

Is two years of age the most important and appropriate time for surgical release of trigger thumb?

Trigger thumb in children

Duran Topak, Fatih Dođar, Ökkeş Bilal, İsmail Kadir Dere
Department of Orthopedics and Traumatology, Kahramanmaraş Sutcu Imam University, Kahramanmaraş, Turkey

Abstract

Aim: The aim of this study was to reveal the similarities and differences of the cases in different age groups by comparing the first complaints, examination findings, and clinical results of children older than 24 months old and younger who applied to our clinic with pediatric trigger thumb.

Materials and Methods: Sixty-nine thumbs of 59 pediatric patients who underwent open release for trigger thumb in the same province between 2012 and 2018 were retrospectively analyzed. The patients were classified into two groups as children aged 24 months or younger (Group 1) and those older than 24 months (Group 2), and clinical presentation, examination findings, operation duration, and treatment results were compared.

Results: In this study, we examined 69 thumbs of 59 patients who underwent open surgical release, of which 54.2% were female (n = 32) and 45.8% were male (n = 27); 29 thumbs were right, 20 were left and 10 were bilateral. Patients with a mean age of 38.71 ± 38.53 (8-186) months were followed-up for 30.25 ± 21.95 (12-90) months. The mean operation time was 5.94 ± 1.65 (3-10) minutes, and full range of motion was achieved in 94.2% (n = 65) of the cases. When the first clinical presentation between the groups was compared, it was found that the limitation of movement was more common in the first group than the second group, and the difference was statistically significant (p = 0.012). In the same group, the possibility of observing constant flexion deformity during the examination was observed to be higher than the second group (p = 0.017).

Discussion: Open surgical release is a reliable treatment that provides effective joint motion restoration in children aged 2 years and younger and older, even with different clinical presentations.

Keywords

Pediatric; Trigger Thumb; Open release

DOI: 10.4328/ACAM.20184 Received: 2020-04-21 Accepted: 2020-05-19 Published Online: 2020-05-23 Printed: 2020-06-30 Ann Clin Anal Med 2020;11(Suppl 3): S168-171

Corresponding Author: Fatih Dođar, Department of Orthopedics and Traumatology, Kahramanmaraş Sutcu Imam University, Kahramanmaraş, Turkey.

E-mail: drfatihdogar@hotmail.com P: +90 344 300 3669 F: +90 344 300 4045

Corresponding Author ORCID ID: <https://orcid.org/0000-0003-3848-1017>

Introduction

Pediatric trigger thumb (PTT) is a pediatric condition emerged as a result of fusiform hypertrophy of the flexor pollicis longus (FPL) tendon. This enlargement causes swelling called “Notta nodule” on the palmar side of the metacarpophalangeal (MCP) joint and fixed flexion deformity on interphalangeal (IP) joint of the thumb. Although rare, triggering has been reported [1, 2]. PTT is a rare hand deficiency in children, although its incidence is not known for certain, most cases are under 2 years of age and the reported incidence is approximately 0.3% [3].

The etiology of PTT is not completely known. Some authors have reported that this disease may improve spontaneously in its natural course, even in the long term [4]. Especially in the presence of fixed flexion deformity, since the adaptation to splint and therapy in toddlers is not possible, most surgeons recommend surgical intervention in practice [5].

The aim of this study was to reveal the similarities and differences of the cases in different age groups by comparing the first complaints, examination findings, and clinical results of children older than 24 months and younger who applied to our clinic with pediatric trigger thumb.

Material and Methods

Sixty-nine thumbs of 59 pediatric patients who underwent open release for trigger thumb in the Kahramanmaras Sutcu Imam University Medical Faculty Hospital and Kahramanmaras Necip Fazil State Hospital in the same province between 2012 and 2018 were retrospectively analyzed. The demographic data (age, sex, side, family history, congenital anomaly, reason for admission to the doctor, examination findings, result of the surgery, operation duration) of the subjects included in the study were recorded using patient files and hospital database. Then the patients were classified into two groups as children 24 months old or younger (Group 1) and those older than 24 months (Group 2), and clinical presentation, examination findings, and treatment results were compared. Local ethics committee approval was obtained for the study (Session: 2019/04, Date: 03/06/2019, Decision No: 09). The patients diagnosed as PTT in our clinic were operated under general anesthesia under elective conditions after the operation preparation. The first finger was inserted through a transverse mini-incision through the MCP joint volar, the digital artery and nerve were taken aside, and A1 pulley was released longitudinally. Subsequently, the operations of the patients who were observed to have gliding movement in FPL tendon movements were ended. The movement was started in the early postoperative period.

Statistical Analysis

SPSS 22.0 (SPSS Inc, Chicago, Illinois, USA) package program was used in the statistical evaluation of the data obtained in the study. The continuous data were summarized as mean and standard deviation and the categorical data were summarized as number and percentage. The Student t- test was used to compare continuous variables in independent groups. The Chi-square (x²) test was used to evaluate two categorical independent variables for comparisons between groups. The Mann-Whitney U test was used to compare the mean values of continuous variables. The level of statistical significance was accepted at p<0.05.

Results

For the study, 69 thumbs of 59 patients of which 54.2% were female (n = 32) and 45.8% were male (n = 27) were examined. Patients with a mean age of 38.71 ± 38.53 (8-186) months were followed-up for 30.25 ± 21.95 (12-90) months. The mean operation duration of the patients was found to be 5.94 ± 1.65 (3-10) minutes per finger. The demographic characteristics of the patients were summarized in Table 1.

The most common complaint defined by families was detected to be dysmotility of the joint and the most common examination finding was found to be nodule in MCP joint. Full range of motion was achieved in 94.2% (n = 65) of the cases.

When clinical complaints of the patient groups were compared, the patients who applied due to the limitation of movement were more in the first group and the difference was statistically significant (p = 0.012).

Table 1. Demographic and Clinical Findings of Patients

Avarege of Age	38,71 ~±38.53 (8-186) months	
Gender	Boy	27 (%54,2)
	Girl	32 (%45,8)
Side	Right	29 (%49,2)
	Left	20 (%33,6)
	Bilateral	10 (16,9)
Family History	No	56 (%94,9)
	Yes	3 (%5,1)
Congenital Anomaly	Pes Equino Varus	2 (%3,4)
	Toticollis	1 (%1,7)
Clinical Presentation	Loss of Motion	47 (%68,1)
	Nodule on MCP Joint	2 (%2,9)
	Squeeze	13 (%18,8)
	Pain	7 (10,1)
Examination Findings	Fixed flexion deformity	59 (%85,5)
	Nodule on MCP Joint	62 (%89,9)
	Triggering	21 (%30,4)
	Pain	5 (%7,2)
Post-Operative Results	Full Motion	65 (%94,2)
	Residual Flexion Deformity	3 (%4,3)
	Hypertrophic Scar Tissue	1 (%1,4)
Operation Time	5,94±1,65 (3-10) minutes	
Following Time	30,25±21,95(12-90) months	

MCP: Metacarpophalangeal

Table 2. Preoperative complaints and postoperative results of groups

	Group 1	Group 2	p-value
Clinical Presentation			
Movement Restriction	26 (%83.8)	21 (%55.2)	0.012
Nodule on MCP Joint	1 (%3.2)	1 (%2.6)	0.884
Triggering	3 (%9.6)	10 (%26.3)	0.081
Pain	1 (%3.2)	6 (% 15.7)	0.088
Examination Outcomes			
Residual Flexion deformity	30 (%96.8)	29 (%76.3)	0.017
Nodule	30 (%96.8)	32 (%84.2)	0.088
Triggering	7 (%22.6)	14 (%36.8)	0.204
Pain	0 (%0)	5 (%13.2)	0.037
Operation Time (minutes)	5.94± 1.49	5.92±1.79	0.873
Postoperative Results (Full Motion)	30 (%96.8)	35 (%92.1)	0.404

MCP: Metacarpophalangeal



Figure 1. Intraoperative image of A1 pulley in pediatric trigger finger patient

In the first group, the presence of fixed flexion deformity in the examination was significantly higher than the other group ($p = 0.017$). Group comparisons are shown in Table 2.

When the operation durations and the operation results were compared, there was no statistically significant difference between the two groups ($p = 0.873$, $p = 0.404$, respectively).

No postoperative neurovascular complications, surgical site infections, and anesthesia complications were observed in any of the patients. While one of the patients who developed residual flexion deformity gained full motion with physiotherapy, two patients were performed open surgical release.

Discussion

For the first time in 1936, Jahss described the clinical presentation of the thumb as the congenital contraction of the thumb, which is common in adults, however, rarely seen in children. It has been reported that the families did not mention the history of the disease and only told "My child bends the tip of his/her thumb but he/she cannot correct it. When I try to correct, he/she cries and withdraws his/her finger" [6]. In our study, limitation of movement in children aged 24 months and younger was seen as the most important reason for admission to a doctor, while pain and triggering were seen as the reason for admission in older children. This result corresponds to Jahss's first definition.

The pathology, natural course, and treatment of trigger thumbs in children are significantly different from adults. Generally, families apply to their doctor by saying that they observe that their approximately 2 years old children have the inability to

correct their thumbs from the interphalangeal joint. Since bilateral involvement is observed in 25% of the cases, the examination of the other hand should be performed carefully [4, 7]. The clinical history and bilateral involvement rate of the cases in our study were similar to the literature.

The etiology of PTT is unknown to a large extent. Fusiform proliferation is the cause of clinical symptoms such as triggering or limitation of motion, and of the inconsistency in the size of the FPL tendon and A1 pulley [8]. Although the main pathology has been reported as the enlargement of the FPL tendon, it has been suggested that it may be effective in the thickening of the A1 pulley as well as in the acquired stenosing tenosynovitis which is observed in adults [9]. Researchers, have shown that the flexor pollicis longus tendon under the a1 pulley of the symptomatic thumb is thicker than the contralateral side [10]. Rare cases of trigger finger in the presence of osteochondroma or tendon sheath ganglion have been reported [11, 12]. This situation reflects as a nodule in the MCP joint in the physical examination and nodules were detected in almost all cases in our study.

Although PTT is thought to occur sporadically, a family history of similar disease is rarely reported [9]. Recent studies have failed to support the belief that the pediatric trigger finger is a congenital condition. The term congenital trigger finger is now considered a misnomer and the trigger finger seen in childhood is considered to be an acquired finger pathology [3]. The fact that the family history and congenital anomaly were detected in only 3 cases in our study is supporting that pediatric trigger thumb disease is an acquired anomaly.

Monn et al. have reported that none of the trigger thumbs were seen at birth when they examined 7700 infants [13]. Similarly, Rodgers and Waters have reported that in any of the 1046 newborns hospitalized at birth and Kikuchi and Ogino have reported that in any of the 1116 newborns they have followed-up during the first two weeks of their life, no trigger thumbs were observed [8, 14].

When Slakey and Hennrikus prospectively examined 4719 newborn infants retrospectively, they have shown that flexion contracture developed in the interphalangeal joint without triggering after birth, although there was no anomaly at birth. The authors have suggested that the definition of congenital or trigger thumb is not correct and should be called "pediatric locked trigger thumb" [15].

In our study, although no congenital cases were detected, it was observed that families did not mention the history of the disease. Nearly in all of the children aged 24 months and under, in examination, it was observed that there was a fixed flexion deformity however, the triggering was very rare. In the younger age group, no pain complaint was detected during the examination. These results support the pediatric locked trigger thumb proposal.

For PTT, emergency surgical intervention is not always necessary. When the natural course of the disease is examined, spontaneous resolution is seen even if it takes a long time. When Dinham and Meggitt have examined retrospectively 26 patients with PTT who had a mean age of 2 years and were followed-up conservatively, they have reported 12% spontaneous recovery in 6 months and 73% in 12 months [4]. In another study, they

have reported that 63% of pediatric trigger thumbs improved without surgery, however, the mean recovery time was 48 months [16]. It is unlikely that newborn toddlers with fixed flexion deformity will be able to adapt to painful physiotherapy and splint therapy. Therefore, most orthopedic surgeons prefer open release.

Although recent studies [17, 18, 19] suggest non-surgical treatment, others have reported that surgery is the recommended treatment for PTT [1, 4, 9, 20, 21].

Comparative studies reported that the success rate of surgical treatment was 90-95% and the success rate of non-surgical treatment was 55% [22, 23]. Important controversies continue regarding the role of surgery in the treatment of PTT. The recommended surgical treatment is the transverse release of the A1 pulley by entering through the transverse incision of the thumb MCP joint volar side.

Although open release of thumb A1 pulley provides effective restoration of interphalangeal joint movements, neurovascular injury, infection reduce the permanent or recurrent triggering risk [1, 4, 12, 24]. While the studies have been reporting success over 95% in patients undergoing surgical open release, they report recurrence between 2-4% requiring re-operation intervention [3, 4, 8, 24, 25]. Recurrence or failure requiring surgical intervention is attributed to inadequate release of A1 pulley [26]. In our study, success and recurrence rates are consistent with the literature.

Although observed to be rare, surgical site infection is a devastating complication developed following the surgical release. In our study, surgical site infection was not encountered. Dunsmuir and Sherlock have reported a 4% recurrence in 200 trigger thumb patients who underwent open surgical release. In the same study, it has been emphasized that the risk of recurrence increases in children under 36 months [19]. In our study, no statistically significant difference was detected between surgical open release results in children aged 24 months and younger and treatment results in older children.

The fact that our study has retrospective character and the application of surgical intervention was performed by two different surgeons was seen as a limitation of our study.

Conclusion

Pediatric trigger thumb is a rare, acquired thumb anomaly that commonly occurs under 2 years of age. Children aged 2 years and younger often apply to the doctor with limitation of movement and older children with pain and triggering complaints. Fixed flexion deformity is seen in the examination in almost all children aged 2 years and younger, however, only in half of older children.

Open surgical release is a reliable treatment that provides effective joint motion restoration in children aged 2 years and younger and older, even with different clinical presentations.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical

standards. No animal or human studies were carried out by the authors for this article.

Funding: None

Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References

- Skov O, Bach A, Hammer A. Trigger thumbs in children: a follow-up study of 37 children below 15 years of age. *J Hand Surg.* 1990; 15(4): 466-7.
- Herdem M, Bayram H, Togrul E, Sarpel Y. Clinical analysis of the trigger thumb of childhood. *Turk J Pediatr.* 2003; 45(3): 237-9.
- Shah AS, Bae DS. Management of pediatric trigger thumb and trigger finger. *J Am Acad Orthop Surg.* 2012; 20(4): 206-13.
- Dinham JM, Meggit BF. Trigger thumbs in children: A review of the natural history and indications for treatment in 105 patients. *J Bone Joint Surg Br.* 1974; 56(1): 153-5.
- Giugale JM, Fowler JR. Trigger Finger: Adult and Pediatric Treatment Strategies. *Orthop Clin North Am.* 2015; 46(4): 561-9.
- Jahss SA. Trigger finger in children. *JAMA.* 1936; 107(18): 1463-4.
- Lin JS, Pettit R, Rosenbaum JA, Popp JE, Samora JB. The Development of Trigger Thumb in the Contralateral Thumb in Pediatric Patients Presenting Initially With Unilateral Involvement. *Hand (N Y).* 2019; DOI: 10.1177/1558944719864449.
- Kikuchi N, Ogino T. Incidence and development of trigger thumb in children. *J Hand Surg Am.* 2006; 31(4): 541-3.
- De Smet L, Steenwerck A, Ransbeeck H. The so-called congenital trigger digit: further experience. *Acta Orthop Belg.* 1998; 64(3): 306-8.
- Kim J, Gong HS, Seok HS, Choi YH, Oh S, Baek GH. Quantitative measurements of the cross-sectional configuration of the Flexor Pollicis Longus Tendon using ultrasonography in patients with pediatric trigger thumb. *J Hand Surg Am.* 2018; 43(3): 284-90.
- de Oliveira RK, Delgado PJ, Geist JG. Pediatric Trigger Finger due to Osteochondroma: A Report of Two Cases. *Hand (N Y).* 2017; 12(1): 99-105.
- Murgai RR, Lightdale-Miric N. Pediatric trigger thumb caused by a flexor tendon sheath ganglion. *J Pediatr Orthop B.* 2018; DOI: 10.1097/BPB.0000000000000561.
- Moon WN, Suh SW, Kim IC. Trigger digits in children. *J Hand Surg Br.* 2001; 26(1): 11-12.
- Rodgers WB, Waters PM. Incidence of trigger digits in newborns. *J Hand Surg Am.* 1994; 19(3): 364-8.
- Slakey JB, Hennrikus WL. Acquired thumb flexion contracture in children: Congenital trigger thumb. *J Bone Joint Surg.* 1996; 78(3): 481-3.
- Weber PC. Trigger thumb in successive generations of a family. A case report. *Clin Orthop Relat Res.* 1979; 143: 167.
- Baek GH, Kim JH, Chung MS, Kang SB, Lee YH, Gong HS. The natural history of pediatric trigger thumb. *J Bone Surg Am.* 2008; 90(5): 980-5.
- Han SH, Yoon HK, Shin DE, Song DG. Trigger thumb in children: result of surgical treatment in children above 5 years of age. *J Pediatr Orthop.* 2010; 30(7): 710-4.
- Dunsmuir RA, Sherlock DA. The outcome of treatment of trigger thumb in children. *J Bone Joint Surg.* 2000; 82(5): 736-8.
- Tan AH, Lam KS, Lee EH. The treatment outcome of trigger thumb in children. *J Pediatr Orthop B.* 2002; 11(3): 256-9.
- McAdams TR, Moneim MS, Omer GE. Long-term follow-up of surgical release of the A1 pulley in childhood trigger thumb. *J Pediatr Orthop.* 2002; 22: 41-3.
- Mulpruek P, Prichasuk S, Orapin S. Trigger finger in children. *J Pediatr Orthop.* 1998; 18(2): 239-41.
- Van Loveren M, van der Biezen JJ. The congenital trigger thumb: is release of the first annular pulley alone sufficient to resolve the triggering? *Ann Plast Surg.* 2007; 58(3): 335-7.
- Womack ME, Ryan JC, Shillingford-Cole V, Speicher S, Hogue GD. Treatment of paediatric trigger finger: a systematic review and treatment algorithm. *J Child Orthop.* 2018; 12(3): 209-17.
- Farr S, Grill F, Ganger R, Girsch W. Open surgery versus nonoperative treatments for paediatric trigger thumb: a systematic review. *J Hand Surg Eur Vol.* 2014 ; 39(7): 719-26.
- Leung OY, Ip FK, Wong TC, Wan SH. Trigger thumbs in children: results of surgical release. *Hong Kong Med J.* 2011; 17(5): 372-5.

How to cite this article:

Duran Topak, Fatih Dođar, Ökkeş Bilal, İsmail Kadir Dere. Is two years of age the most important and appropriate time for surgical release of trigger thumb? *Ann Clin Anal Med* 2020;11(Suppl 3): S168-171