

The Natural History of Pediatric Trigger Thumb: A Study with a Minimum of Five Years Follow-up

Goo Hyun Baek, MD, Hyuk Jin Lee, MD

Department of Orthopedic Surgery, Seoul National University College of Medicine, Seoul, Korea

Background: Pediatric trigger thumb is due to deformed flexion of the interphalangeal joint. We previously reported that pediatric trigger thumb can spontaneously resolve in > 60% of patients at the median follow-up of 48 months. The purpose of this study was to determine whether there were any more cases of resolution with a follow-up of more than 5 years and whether any residual deformities remain, and so to confirm the natural history of pediatric trigger thumb.

Methods: We prospectively followed 87 thumbs in 67 patients with pediatric trigger thumb and these patients didn't receive any treatment such as passive stretching, splinting or surgery. The date of the first visit ranged from April 1994 to March 2005. The patients were evaluated every six-months prior to resolution and annually after resolution. The median duration of follow-up was 87.3 months (range, 60 to 156 months).

Results: Of the 87 trigger thumbs, 66 (75.9%) resolved spontaneously. The median time from the initial visit to resolution was 49.0 months (95% confidence interval, 41.1 to 56.9). There were no residual deformities that resolved beyond 48 months. Although complete resolution did not occur in the remaining 21 thumbs, the flexion deformities did improve in all 21 thumbs. There were no other differences between the two groups besides the average duration of follow-up. There was no difference in resolution based on gender.

Conclusions: Pediatric trigger thumb can spontaneously resolve in > 75% of the cases after a follow-up period of at least 5 years. An operation may be delayed or avoided in the majority of cases. This may help both the families and the surgeons make decisions regarding the proper treatment of pediatric trigger thumb.

Keywords: *Pediatric trigger thumb, Natural history, Conservative management*

We have already reported that pediatric trigger thumb can be expected to resolve without surgery in more than 60% of patients at the median follow-up period of 48 months, and 21 out of 71 thumbs that did not resolve completely demonstrated improvement.¹⁾ In this study, we enrolled 25 more children (27 thumbs) in the previous cohort and we extended the observation period till a minimum of 5 years. The purpose of this study is to determine whether any fur-

ther resolution of trigger thumb can be obtained in those patients who did not experience improvement during 4 years of follow-up, to determine whether any residual or secondary deformities can develop and finally to confirm the natural history of pediatric trigger thumb based on long-term observation for at least 5 years.

METHODS

The materials and methods were the same as those of our previously.¹⁾ Fifty-three children (71 thumbs) were enrolled in the previous study between April 1994 and March 2004. We enrolled 25 more children (27 thumbs) between April 2004 and March 2005. A total of ninety-eight thumbs in 78 children (50 boys and 28 girls) were

Received December 28, 2010; Accepted January 19, 2011

Correspondence to: Goo Hyun Baek, MD

Department of Orthopedic Surgery, Seoul National University College of Medicine, 28 Yongon-dong, Chongno-gu, Seoul 110-744, Korea

Tel: +82-2-2072-3787, Fax: +82-2-764-2718

E-mail: ghbaek@snu.ac.kr

Copyright © 2011 by The Korean Orthopaedic Association

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Clinics in Orthopedic Surgery • pISSN 2005-291X eISSN 2005-4408

enrolled. One of the children underwent surgery with A1 pulley release; this was an 11-month-old boy who had a right trigger thumb with an initial flexion deformity of 15°, and this did not improve for five years. His parents requested surgery at the age of 84 months. Postoperatively, he had no flexion deformity and he was excluded from the study. Ten (10 thumbs) of the 77 children were dropped out from the cohort. Five children (3 boys and 2 girls) were lost to follow-up prior to resolution. Five children (3 boys and 2 girls) were lost to follow-up prior to the end of

the study, although they demonstrated resolution on their last visit. In conclusion, 87 thumbs in 67 children (43 boys and 24 girls) completed the study. The clinical evaluation and the definition of the resolution were the same as those of the previous study.

RESULTS

The average age at the first visit was 25.3 ± 11.8 months and the average duration of follow-up was 87.3 ± 24.7 months. The average initial flexion deformity of the interphalangeal (IP) joint was $26.3 \pm 9.9^\circ$. This was unilateral in 27 boys and 20 girls and bilateral in 16 boys and 4 girls. The trigger thumbs spontaneously resolved in 66 (75.9%) of 87 thumbs. The average age at the time of resolution was 70.6 ± 27.1 months. Kaplan-Meier analysis showed that the median time from the initial visit to the time of resolution was 49.0 months (95% confidence interval [CI], 41.1 to 56.9) (Fig. 1). Half of the cohort resolved within 4 years. In this study another 13 thumbs had resolved in addition to the 21 thumbs (the 26 non-resolved thumbs minus the 5 cases lost to follow-up) that were unresolved in our previous study.¹⁾ The average duration from the initial visit to the time of resolution for these 13 thumbs was 79.5 ± 17.6 months (range, 53 to 105 months), and their average age at resolution was 86.5 ± 14.1 months (range, 6.8 to 10.6 years of age).

We compared those thumbs that resolved within 48 months vs. those that did not by using the Mann-Whitney

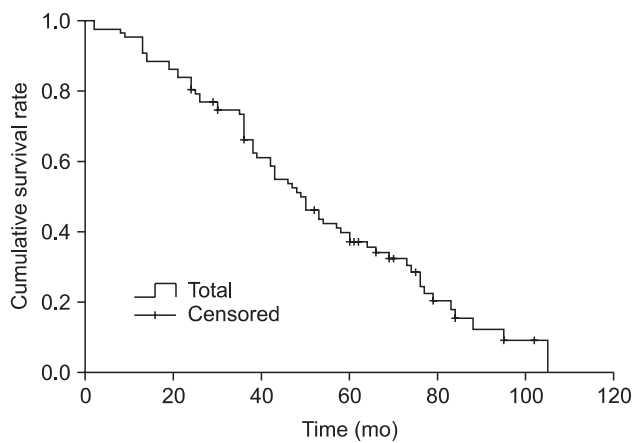


Fig. 1. The Kaplan-Meier survival curve with resolution of the patients' trigger thumbs as the end point. The median survival time (the median time of having trigger thumb) from the initial visit to the time of resolution was 49 months (95% confidence interval, 41.1 to 56.9).

Table 1. Literature Review of Outcomes of Conservative Management

Authors	No. of cases	No. (%) of resolution	Mean duration of resolution (range)	Conservative treatment
Dinham and Meggitt (1974) ²⁾	107	13 (12.1)	< 6 mo	Observation
Michifuri et al. (1978) ³⁾	108	49 (45.3)	62 mo (12–143 mo)	Observation
Nemoto et al. (1996) ⁴⁾	40	29 (72.5)	10 mo (1–30 mo)	Splint therapy
Mulpruek et al. (1998) ⁵⁾	42	10 (23.8)	< 3 mo	Observation
Dunsmuir and Sherlock (2000) ⁶⁾	53	26 (49.1)	7 mo (1–23 mo)	Observation
Moon et al. (2001) ⁷⁾	35	12 (34.3)	5 mo (1–24 mo)	Observation
Watababe et al. (2001) ⁸⁾	58	50 (86.2)	38 mo (3–87 mo)	Passive stretching exercise
Tan et al. (2002) ⁹⁾	31	24 (77.4)	6 mo (3–9 mo)	Splint therapy
	25	13 (52.0)		Passive stretching exercise
Lee et al. (2006) ¹⁰⁾	31	22 (71.0)	11.7 wk (4–24 wk)	Splint therapy
	31	7 (22.6)	20 mo	Observation
Baek et al. (2008) ¹⁾	71	45 (63.4)	48 mo (24–114 mo)	Observation

U-test. There was no difference in the initial flexion deformity between the two groups (those with resolution at less than 48 months, $24.4 \pm 10.5^\circ$; those with resolution at greater than 48 months, $27.6 \pm 9.3^\circ$; $p = 0.139$), nor was there any difference in the average age at the initial visit between the two groups (25.6 ± 11.6 months vs. 27.4 ± 11.5 months; $p = 0.605$). All the thumbs that spontaneously resolved had no residual deformity such as persistent flexion deformities or radial deviation at the IP joint. There were no cases of compensatory hyperextension of the metacarpophalangeal joint that affected the activities of daily life. There was no recurrence once the trigger thumb had resolved.

We compared the group with spontaneous resolution vs. the group without spontaneous resolution using the Mann-Whitney *U*-test. There was no difference in age at the first visit (those with resolution, 26.3 ± 11.5 months; those without resolution, 19.9 ± 11.3 months; $p = 0.216$) or the initial flexion deformity (those with resolution, $25.5 \pm 9.9^\circ$; those without resolution, $30.0 \pm 10.0^\circ$; $p = 0.170$). There was a significant difference in the average duration of follow-up between the two groups (those with resolution, 93.3 ± 23.9 months; those without resolution, 73.9 ± 13.6 months; $p < 0.001$).

Based on gender, there were no differences in the initial age, the initial flexion deformity of the IP joint, the age at the time of resolution, the time from the initial visit to that of resolution and the duration of follow-up. The mean age at the initial visit was 25.7 ± 10.5 months for the boys and 25.5 ± 9.6 months for the girls ($p = 0.632$, Student's *t*-test). The mean initial flexion deformity of the IP joint was $25.7 \pm 10.5^\circ$ for the boys and $25.5 \pm 9.6^\circ$ for the girls ($p = 0.923$, Student's *t*-test). The mean age at the time of resolution was 67.2 ± 24.8 months for the boys and 77.5 ± 30.6 months for the girls ($p = 0.146$, Student *t*-test). The mean duration of follow-up was 92.0 ± 24.6 months for the boys and 96.0 ± 23.1 months for the girls ($p = 0.525$, Student *t*-test). The median time from the initial visit to resolution was 46.0 months for the boys (95% CI, 37.9 to

54.1) and 60.0 months for the girls (95% CI, 44.2 to 75.8); the log-rank test indicated that there was not a significant difference between these two survival curves ($p = 0.564$).

DISCUSSION

This study demonstrates that spontaneous recovery of trigger thumbs occurs in the major of patients by at least the 5th year, and this is indicative of its natural history. In our previous study,¹⁾ trigger thumb resolved in the 63% of the thumbs at an average of 48 months follow-up. In this study, trigger thumb resolved in 75.9% of the thumbs (an additional 12.9%) at an average of 87 months follow-up.

Such findings have been previously reported (Table 1); however, the rate and age of resolution still remain unclear. Our study showed an overall success rate of 76%, and the duration of follow-up and the success rate were greater than most of the previously reported data.

We compared the group with spontaneous resolution vs. those who did not. The only significant difference between the two groups was the duration of follow-up. Thus, it is possible that the cases without resolution may resolve with time. So, we support that pediatric trigger thumb has the potential to spontaneously resolve after a sufficient observation period of more than 4 years without developing residual deformities.

In conclusion and practically speaking, we can delay or avoid performing an operation because the majority of cases of spontaneous resolution occur within 4 years.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

ACKNOWLEDGEMENTS

This study was supported by the Korean Human Technology Research Foundation (KOHTERF-2009-03).

REFERENCES

1. Baek GH, Kim JH, Chung MS, Kang SB, Lee YH, Gong HS. The natural history of pediatric trigger thumb. *J Bone Joint Surg Am.* 2008;90(5):980-5.
2. Dinham JM, Meggitt 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.
3. Michifuri Y, Murakami T, Kumagai S, Oyama M. Natural history of the trigger fingers in children. *Seikei Geka.* 1978;29:1648-51.
4. Nemoto K, Nemoto T, Terada N, Amako M, Kawaguchi M. Splint therapy for trigger thumb and finger in children. *J Hand Surg Br.* 1996;21(3):416-8.
5. Mulpruek P, Prichasuk S. Spontaneous recovery of trigger thumbs in children. *J Hand Surg Br.* 1998;23(2):255-7.

6. Dunsmuir RA, Sherlock DA. The outcome of treatment of trigger thumb in children. *J Bone Joint Surg Br.* 2000;82(5):736-8.
7. Moon WN, Suh SW, Kim IC. Trigger digits in children. *J Hand Surg Br.* 2001;26(1):11-2.
8. Watanabe H, Hamada Y, Toshima T. Conservative management of infantile trigger thumb: indications and limitations. *Tech Hand Up Extrem Surg.* 2003;7(1):37-42.
9. Tan AH, Lam KS, Lee EH. The treatment outcome of trigger thumb in children. *J Pediatr Orthop B.* 2002;11(3):256-9.
10. Lee ZL, Chang CH, Yang WY, Hung SS, Shih CH. Extension splint for trigger thumb in children. *J Pediatr Orthop.* 2006;26(6):785-7.