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A study on surgical outcome of camptodactyly based on the age of presentation

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Abstract
Background: Camptodactyly refers to a permanent flexion contracture at the proximal interphalangeal joint. Most cases are limited to fifth finger involvement. Although it's common, but treatment been controversial. Many published studies have emphasized conservative treatment, while others have described surgical procedures. As it presents in several forms there is no single model for effective treatment. The aim of the study is to show that outcome of the surgical management depends on the age of presentation.
Materials and Methods: This study is done in the department of orthopaedics, Mamata medical college, khammam during the period of September 2021 to July 2022 on 6 patients who underwent surgery i.e. FDS release, z plasty and k wire fixation depending on deformity. Each case been followed for 10 months and the results were classified using method from mayo clinicas excellent, good, fair and poor.
Results: Among 6 patients who underwent unilateral surgical correction having all finger deformity, 4 patient of age group ≤ 5achieved good results and 2 patients of age group >17 had poor results.
Conclusion: We utilized the same surgical correction approach on all six children, and we noticed that if the patient comes to us at an early age, surgical corrections result in better outcomes. As a consequence of our research, we have observed that the patients in young age had better prognosis than those who come later in life.

Keywords: Camptodactyly, fingers, contracture, flexion deformity

Introduction
Camptodactyly is a relatively uncommon hand deformity characterized by variable degrees of congenital or acquired flexion contracture of the fingers at the proximal interphalangeal (PIP)joint, which can be unilateral or bilateral [1, 2]. The fifth finger is mostly involved, and the entity can occur singly or have a syndromic association. Several authors [3, 4] note a high incidence of bilaterality, but the degree of contracture is not necessarily symmetrical. Other fingers may be affected occasionally, but the incidence of involvement and the degree of the flexion contracture usually is higher in the fingers on the ulnar side of the hand. Several aetiologies have been proposed, including abnormal lumbricals; short flex or digitorum superficialis (FDS), which is often accompanied by subsequent or associated skin shortening; tight fascial bands; a deficient dorsal central slip extensor mechanism; and changes in the distal interphalangeal joint or metacarpophalangeal joint [5].
Camptodactyly probably was first described in 1846 by Tamplin when he illustrated congenital flexion contractures in a treatise on deformities. Since that time it has been the subject of numerous articles without un-animityas to its cause or treatment [6].
The reported incidence of camptodactyly varies greatly, but generally it is felt to occur in less than 1% of the population [7]. In familial cases it usually follows a simple autosomal dominant pattern of inheritance with variable penetrance, but most cases are sporadic in occurrence. Camptodactyly may be divided into simple and complex types. Simple camptodactyly consists only of the flexion deformity of the P.I.P. joint, whereas in complex camptodactyly, there are also other deformities' such as syndactyly or combinations of clinodactyly and camptodactyly.
Except in severe forms, the functional defect is limited and the concern is more about appearance. Unfortunately, the results of treatment have so far been qualified as disappointing

or at least unpredictable. As with thumb hypoplasia, symbrachydactyly, and triphalangeal thumb, which became recognized as a spectrum of the same disease with different structures involved in different clinical presentations under the same heading, Smith and Grobbelaar [8] tried to "unify" the pathology of camptodactyly.

Camptodactyly can have an early or late onset, and it has been proven to show an autosomal dominant pattern of inheritance [9]. This condition of ten does not cause functional impairment, meaning that patients seek medical attention for concerns relating to cosmetic appearance. Treatment for Camptodactyly may be conservative (non-surgical) or non- conservative (surgical), and the choice depends on the severity of the contracture. Surgical treatment for camptodactyly has been recommended by a number of authors, although long-term objective data to support this are often lacking.

In surgical approach, it is important to capture and repair any pathologic changes, not just to repair the contracture as such [6]. Postoperative care and rehabilitation, as well as patient co-operation, are crucial for a favorable outcome of surgery [10]. In this study we present the outcomes of the surgical management of 6 patients with camptodactyly based on age of presentation. The aim of the study is to show that outcome of the surgical management depends on the age of presentation.

Materials and Methods

The aim of the study is to show that the surgical outcome will be better if patient presents to hospital at early age. The study was carried out on 6 patients with simple camptodactyly without any other deformities, such as clinodactyly. Written informed consent for surgery was duly provided by the patients or by the parents, if the patients were children. Surgical planning was done for all 6 patients with a progressive deformity. The preoperative assessment was based on the shortening of skin, the extent of the deformity, and whether the deformity was progressive or static.

Surgery was performed under general anaesthesia. The site of the incision was marked. The intra operative findings were as follows: skin shortening in two cases, tight and small FDS in 6 cases. We performed FDS release, Z-plasty and k-wire fixation in all cases for 2nd, 3rd and 4th fingers and k-wire fixation for 1st and 5th fingers.

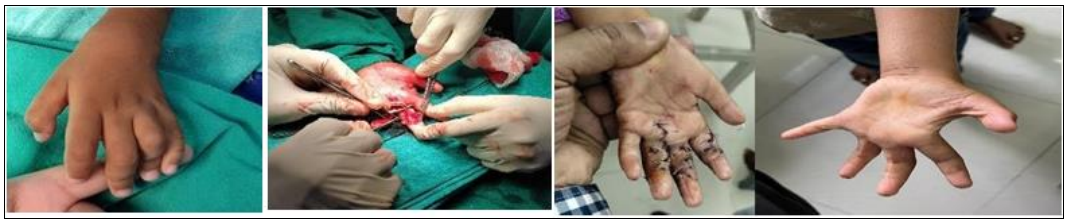
The grading system (Mayo Clinic) proposed by Siegert and co-workers [11] used to classify the surgical outcomes. Postoperatively, our study has decided upon splinting of the finger for 2 weeks, followed by physiotherapy. Patients were followed up at 2nd week intervals for first four months and followed up monthly for next 6 months.

Results

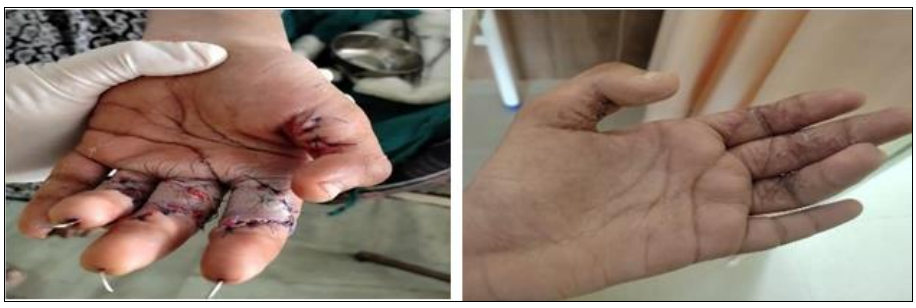
A total of six patients were operated on, and all of their fingers were operated on unilaterally. Four of the six patients are under the age of five, and two are over the age of seventeen. All patients with a preoperative mean extension lag of greater than 60° (range, 30°-90°) were operated on all fingers on one side. The average period of follow-up was 10 months (range: 6–8 months). Four patients aged less than or equal to five years had a good outcome for all fingers, with a postoperative mean extension lag of 10° (range, 5° -15°).With the exception of the little finger, two of the patients above the age of 17 had a poor outcome, with a postoperative mean extension lag of 30° (range 20°-40°).

Caseno	Age	Treated digit	Fixed flexion (on an average)	Preoperative extension lag (on an average)	Procedure	Postoperative extension lag (on an average)	Grade
1	3	All digits	60°	60°	Fds release, z plasty and k Wire fixation	10°	G
2	4	All digits	70°	70°	Fds release, z plasty and kwire fixation	10°	G
3	4	All digits	80°	80°	Fds release, zplasty and k Wire fixation	15°	G
4	5	All digits	60°	60°	Fds release, z plasty and kwire fixation	10°	G
5	18	All digits	80°	80°	Fds release, zplasty and k Wire fixation	40°	P
6	20	All digits	70°	70°	Fds release, zplasty and k Wire fixation	40°	P

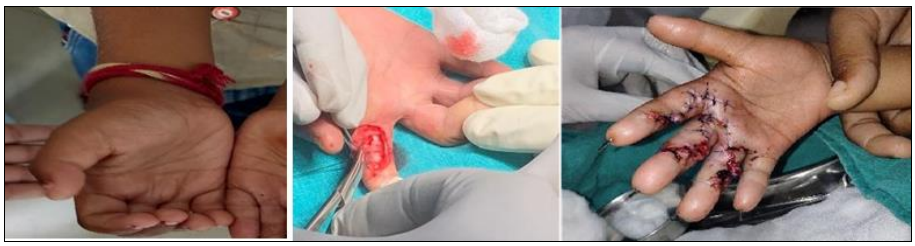
Case 1



Case 2



Case 3



Discussion

Camptodactyly appears superficially to be a simple problem. In reality, however, it is a long-term and frustrating problem to both patient and doctor. The cause is unknown, but the deformity often appears to have a genetic basis [12]. It can be simple or complex, if it is associated with other distinct deformities. Benson and group [13] stated that while patients who presented early with this condition have an equal sex distribution, late-onset patients are mostly females. Additionally, syndromic associations of this condition have also been noted. The little finger is the first to be affected. Other causes of PIP joint flexion, such as Boutonniere deformity, Dupuytren contracture, trigger finger, and an absent extensor mechanism, must be ruled out before confirming the diagnosis. Clinical and radiological parameters are used to define the extent of the deformity and joint flexibility [14].

Based on those factors, surgeons choose between conservative or operative management. In our study, operative management was planned for all cases with > 60° of involvement and compared outcome among the age of presentation and was to ascertain that simpler operation involving FDS release, z plasty and k wire are enough for the correction of the deformity at early age of presentation. Crucial to the outcome is the role of post-operative splintage and hand therapy in which patient compliance is essential. Immobilisation in all patients was similar, but the method used differed as K-wires were used in patients judged likely to benon-compliant.

Smith and Kaplan [15] believe that contracture of the flexor digitorum superficialis initiates the flexion deformity in most cases of camptodactyly. In 12 fingers they report that the procedure tenotomy of flexor digitorum superficialis decreased the flexion contracture by at least 33%, with no loss of excursion or flexor strength our procedure is in accordance with Smith and Kaplan.

Our preliminary findings are encouraging, owing to the functional improvements achieved postoperatively, and show that it is better to operate sooner rather than later when deterioration is rapid, rather than waiting until the adolescent age group, which in our study did not show such promising results.

Our study correlates with earlier studies [16] results of correctively pre operations on 20 hands with the average age of the patients at operation. These results indicate that whichever type of corrective operation is undertaken, the chance of a good result is better if the procedure is carried out at a young age. For mild cases non-operative measures such as active exercises, dynamic splints, serial plaster casts, and passive stretching have been recommended. Unfortunately, most authors (3, 4) have found these forms of therapy do not yield consistently satisfactory results. As a result of our research, we have concluded that patients who present to us at an early age have a better prognosis than those who present at a later age. If a patient appears at a younger age, surgical correction will be easier, with less tissue manipulation and a lower need for repeat surgery. However, more research is required.

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