

# Endoscopic Retrograde Approach for Trigger Finger Release: A Cadaver Study

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**Summary:** Trigger finger is one of the most common causes of disability and pain in the hand. Current surgical techniques for trigger finger release fall short in that they are performed blindly with trauma to, or require incision of, the palmar fascia, which can be a source of significant and long-lasting morbidity. Retrograde endoscopic release of the A1 pulley was performed through a single incision at the proximal digital crease in cadaveric specimens. The fingers were then dissected to assess for completeness of release and inspected for injury to nearby structures. Complete release of the A1 pulley was noted in 16 of 16 fingers. No significant injuries to the A2 pulley and flexor tendon were found, and no injuries to the digital nerves or vasculature occurred. The described technique, as demonstrated in cadaveric specimens, is a feasible alternative approach in the treatment of trigger finger. The technique allows complete visualization of A1 pulley release through a single palmar fascia sparing incision. (*Plast Reconstr Surg Glob Open* 2020;8:e3294; doi: 10.1097/GOX.0000000000003294; Published online 21 December 2020.)

## INTRODUCTION

Trigger finger is an entrapment tendinopathy in which the flexor tendon catches within a thickened or narrowed A1 pulley.<sup>1-3</sup> With a lifetime incidence between 2% and 3% in the general population, trigger finger is one of the most common causes of disability and pain in the hand.<sup>2,4</sup>

Initial treatment is conservative, but definitive treatment often requires release of the A1 pulley through an open, percutaneous, or endoscopic approach.<sup>4-9</sup> The described surgical techniques fall short in 1 of the 2 ways: they require an incision of the palm, and the underlying palmar fascia or the release is performed blindly.<sup>3,10,11</sup>

The purpose of the study was to prove feasibility of a new retrograde endoscopic technique for release of the A1 pulley through a single incision at the proximal digital crease. Similar to endoscopic carpal tunnel release, the

technique avoids an incision in the palmar fascia, which can be a source of significant and long-lasting morbidity.

## MATERIALS AND METHODS

Release of the A1 pulley was performed in the fingers of 4 embalmed cadaveric hands (Innoved Institute, LLC). First, the proximal digital crease was identified, and the width was incised transversely (Fig. 1). Blunt dissection was then performed down to the level of the flexor tendon sheath. With the finger held in extension, a 2.7-mm arthroscope with EndoSleeve attachment (A.M. Surgical, Inc.) was inserted retrograde and situated on the distal edge of the A1 pulley. The endoscope was advanced proximally (retrograde) along the length of the pulley to a point just distal to the distal palmar crease. The blade was well visualized throughout the release (Fig. 2). The surrounding tissue was inspected and the instrument removed. Release was performed in 16 fingers collectively by all the authors, who were first-time users of the device. The fingers were subsequently dissected open to assess for completeness of release and injury to nearby structures (Fig. 3). We measured the length of the release with a Baseline aesthesiometer (Fabrication Enterprises). We then inspected the A2 pulley, the flexor tendon, the digital nerves, and the digital vessels for injury. Descriptive statistics were used to analyze length of release.

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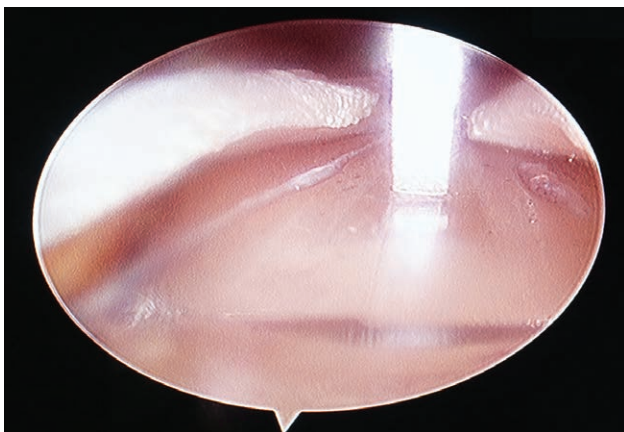
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**Fig. 1.** The surgical incision (yellow line) is placed at the proximal digital crease at the base of the proximal phalanx.



**Fig. 2.** Release of the A1 pulley is well visualized on endoscope.

## RESULTS

Results are summarized in [Table 1](#). Complete release of the A1 pulley was noted in 16 of 16 fingers (100%).



**Fig. 3.** After endoscopic treatment, specimens were opened to examine for completeness of release and to inspect for injury.

The average length of release was 1.4cm (SD 0.2). No significant injuries to vital structures occurred. A partial transverse laceration to the A2 pulley was noted in one finger; and a minor longitudinal cut occurred in one of the flexor tendons. No injuries to the nerves or vasculature occurred.

## DISCUSSION

The advantages and disadvantages of each surgical technique are well known, yet controversy remains as to which is superior.<sup>2,11,12</sup> Studies comparing open surgery versus percutaneous release, for example, show that the treatments are overall equal in their success and complication rate, but the quality of evidence is low.<sup>2,11,12</sup> Endoscopic release seemingly offers the best of both the open and percutaneous techniques, offering complete visualization while minimizing soft tissue damage and incomplete or excessive release. The approach remains the least popular, however, owing to its steep learning curve and the cost of the instruments.<sup>13</sup>

The technique described here has the advantage of complete visualization. Completeness of release is easily confirmed with the endoscope, and injury to the digital neurovascular bundle, the flexor tendon, and the A2 pulley is minimized. The direction of release, however, is novel. Release of the A1 pulley in a distal-to-proximal (retrograde) fashion decreases inadvertent injury to the A2 pulley. In our hands, 2 clinically insignificant injuries occurred. The A2 pulley was partially lacerated in a transverse direction one time. This occurred during blunt dissection before the endoscope was introduced. A minor longitudinal laceration was also noted in one of the flexor tendons. Similar injuries have been described during both routine flexor tendon repair and percutaneous trigger release in clinical and cadaveric studies, and result in no perceptible adverse outcomes.<sup>14-20</sup> Pope and Wolfe, for example, report scoring of the flexor tendon in most of their described cases but consider the injury to be of no consequence.<sup>14</sup> Although the difference among scoring, abrasion, and minor laceration is difficult to compare between studies, no observable complications have been reported.<sup>14,17-20</sup> The minor injuries reported in this study

**Table 1. Success and Clinically Significant Injury Rates by Finger**

	Complete Release, n (%)	Average Length of Release (cm)	Neurovascular Injury	Laceration of A2 Pulley	Flexor Tendon Injury
Index	4 (100)	1.2 ± 0.2	0	0	0
Middle	4 (100)	1.3 ± 0.2	0	0*	0
Ring	4 (100)	1.5 ± 0.2	0	0	0
Little	4 (100)	1.2 ± 0.3	0	0	0†
Total	16 (100)	1.4 ± 0.2	0	0*	0†

\*One transverse cut noted of the A2 pulley.

†One longitudinal incision of the flexor tendon.

are not clinically significant, occurred less frequently than reported elsewhere, and would otherwise go undetected in humans.

The second advantage of our technique—and the most significant compared with those previously described—is the placement of the incision. Rates of major complications associated with open release range from 0.6% to 7.5% and include persistent or recurrent triggering, nerve damage, synovial fistula, and joint arthrofibrosis.<sup>21–23</sup> Minor complications are reported to occur in up to 30% of patients treated with the open surgical approach, with the most common complaint after open release being pain and tenderness associated with the surgical scar.<sup>21–23</sup> These symptoms may limit a patient's hand use for weeks after surgery.<sup>10,13,21,22</sup> In the open approach, an incision is made in the palm, most commonly at or slightly distal to the distal palmar crease, which violates the palmar fascia and causes great discomfort to patients.<sup>10,11</sup> We believe this pain is analogous to the tenderness experienced with open carpal tunnel release, which is lessened through use of a non-palmar incision during endoscopic release.<sup>24</sup>

The previously described endoscopic techniques for trigger release similarly violate the palmar fascia, requiring an incision at the proximal digital crease and also at the proximal palmar crease. Although the authors' results support use of endoscopic technique, it is our belief that incision of the palmar fascia, no matter the location, increases the patient's risk for long-term pain and disability associated with the scar.<sup>19,25</sup>

To date, endoscopic treatment for trigger finger has been used the least of the treatment options because many believe that the technique has a greater learning curve.<sup>11,13</sup> Our results suggest the contrary by demonstrating feasibility, without clinically significant injury, in first-time users. Our study is limited by use of the technique in cadaveric specimens, which limits our ability to examine the aesthetic and functional outcomes of the proximal digital crease incision. Future studies will aim to explore these outcomes with in vivo use of this retrograde non-palmar endoscopic technique. Other areas for future study include operative time and cost–benefit analysis of the technique.

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