older children and adults, chondrodesis or arthrodesis of the MP joint is required to overcome the tight flexors (Figs. 5h and i). The MP joint is stabilized in extension with an axial K-wire with the thumb in palmar abduction (Figs. 5g and i). The ulnar collateral ligament is imbricated by double breasting.

Extrinsic tendons

The major hallmark in this condition is that of either the attenuation, hypoplasia, and, in severe cases, absence of one or both the extrinsic extensors of the thumb (Fig. 5f). In addition, in the more severe varieties, contracture of the FPL may also be present. Very rarely, the contractures are not significant as passive range of movement of the CMC and MP joint is well preserved. Observation of the two long extensors at the time of contracture release allows planning for future options (Fig. 5e). In isolated absence of the extensor pollicis brevis (EPB), thumb function is often sufficient. Release of contracture may be sufficient and subsequent hand therapy may improve the thumb extensor function.

Tendon transfer is required in the absence of the long extensors, and generally, extensor indicis is preferred (Figs. 6a-f). On the volar side, FPL tightness is addressed by Z-plasty at the forearm level.

The limb is protected in a long-arm thumb spica cast for 4 weeks. The cast is replaced with a customized thermoplastic thumb spica splint at the end of 4 weeks. Gradual active movements and play activity using the thumb is encouraged. Night splinting is continued from the beginning of 7th till the end of 12th week after surgery. When used, the K-wires were removed at 6 weeks and the thumb position was maintained in a thumb spica splint at night for further 4–6 months. The child was encouraged as much play activity with the addition of hand therapy exercises for older children during the day.

Patients who completed a minimum of 1 year of follow-up were reassessed for function using the Gilbert's scale (Table 2).

Results

Fifty-seven patients including 49 bilateral hands totaling 106 congenital clasped thumbs were assessed during the

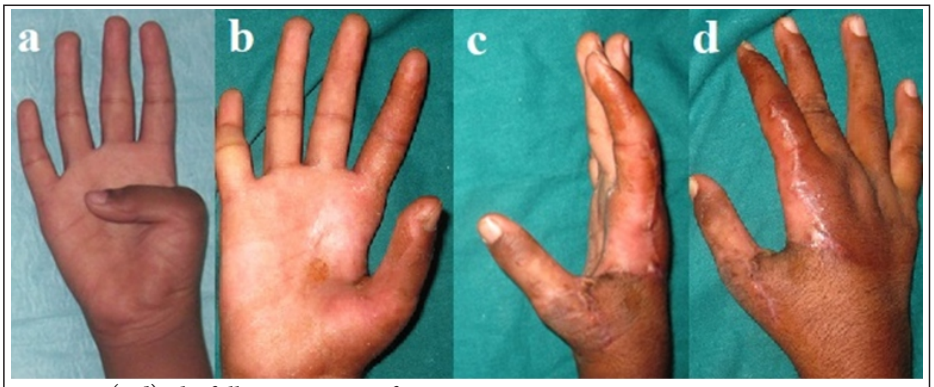

Figure 8: (a-d) The follow-up images after correction.

period of study. There were 43 males and 14 females, with an average age at presentation of 33 months [range from birth to 21 years]. Sixteen [15%] hands were found to be supple [Tsuyuguchi I], 36 [34%] were found to be severe [Tsuyuguchi II], and 54 [51%] had severe with syndromic pattern [Tsuyuguchi III] of presentation (Table 3). About 61% [35/57] of the patients presented at the age <5 years, 10 [17%] presented between 5 and 10 years of age. Interestingly, 12 [21%] of them presented after 10 years of age which included three adults.

About 41% of these patients [23/57] had a history of consanguinity and 27% [15/57] of them had a family history of similar or associated congenital deformity suggestive of a strong genetic predisposition (Table 1). Most of the patients had additional musculoskeletal and systemic manifestations which were seen in 38 [66%] patients. An overall 58% [33 patients] of our patients had a syndromic association.

Non-operative treatment was followed for all 25 patients presenting before the age of 1 year and 20 patients presented for the 1st time between 1 and 10 years for the initial 3–4 months. Surgery was done in 28 patients who did not respond to conservative splinting and primarily in all the 22 patients who presented after 10 years of age totaling a number of 94 hands. This included two patients in type 1 and all the patients in Group 2 and 3. Five of the patients in the supple variants responded well to splinting and satisfactory movement of the thumb extension was observed. Two of the patients in the supple category were lost to follow-up after their first visit.

Results of non-operative treatment

Non-operative treatment was successful with only the type I variety as seen in five patients [bilateral – 10 hands], who achieved full range of movement of all the joints of the thumb with excellent scoring in the Gilbert's scale. In the all these children, the diagnosis was made within the 1st year. Two of the children who presented later underwent surgery as splinting for a minimum of 3 months. Dynamic ultrasound done in these two children did show the extensor pollicis longus and EPB tendons whose excursion could be traced in the distal forearm suggesting dynamic activity. Two children with unilateral Type 1 deformity did not return for follow-up after receiving their splints. Patients with Type 2 showed a marginal improvement at the interphalangeal joint and first web space, however, there was no improvement at the MP joint extension. Type 3 deformities also did not yield to splinting program.

Results of operative treatment

Operative findings

Type 1: Only two patients with four hands were operated. The web space was found to be adequate. Extensor pollicis longus and brevis were present in all hands but were found attenuated. All the children underwent extensor indicis transfer which showed adequate excursion, tone, and elasticity.

Types 2 and 3: All these patients had deficiency of the first web space which required release and required a minimum of Z-plasty or more frequently a local flap cover. In milder forms with contracture in the plane of abduction/adduction, four-flap Z-plasty was found adequate in 16 patients. Combined soft-tissue deficiencies involving both the planes are more frequently observed. The incision was planned in such a way as to raise a flap from the radial side of the index finger which could be closed primarily (Fig. 7). This was adequate in 68 [72%] of our patients. Subcutaneous fascial contracture was observed in all the cases which were released to expose the first web space muscles. Release of the Adductor pollicis, first dorsal interossei, and FBP was required in majority of the cases (Table 4).

Laxity of ulnar collateral ligament of the MP joint was detected in 50 hands. Abnormal articular surface of the first MP joint was detected in the 12 hands

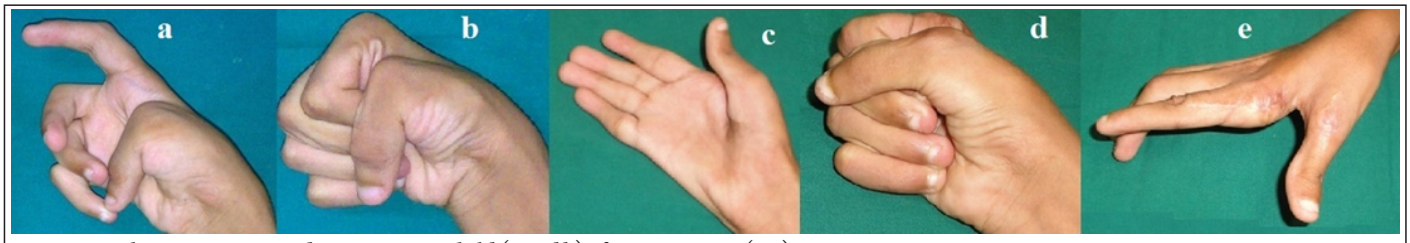

Figure 9: The images in a syndromic Type 3 child (a and b) after correction (c-e).

Table 1: The clinical profile of the patients in our case series

Syndromes associated	Consanguinity	Family history	Systemic manifestations	Lower limb manifestations	Upper limb manifestations
Total – 33 patients	23 (41%) patients	15 (27%) patients	Tricuspid valve prolapse – 1 patient	Congenital club foot: 6 patients (all bilateral)	Bilateral ulnar drift fingers (wind-blown hand) – 27 patients
Multiple Congenital Contracture (CVT, CTEV, G. VALGUM/ RECURV, DDH) – 15 patients	First degree	9 patients – sibling affected by a similar thumb deformity		Congenital vertical talus: 2 patients (one bilateral)	Unilateral ulnar drift fingers (wind- blown hand) – 12 patients
Freeman-Sheldon syndrome - Facial anomalies	10	4 patients	Atrial septal defect - 2 patients	hip dislocation	Flexion deformity of other fingers (camptodactyly – 9 patients
Antimongoloid facies of the palpebral fissure, cleft palate, flat face, depressed nasal bridge with long philtrum – 12 patients	Distant	Siblings affected by lower limb anomalies		2 patients (one was bilateral)	Restricted wrist movements – 5 patients
ptosis – 3 patients	13	7 patients	Ventricular septal defect – 1 patient	Congenital knee dislocation (bilateral) – 1 patient	Pterygium cubitale – 2 patients
Low set of ears – 2 patients		– parents affected by a similar thumb deformity,		Stiff knee – 2 patients	
pectus recurvatum – 1 patient		5 patients – parents had lower limb anomalies (CTEV)		Genu valgum – 1 patient	
		7 patients had second degree relatives with similar deformity			

where it was opened for fusion (Table 3). The dorsal capsule of the MP joint was found adherent to the cartilage of the metacarpal head. Tendon transfer was done with extensor indicis in all the 36 cases.

Post-operative complications

Superficial necrosis of the tip of the modified dorsal rotational advancement flap with venous congestion was the most common problem encountered as seen in 14 [20%] hands and was managed conservatively with alternate day dressings. Six of these patients did show recurrence of the adduction contracture albeit in a milder form. Non-union of chondrodesis of MP joint occurred in one hand which was asymptomatic as it resulted in a painless fibrous ankylosis in a functional position. All the operated patients could be followed up till the end of 1 year following surgery. The Gilbert's score was good to excellent in 69 [73%] patients with milder deformities showing better results (Figs. 8 and 9). Nine thumbs were unable to oppose due to web creep, however, parents of only four patients agreed for repeat soft-tissue release and full-thickness grafting.

Discussion

There has been very little written about the description and characteristics of the patients with the rare condition of congenital clasped thumb and reports from the Indian subcontinent have not been described.

This study presents a large series showing the clinical pattern and distribution of this condition from this region. 3/4th of our patients were male with a much older overall average age at presentation. This has not been observed in other studies where the presentation is at a much earlier age with a higher proportion of female representation [1, 3]. Interestingly 1/5th of them presented after 10 years of age which included three adults. The reason could perhaps be due to parents being financially challenged and sociocultural apprehensions about treatment at medical centers. The distribution of operated patients based on the Tsuyuguchi classification in our series is similar to the one presented by Abdel-Ghani et al., where they showed only 21% as type I and 29% as type II and with a majority of 50% of patients in the category of type III clasped thumb [1]. This suggests a trend of more severe cases presenting to tertiary referral centers in the developing world where sociocultural and economic reasons decide the treatment sought by parents. Similarly, these children also present at a much older age with 57% of them presenting after 1 year of age. This differs from the case series from advanced nations where they present within infancy with majority in the Type 1 category [3].

The most striking feature which was present was the strong genetic association with 2/3 of patients [as high as 68%] showing history of consanguinity and familial tendency. More than 50% had a syndromic feature with additional musculoskeletal and systemic manifestations. This is similar to a case series of 40 patients presented by Abdel-Ghani et al. where they showed a positive consanguinity in 60% of patients and family history of 32.5% [1]. In a recent retrospective survey of patients with clasp thumbs, Verhagen et al. observed syndromic features in 88% of

Table 2: The Gilbert's assessment scale done for the operated patients (94 thumbs)

Abduction	Rotation	Stability	Opposition	Results	Patients
40–45	110–120	Very stable	With little	Excellent	23
30–40	90–100	Stable (stable at the ulnar side)	With ring	Good	46
10–30	80–90	Mild instability (no problem at pinch)	With middle	Fair	16
0–10	80	Unstable	None	Poor	9

Table 3: Percentage distribution pattern of clasp thumbs as per the Tsuyuguchi classification in three of the largest studies

Type	Study of Tsuyuguchi *et al* . [1985]	Study of Abdel-Ghani*et al* . [2007]	Present study [2022]
I	32	38	15
II	28	19	34
III	40	43	51

Table 4: Types of procedures done in our patients

Procedure	Type of operation	No. of hands
Widening of the first web space	Four-flap Z-plasty	16
	Dorsal rotational advancement flap – modified Brand's flap	68
	Dorsal rotational advancement flap – modified Brand's flap with split skin graft	10
Release of first web structures	Release of fascia of first web space	90
	Release of the adductor pollicis muscle	70
	Release of first dorsal interosseous muscle	70
	Release of the flexor pollicis brevis	55
	Release of the carpometacarpal joint capsule	55
Chondrodesis/arthrodesis of the MP joint		12
Ligament reconstruction of the MP joint	Double breasting of the ulnar capsule and ulnar collateral ligament	50
Z-lengthening of the flexor pollicis longus tendon		20
Tendon transfer	Extensor indicis transfer	36

MP: Metacarpophalangeal

cases. In 25% of cases, L1CAM gene mutations and cytogenetic abnormalities were identified [5]. They concluded that clasp thumbs were frequently associated with central nervous system malformations including congenital hydrocephalus and despite recent advances in genetics, the genetic etiology of adducted thumbs remains elusive [5]. This study concurs with the earlier reported increased incidence of syndromes and other congenital anomalies associated with clasped thumb which was seen in more than half [58%] and 2/3rd [66.7%] of our patients, respectively. Abdel-Ghani et al. had reported a similar 68% and 77.5% incidence, respectively, in their case series [1,4].

We used the Tsuyuguchi classification as suggested by Abdel-Ghani et al. and we agree with their opinion of no difference between type II and type III clasped thumb with respect to severity, operative findings, treatment protocol, procedures performed, and the operative results and, hence, their suggestion of grouping the condition into supple and complex variants [1,2,3,4,6].

The classical approach to management is to treat the supple type with splinting and perform tendon transfers if it failed, while the complex type was treated by surgical correction of the contractures [1, 2, 3, 4, 6, 7]. We followed a more conservative protocol in splinting all the patients at first presentation. Cases were treated by serial splinting for all cases at initial visit for children up to 10 years of age. Operative treatment was planned for older children primarily and for those who failed to respond to splinting program. Although all patients in Types 2 and 3 eventually required surgery, we feel that splinting has several advantages. Many of parents are very reluctant for immediate surgery, particularly in infancy, and hence, splinting may help buy time and prevent further deterioration of the contracture. It reassures the parents on the treatment and primes them for the need for surgery at a later date. Besides, it does bring marginal improvement and makes surgical approach and release easier for the hand surgeon. Nearly 2/3 of the children showed excellent response to splinting in Type 1 cases. An important observation was that all the children were <1 year of age, and hence, early detection and prompt splinting is vital for this condition. We feel that this helps in prevention of overstretching of the long extensors and encourages a healthy growth and tone development of both the extensor and flexor tendons. A pilot ultrasound study in our series showed that the long extensors do have a viable muscle with visible active excursion in the forearm and should be encouraged to develop in the 1st year of life. Delay in treatment may permanently stretch them and necessitate tendon transfers at a later date.

The present study confirms the typical pathoanatomy described by McCarroll and Manske and Abdel-Ghani et al. where they show a classical composite tissue contracture on the radiovolar side of the hand extending from skin, subcutaneous tissue, and hypoplasia of thenar and adductor intrinsic muscles, instability of MP, and flexion contracture at both MP and CMC joints [1, 4, 6]. Abdel-Ghani et al. have suggested an "a la Carte release" of tight first web tissues and chondrodesis of the thumb MP joint [4]. They strongly advocate chondrodesis in view of global instability, joint and cartilage abnormality, and lack of good quality muscles for tendon transfer, besides alleviating the need for major flap cover and lengthening of FPL which further weakens the pinch activity [4]. Zlotolow and Tiedeken have described a reorientation pronation extension metacarpal osteotomy for such deformities after soft-tissue release and index-based local flap cover [8]. We have observed that in majority of the patients, the FPB is tight and its release is mandatory apart from the APB, AP, and long flexors. We agree on the serial release of the soft tissues, however, we have done chondrodesis in only older age group. In majority of cases, we achieved adequate stability and strength with FPB release, FPL lengthening, and K-wire stabilization of MP and CMC joint along with UCL imbrication of the MP joint. The Gilbert score showed good to excellent results in 2/3rd of our patients which suggests that chondrodesis may not be necessary in younger age group. We agree with earlier reports which showed a more severe and stiff contracture in older age group where MP joint chondrodesis or arthrodesis is essential to achieve correction and

stability [4].

The first web space defect needs to be covered with a flap at the end of contracture release. Milder cases can be managed with Z-plasties. Square flap and its modification are another design of Z-plasty which gives more length when compared to the simpler techniques [2]. Mahmoud has described a modification of the square flap using an index rotation flap from the dorsoradial aspect of the index which corrects the deformity in both the planes of narrowed web space and palmar contracture [9]. We have relied on four-flap Z-plasties which have given satisfactory results and are our choice in Type 1 and mild Type 2 variants [2].

Local flap becomes necessary for more severe defects for which a variety of options have been described. Caroli and Zanasi have suggested the palmar and dorsal rotation flaps, whereas Flatt and Wood have shown good results with multiple dorsal rotation flaps [10, 11]. The technique uses the basic principle of raising proximally based transposition flaps, either from the index finger, thumb, or the dorsum of the hand which is rotated into the web space. Strauch and Sandzen have advocated dorsal flaps from the thumb, whereas Brand has described the sliding flap which includes skin from the radial aspect of the index finger [11, 12]. Both the flaps need split skin grafting and may be useful in the more severe deformities. Buck-Gramcko has described the dorsal rotation advancement flap with a highly reliable vascularity which can offer a wide flap for release of the web, without the need to use skin graft for cover of the donor site on the dorsum of the hand [13]. We have used a modification of these two flaps without skin graft in the majority of our patients and have achieved satisfactory results [14]. The nine patients where we saw tip necrosis may have been due to venous congestion for which we suggest to retain a visible viable vein in the flap. Interrupted sutures should be placed at a longer distance and the apex should be kept broader for safety.

In this study, we observed that a well-planned treatment can achieve satisfactory results in the majority of patients. An early splinting program is beneficial and prompt surgical correction improves the cosmesis and function in the hand.

Conclusion

Congenital clasp thumb is a rare entity with very distinct features which can be differentiated from trigger thumb and hypoplastic thumb. It has a strong genetic predisposition. It has been classified based on severity of presentation. However there are no difference between type II and type III variants with respect to the pathoanatomy, treatment protocol, operative procedures, and results. Splinting program in mild deformity and surgical correction with reconstruction in more severe cases gave satisfactory results.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of Interest: NIL; **Source of Support:** NIL

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