Trigger thumb and finger in pediatric patients

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ABSTRACT

Objectives: Trigger finger in pediatric patients is not as commonly seen as it is in adults. With that, it is ten times less likely to be seen than trigger thumb. Trigger finger usually presents in children less than 8 years old. It may be associated with anatomic, metabolic, inflammatory, and central nerve disorders. Flexion deformity of the finger is reported as the most frequent presentation of triggering. Diagnosis may be delayed because of the characteristic flexion posture of the newborn.

Material and Methods: Between 2009 and 2014, we treated 37 trigger thumbs and fingers in 28 children.

Results: Standard surgical techniques were used to release the A1 pulley in 32 digits of 27 patients. One patient that had five trigger digits was treated with steroid injections.

Conclusion: Surgical release is recommended by many for the treatment of trigger finger in children if there is no discernible connection with either metabolic or inflammatory disease. We did not prefer conservative treatment after one year of age because of its failure and recurrence rates with the misbehavior and disobedience of children during physical therapy. Therefore, we maintain the recommendation of the standard surgical technique to release the A1 pulley for the treatment of triggering in childhood.

Key words: Trigger finger, trigger digit, childhood, open release

Introduction

When a symptomatic locking, snapping, clicking, or a fixed-flexion deformity of a finger or thumb presents, a patient can be diagnosed with stenosing tenosynovitis, or trigger finger or thumb [1-8]. The main problem occurs during movement of the flexor tendon under the sheath that inhibits flexion of the finger from the extension [4-11]. It usually consists of relative stenosis of the tendon or increase of flexor tendon volume by myofibroblast activity, thickening, or synovial proliferation of the flexor tendon within its sheath and/or fibrocartilagenous metaplasia of the annular sheath [8-18].

The incidence of trigger thumb in children is 1-3:3000. It is ten times more common than trigger finger [16-19]. The “Notta nodule”, first described by Notta in 1850, can be present on the volar aspect of the metacarpophalangeal joint [1-12,19-22]. Triggering, snapping, or pain is not common during childhood [16]. Fixed-flexion deformities and Notta nodules are reported as the most frequent symptoms in pediatric cases [2,4,5,22-26]. Therefore, various reports have

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stated that fixed-flexion deformity is a rule for trigger thumb in childhood [2].

Non-surgical management, such as observation, physical therapy, splinting, and corticosteroid injections, has variable results. Percutaneous release was performed as an alternative to open release in pediatric cases during the last decades but has possible risks of neurovascular injury and inadequate release [12]. Open release of the A1 pulley has been utilized for a long time as the traditional treatment, having successful results when executed meticulously. Complications following open release include inadequate release, neurovascular injury, and flexion deficits [19]. Recurrence is reported more regularly in younger age groups than the typical pediatric population [13].

The aim of this study was to evaluate the clinical results, efficacy, and long-term outcomes of surgical release of the A1 pulley in cases of pediatric trigger finger and thumb.

**Patients and Methods**

Between 2009 and 2014, 21 thumbs and eight fingers with triggering were treated in 28 children (12 males and 16 females). Five patients had bilateral trigger thumbs. The mean age was 3 (1-12). 22 (59%) trigger fingers and thumbs had Notta nodules. None of the patients presented with triggering at birth. There

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**Figure 1.** 2-year-old boy - intraoperative view of released tendon.

**Figure 3.** 4-year-old boy - intraoperative view of A1 pulley.

**Figure 2.** 4-year-old boy - intraoperative view of incision design.

**Figure 4.** 4-year-old boy - intraoperative view released tendon.
was no family history noted for any of the patients. 20 (71%) patients had flexion deformities and seven (25%) patients had snapping or triggering at the time of diagnosis.

Open release of the A1 pulley was performed in 27 patients for 32 thumbs and digits, and one patient was followed up with steroid injections having 5 trigger digits. All operations were conducted under general anesthesia and tourniquet control. Transverse skin incisions were made with a conscientious effort to protect the neurovascular structures, and then the A1 pulley was released by longitudinal division. The movement of the affected fingers was controlled in all operations with full extension and flexion of the finger passively. Additionally, free movement of the flexor tendons was checked visually. Skin closure was performed with absorbable sutures. The average tourniquet time was 12 minutes (Figures 1 to 8 shows the intraoperative view of the operations).

**Results**

Neither any complications nor recurrence was noted in this study. Compression garments were applied for 10 days and movement was permitted one day after surgery for all patients. The mean follow-up period was 30 (3-66) months. 27 patients (96%) with 32 (86%) trigger fingers and thumbs were operated on without
any intraoperative or postoperative complications. Steroid injections were performed for just one patient - a 12-year-old girl - and the symptoms were resolved in one month after a one stage injection.

**Discussion**

As far we know, there are few studies reporting trigger finger in pediatric populations. The exact etiology, treatment method, time of surgery, and spontaneous resolution rates are controversial. Diagnosis may be delayed because of the characteristic flexion posture of the newborn.

Verma et al. studied 56 thumbs and did not reveal any abnormal ultrasonographic findings of the A1 pulley [17]. Rodgers et al. described one congenital clasped thumb case in their 1046 patients series [11]. Dinham and Meggitt documented 19 of 105 patients having trigger thumb deformity at birth [10,14]. In this study, we did not note any congenital trigger cases.

Kuo et al. reported that the primary pathology of trigger thumb is associated with the oblique pulley and the Notta nodule is at the proximal part of the stenosing oblique pulley rather than annular pulley [23]. Wass et al. detailed a 23-month-old girl presented with an acute trigger thumb, possibly having a different development pathway of pathology [14]. Trauma has been ascribed as an etiologic factor in the literature, though Verma et al. rebuked this theory [3,17]. Triggering has also been described in identical twins that have a family history and trisomy, and so some authors suggested it as a congenital pathology [7,11]. The higher incidence in Hispanic populations may reveal a relationship between ethnicity and development of trigger thumb [15,16].

When triggering is not diagnosed at birth, awareness of parents is important for diagnosis and treatment. Based on the fact that recognition of minor deformities is hard to recognize, education of physicians and families is important for finding accurate prevalence figures of triggering [1,2,13].

Age is an important factor for surgery because correcting the fixed deformity is challenging [1]. In contrast, it has been also reported that if surgery is the chosen treatment method, age of the patient does not affect postoperative outcomes [13]. Diagnosis is more difficult in children who cannot explain the complaints unless a fixed-flexion deformity develops. Slakey et al. and Herdem et al. suggested changing the description of the disease from congenital trigger thumb to acquired thumb flexion contracture and developmental trigger thumb in children [6,18].

Dinham and Meggitt established a guide for treatment of triggering in 1974: (1) Observation of the patient for 12 months when presenting at birth; (2) Observation of the patient for 6 months when diagnosed from 6 to 30 months; and (3) Operation must be performed before 4 years of age to prevent flexion deformity [1,10,14]. Observation has been suggested by some authors with variable spontaneous resolution rates [1,7,20]. Baek et al. observed 63%, Marek et al had 50%, and Watanabe et al. saw between 7% to 71% cases of spontaneous resolution [1,4,7]. Tordai et al. followed up 17 trigger thumbs and Steenwerckx followed up 57 digits of 41 patients, both findings that the two fingers were resolved spontaneously [11,25].

Observation requires time and close communication and coordination between families, patients, and therapists [1,4,7,19]. Shiozawa et al. reported 67% resolution with splinting and 30% resolution with observation [20]. Marek et al. documented 78% and Watanabe et al. 96% resolution with conservative treatment [4,7]. Complications after splinting included contact dermatitis, withdrawal from treatment, hyperextension of the metacarpophalangeal joint, radial flexion deformity, and residual triggering [4,19].

Masquijo et al. detailed complete release in 4 cases (%20) employing percutaneous release [22]. Further, Amrani et al. reported successful results with percutaneous release in 50 patients, recurrence only taking place in 2 patients [10]. Sevencan et al. saw 31 trigger thumbs of 26 patients and released only the involved part of the pulley when the finger was in the flexion...
posture [16]. Neurovascular injury, A2 pulley or palmar aponeurosis damage, recurrences from inadequate release are possible complications with percutaneous release [12]. Percutaneous release using hypodermic needles might have a similar efficacy and safety as open techniques, a potential alternative to open release [5, 8]. We did not use percutaneous release in pediatric patients because of the possible aforementioned complications.

Several procedures have been put forth over the classical A1 pulley release [1,2]. Bae et al. removed the radial or ulnar slip with selection of the detached slips randomly [7]. If the pathology was not related to a particular slip of the superficial flexor tendon, the ulnar slip resection was usually performed randomly [2,7]. If the flexion contracture persisted after 1 year old, Slakey et al. recommended dividing the A1 pulley [18]. Partial V-shaped resection of the central part of the flexor digitorum superficialis tendon over the ulnar slip has also been reported in pediatric cases [24]. Marek et al. reviewed 24 studies (875 thumbs) regarding open release and found excellent results, thereby advocating open release before 3-4 years old with the promise of few complications [7]. Yet, Cardon et al. have suggested that release of the A1 pulley alone may not be enough in pediatric trigger cases and additional sublimis tendon resectioning (one or both) and release of the A3 pulley is be necessary [21]. Kuo et al. suggested that partial release of the oblique pulley and complete release of the annular pulley was necessary in all thumbs to have full flexor palmaris longus tendon motion [23].

Possible postoperative complications are inadequate release, bowstringing, neurovascular injury, scar contracture, wound healing problems, flexion deficits, and metacarpophalangeal hyperextension deformity [7,19,21]. Farr et al. compared open release, splinting, and hand therapy. They suggested that open release is the most reliable method with the most rapid recovery [19]. We performed open release of the A1 pulley in all patients, except one who was treated with steroid injection. There were no postoperative complications; therefore, we did not need to use any other procedure on our patients.

According to our experience, we suggest that open release of the A1 pulley is a long-standing and effective treatment method for trigger finger and thumb. However, a number of authors have hypothesized that merely releasing the A1 pulley is insufficient and advanced methods may be necessary.

**Conclusion**

Although there are many publications on pediatric trigger finger and thumb, their management is still controversial. There is no significant difference noted in complication frequency between surgical and non-surgical treatment. The open release of the A1 pulley is the traditional method to treat pediatric triggering. Surgical release of the A1 pulley for trigger thumb and finger has satisfactory results with speedy, favorable outcomes in both childhood and infancy periods if performed at the right time appropriately.

**Conflict of interest statement**

The authors have no conflicts of interest to declare.

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