

Trigger Finger at the Distal A2 Pulley with Extension Locking of Proximal Interphalangeal Joint: Category of the Idiopathic Trigger Finger by the Location of Pathologic Lesion

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Abstract

A 44-year-old man came because of the triggering of the right ring finger. Except triggering, the patient could not fully extension of the proximal interphalangeal joint, and flexion contracture of about five degrees was observed. On physical examination, the nodule was not obvious on the A1 pulley, but there was mild tenderness. Despite performing A1 pulley release, the flexion contracture was still observed. Full extension was possible only after giving excessive force and it was kept locked in a state of hyperextension of the proximal interphalangeal joint. Additional incision was performed on the A2 pulley area. In the operative field, when passive flexion of locked finger was performed, the flexor digitorum profundus did not glide into the A2 pulley and became bulged. The extension locking of proximal interphalangeal joint was disappeared after venting distal 4 mm of A2 pulley.

Keywords: *Distal A2 pulley; Trigger finger; Extension locking; Venting*

Received Date: June 13, 2019; **Accepted Date:** June 25, 2019; **Published Date:** June 30, 2019

Introduction

Trigger fingers are known to be caused by volume mismatching of the A1 pulley and flexor tendon [1]. It has been reported that trigger fingers can occur in the A2 pulley area, and it is known to cause symptoms such as extension limitation and flexion locking [2-4]. As far as I know, A2 triggering itself is rare, and cases with extension locking of proximal interphalangeal joint have not been reported. We experienced an A2 trigger finger with extension locking of the proximal interphalangeal joint, and proposed a category of idiopathic trigger finger through literature review and thought about each treatment.

Case Report

A 44-year-old man came to our hand clinic because of the triggering of the right ring finger, which began five years ago. Except triggering, the patient could not fully extension of the proximal interphalangeal joint, and flexion contracture of about five

Citation: Chul-Hyung Lee, Trigger Finger at the Distal A2 Pulley with Extension Locking of Proximal Interphalangeal Joint: Category of the Idiopathic Trigger Finger by the Location of Pathologic Lesion. Clin Surg J 2(1): 16-21.

degrees was observed. In addition, the patient said that it was inconvenient because the ring finger did not completely flex during work. On physical examination, the nodule was not obvious on the A1 pulley, but there was mild tenderness. We planned A1 pulley release. After axillary brachial plexus block, a tourniquet was applied and open A1 pulley release was performed. Degenerative changes of the A1 pulley or abnormal findings of the flexor tendons like nodule were not evident. Despite performing A1 pulley release, the flexion contracture was still observed (Figure 1). Full extension was possible only after giving excessive force, and it was kept locked in a state of hyperextension of two to three degrees of the proximal interphalangeal joint (Figure 2). When compressing the musculotendinous junction of the forearm, other fingers were naturally flexed, but the metacarpophalangeal joint of ring finger was flexed with extension locking on the proximal interphalangeal joint maintained (Figure 3). In the extension locking state, the proximal interphalangeal joint was passively flexed, and locking was disappeared with snapping at about 90 degrees. Extension locking was repeated without improvement. In the operating room, we found a nodule like lesion moving along the flexor tendon during flexion-extension on the A2 pulley area. We explained to the patient that there may be problems on the A2 pulley area. Additional incision was performed on the A2 pulley area. In the operative field, when passive flexion of locked finger was performed, the flexor digitorum profundus did not glide into the A2 pulley and became bulged (Figure 4). We concluded that the triggering occur between the both slips of flexor digitorum superficialis and the flexor digitorum profundus exiting the Camper's chiasm at the distal part of the A2 pulley. The extension locking of proximal interphalangeal joint was disappeared after releasing distal 4mm of A2 pulley. There were no significant enlargement of flexor tendons and inflammatory findings around A2 pulley.

When we asked about the symptom of extension locking to the patients during operation, the patient said that the symptom occurred 3 weeks ago and improved after bending passively using opposite hand.



Figure 1: Despite performing A1 pulley release, flexion contracture of the proximal interphalangeal joint of ring finger was observed.



Figure 2: When passive force for extension of proximal interphalangeal joint was applied, extension locking was occurred.



Figure 3: Despite compressing the musculotendinous junction of the forearm, extension locking of the ring finger was still maintained while other fingers were flexed.



Figure 4: The flexors could not glide into the pulley at distal part of the A2 pulley and became bulged.

Discussion

Seradge et al. [4] first reported triggering at the level of A2 pulley in 1981. In all two cases, triggering with full flexion blocking was continued after A1 pulley release. They recognized the problem of A2 pulley after performing physical examination meticulously. Because of the functional importance of A2 pulley, they recommended reduction tendinoplasty as a treatment method. The authors suggested that a trigger finger with no significant enlargement on the A1 pulley should be suspicious of A2 pulley triggering.

M Nagaoka et al. [2] also reported two cases in which thickened tendons were palpable in the A1 and A2 pulleys. The authors confirmed the hypoechoic enlargement in the distal part of the A2 pulley via ultrasound before the surgery. Nevertheless, the A1 pulley release was performed first, and the symptom was not lost, so the authors underwent surgery for A2 pulley and experienced loss of triggering. Although some cases of the A2 pulley triggering has been reported, there was no case of A2 pulley triggering with extension locking of the proximal interphalangeal joint [3,4]. Treatment has also been shown to reduce the volume of enlarged flexor tendons or lengthening of A2 pulley rather than pulley release due to the functional importance of A2 pulley in most papers [2-4]. In our case, we could not find prominent nodule or enlargement on the flexor tendons. However, on the camper's chiasm distal area of the A2 pulley, we was impressed with the fact that the flexor digitorum profundus tendon gliding between both slips of the flexor digitorum superficialis tendon seemed pretty tight and thought we

should vent it here. When releasing the A2 pulley at 1 mm intervals and releasing a total of 4mm, the hyperextension locking was disappeared. We then experienced several more A2 pulley triggering in our clinics and divided the idiopathic trigger fingers into 4 categories based on location of the lesion with reviewing several papers (Table 1).

Category		Lesion	locking	FC	Treatment
Proximal trigger finger	I	A1 pulley only	Flexion	-	A1 pulley release
	II	A1 pulley + Proximal A2 pulley	Flexion	+	A1 pulley release + Proximal A2 venting
Distal trigger finger	III	Distal A2 pulley	Flexion	-	Distal A2 venting
	IV	Distal A2 pulley	Extension	+	Distal A2 venting

Table 1: Category of the idiopathic trigger finger by the location of pathologic lesion.

Note: FC: Flexion Contracture.

Al-Qattan [5] reported that A2 pulley release after A1 pulley release, in 8% of 50 primary idiopathic trigger fingers, was required in a prospective study. In this paper, the term “idiopathic distal trigger finger” was used to indicate that there was a problem in the distal part of the A1 pulley, which was not expected to improve with A1 pulley release alone. They classified 4 cases as type IV, 8% of the study subjects. Unlike the A2 pulley, the A1 pulley has a small width and is very close to the A2 pulley. Therefore, if the mismatching area between tendon and pulley is small that is not severe case; A1 pulley release alone will improve the triggering. However, if the mismatching area is relatively large that is severe case, triggering is induced not only A1 but also on the proximal A2 pulley, the combination of A1 pulley release and proximal A2 pulley release will be needed for improving symptom. We classified conventional A1 pulley triggering and the idiopathic distal trigger finger referred to by Al-Quattan [5] as proximal trigger finger. This is because it is a disease caused by the proximal area of the A2 pulley, i.e. the A1 pulley, which is just a difference in the severity of the lesion. Therefore, this group needs A1 pulley release. However, the triggering on the distal area of the A2 pulley was classified as a term of the distal trigger finger because in this group, the A1 pulley release did not affect the symptomatic improvement. And we suggest distal A2 pulley venting as a treatment method in this group.

Most trigger digits are considered idiopathic, several diseases or traumatic events have been associated with this entity [6]. These may include carpal tunnel syndrome, diabetes, Rheumatoid arthritis, mucopolysaccharidosis, de Quervain’s disorder, hypothyroidism, and amyloidosis [1,6,7]. In our thought, most idiopathic trigger fingers can be expected to have sufficient symptom relief by venting alone. If the nodule enlargement is severe, reduction tendinoplasty can be performed if there is no improvement in symptoms. If synovitis or inflammation is severe, ulnar slip resection of the flexor digitorum superficialis can also be considered [8]. However, the idiopathic trigger finger due to repeated use of the hand, which is usually encountered in clinical practice, is technically easy to vent to the lesioned pulley, i.e., A1 pulley release, proximal A2 pulley 4 mm release, distal A2 pulley 4 mm release, and A3 pulley release. It should be considered and considered sufficient for simple surgical treatment.

Al-Qattan [5] reported 4 cases (type IV) as a term of distal trigger finger that there was a problem on the distal part of the A1 pulley, but we think that the category III and IV lesions of the distal A2 pulley were the true distal trigger finger.

Treatment of category III is considered to be debulking of the flexor tendon or lengthening of the A2 pulley since Seradge [4] recommended reduction flexor tendinoplasty because of the functional importance of A2 pulley.

However, we think that lesions of category III and IV were not a problem for the entire A2 pulley but anatomically particularly thick distal part of the A2 pulley. So, in the category III, venting of distal A2 pulley can be expected to relieve the symptoms, as if releasing A1 pulley in category I. Nagaoka et al. [2] also reported that the tendon debulking method and distal A2 pulley venting were used together for treatment and distal A2 pulley venting alone could be an option for treatment. In fact, A2 pulley has been reported to have no loss of function even after 25% to 50% of width incision [9]. So, technically easier and simple A2 pulley venting than tendon debulking method should be considered as first choice for treatment.

In this sense, category III and IV caused by distal A2 pulley which is anatomically thick and predominant lesions, are referred to as distal trigger finger, and category I and II which are in the category of the same lesion occurring on the proximal A2 pulley area but different in chronicity or severity are the right proximal trigger finger. The reason we divide the idiopathic trigger finger into this category and use the term distal trigger finger is to prevent unwanted A1 pulley release. Category III, which has similar clinical features, may be misdiagnosed as category I and may not get proper treatment if there is no recognition of the distal trigger finger, and if there is no history of hyperextension locking or if the patient does not adequately describe the symptoms to the physician, category IV may be misdiagnosed for category II, and a completely different surgical treatment can be done. To establish a treatment plan for the idiopathic trigger finger, a thorough physical examination of the position of the tenderness and nodule, i.e. proximal A2, distal A2, as well as A1, is required and ultrasound may be helpful if necessary. In addition, we can determine where to vent if we consider the clinical signs of flexion or extension locking, flexion contracture, etc., which can be seen in our category.

The distal trigger fingers may have tenderness on the A1 pulley, but more severe tenderness or swelling may be observed on the A2 pulley distal portion. They are all middle-aged men in forties, younger than the conventional trigger finger patients, have professional job like chef or guitarist using hands a lot.

Although it was already known about A2 trigger fingers by Seradge [4] in 1981, most textbooks still only mention about A1 pulley triggering. A2 pulley triggering should be suspected in patients whose tenderness or nodule of A1 pulley area is not clear. A careful physical examination is necessary. If necessary, additional diagnostic tests such as ultrasound or MRI should be performed to avoid unnecessary A1 pulley release.

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