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Cadaveric Study of Thread Trigger Finger Release Using Newly Developed Thread

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Objective

Thread trigger finger release (TTFR) is a percutaneous first annular (A1) pulley resecting technique using resecting thread under ultrasound guidance without skin excision. It can be performed in two ways, distal and proximal approaches according to the direction of procedure. This cadaveric study was conducted to examine the operational usefulness and feasibility of TTFR with newly developed domestic thread (Smartwire) and verify which approach is safer and more effective in TTFR by comparing the results between the distal and proximal approach.

Method

TTFR with Smartwire and 20G Tuohy needle was performed on 12 fresh cadaveric hands (12 thumbs, 48 other fingers) by two different experts with equal assignments. The distal and proximal approach were equally performed in 6 hands each. (Figure 1, 2) After TTFR, the anatomical analysis was performed by a blinded anatomist. (Figure 3) The completeness resection of the A1 pulley and the presence of damaged nearby structures were assessed.

Results

The complete A1 pulley resection rates were 83.3% in the thumb and 100% in other fingers with the distal approach and 50.0% in the thumb and 83.3% in other fingers with the proximal approach. There were no injuries to the digital nerves and flexor tendons except 1 minor partial flexor tendon injury in the left 4th finger with the proximal approach. (Table 1)

Table 1. The results of A1 pulley resection and damage to nearby structures.

	Distal approach	Proximal approach
A1 pulley (Thumbs, N=12)		
Complete resection (N (%))	5 (83.3%)	3 (50.0%)
Incomplete resection (N (%))	1 (16.7%)	2 (33.3%)
Failure to resection (N (%))	0 (0.0%)	1 (16.7%)
A1 pulley (Other fingers, N=48)		
Complete resection (N (%))	24 (100.0%)	20 (83.3%)
Incomplete resection (N (%))	0 (0.0%)	3 (12.5%)
Failure to resection (N (%))	0 (0.0%)	1 (4.2%)
Damaged structures (N=60)		
Digital nerve (N (%))	0 (0.0%)	0 (0.0%)
Flexor tendon (N (%))	0 (0.0%)	1 (3.3%)

Conclusions

TTFR with smartwire is the safe and effective procedure for resecting the A1 pulley, especially with the distal approach.

Figure 1. Two ways of thread trigger finger release (TTFR) procedure. A: Needle puncture sites and direction of procedure (blue points indicate distal puncture sites, red points indicate proximal puncture sites, dotted lines indicate needle pathway under the skin, black arrow indicates the direction of distal approach, and green arrow indicates the direction of proximal approach). B: Distal approach of TTFR with ultrasound guidance. C: Looped smartwire with the distal approach before resecting the A1 pulley.

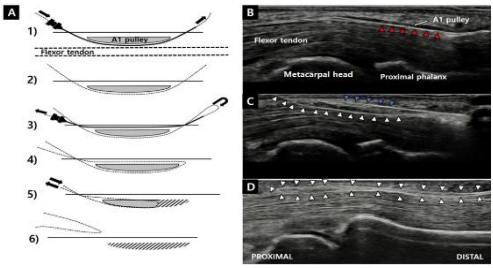

Figure 2. Schematic drawing illustrating the thread trigger finger release (TTFR) procedure and ultrasound images during TTFR procedure with the distal approach. A: 1) The 20G Tuohy needle was inserted under the A1 pulley with hydrodissection and exited then Smartwire-01 passed through the needle. 2) The needle was removed, leaving the Smartwire-01 under the A1 pulley. 3) Another needle was inserted at the same entry point, passed above the A1 pulley and exited at the same exit point then the end of the thread was inserted into the needle tip and passed through the needle. 4) After withdrawing the needle, the looped Smartwire-01 remained. 5) A1 pulley was resected by reciprocal movement of Smartwire-01. 6) A1 pulley was resected completely and Smartwire-01 was exited out. B: Red arrowheads indicate the needle under the A1 pulley. C: Blue arrowheads indicate the needle above the A1 pulley and white arrowheads indicate leaving Smartwire-01 under the A1 pulley. D: White arrowheads indicate looped Smartwire-01 before resecting the A1 pulley.

Figure 3. Gross findings of the resected A1 pulley after performing thread trigger finger release with distal approach without injuries to digital nerves and flexor tendons. The red arrowheads indicate the completely resected A1 pulley in the thumb and other fingers.