

Eight-strand Cross-locked Cruciate Flexor Tendon Repair Using Double-stranded Suture: A Description of the Surgical Technique

Kentaro Watanabe, MD, PhD
Hideyuki Ota, MD, PhD
Hiroshi Sasaki, MD

Summary: This article describes a technique for improved repair of digital flexor tendon laceration. Eight-strand cross-locked cruciate repair using 4-0 caliber double-stranded suture is not bulky and has a smooth configuration for tendon gliding. Additionally, it has sufficient strength for early postoperative active motion exercise. (*Plast Reconstr Surg Glob Open* 2016;4:e1048; doi: 10.1097/GOX.0000000000001048; Published online 7 November 2016.)

The strength of the core suture is one of the important factors for valid flexor tendon repair. It is obvious that an increased strand number increases repair gap resistance and strength.¹ Although 8-strand repair strength is equal to or stronger than 6-strand repair strength, there is a disadvantage in that the repair becomes bulky because of the increased number of anchors and knots at the surface of the tendon. This article describes an 8-strand repair technique that is not bulky and that has a smooth geometric configuration.

SURGICAL TECHNIQUE

The technique is basically a modification of cross-locked cruciate repair (the so-called Adelaide repair) using 4-0 caliber double-stranded nylon suture. It is also possible to use 4-0 caliber looped suture for this technique. The starting point is placed in the center of the lacerated site of the tendon, and a 2-mm-wide cross-locked anchor is made at the point of an 8-mm-long purchase. Then, a cross-locked anchor is made in the same fashion at the opposite side of the tendon. After making 4 cross-locked anchors bisymmetrically, each thread is tied under the tension that shortens the encompassed tendon segment by 10%. Because a single knot tied by double threads is bulky

and tends to unravel compared with knots tied by a single thread, threads are tied by 3 suture throws, respectively, and embedded in the repaired site of the tendon (Fig. 1).

DISCUSSION

The important aspects of flexor tendon repair are that the suture should have sufficient mechanical strength, it should not inhibit the inner healing of the tendon, and it should not result in a bulky configuration, which would affect tendon gliding. The Adelaide repair is recommended because of its technical simplicity and practical mechanical strength.²⁻⁴ Also, it has a smooth geometric configuration with only 4 cross-locked anchors at the tendon surface. However, it is not sufficient to withstand early postoperative active motion exercise. Savage repair, triple Tsuge repair (the so-called Tang repair), and Lim-Tsai repair are 6-strand repairs (Fig. 2), and therefore, each has sufficient mechanical strength to perform early postoperative active motion exercise.⁵ However, the Savage repair and triple Tsuge repair have 6 total knots and locked anchors at the surface of the tendon, which might increase the work of flexion.⁶ The Lim-Tsai repair has an asymmetrical oblique strand and tends to be distorted although the total number of anchors is only 4. The repair presented here has 4 cross-locked anchors at the tendon surface, and 2 knots are embedded in the repair site of the tendon. Compared with the double (ie, twice repeated) Adelaide repair using single-strand suture, it is technically easy, and the load being applied to each strand is more equal. Additionally, the repair is not distorted owing to its geometric configuration, and therefore, minimal increase in the work of flexion is expected (Fig. 3). Recently, with institutional ethics board approval, the authors have

From the Department of Orthopaedic Surgery, Nagoya Ekisaiikai Hospital, Nagoya, Japan.

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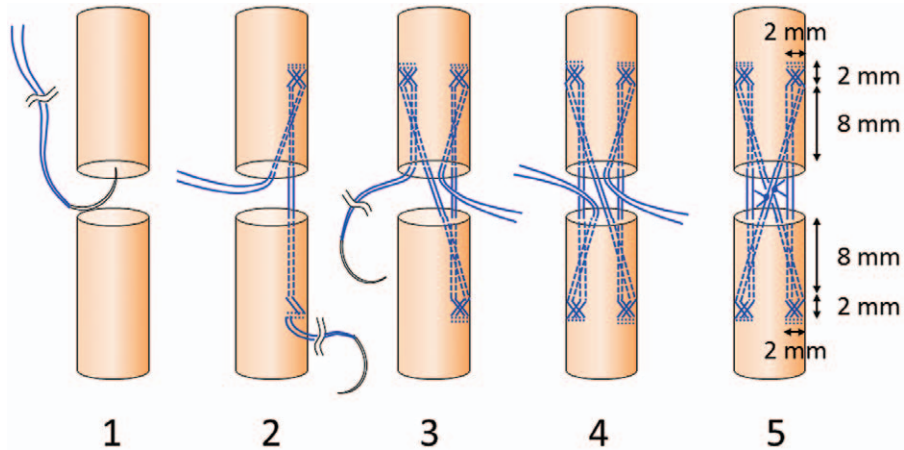


Fig. 1. A diagram of the 8-strand cross-locked cruciate repair technique.

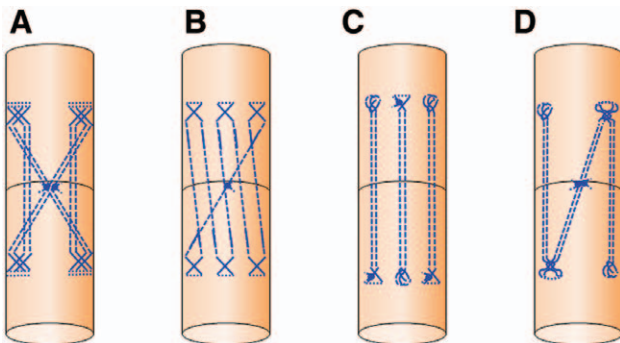


Fig. 2. An illustration of various repairs: (A) 8-strand cross-locked cruciate repair, (B) Savage repair, (C) triple Tsuge repair, and (D) Lim-Tsai repair.

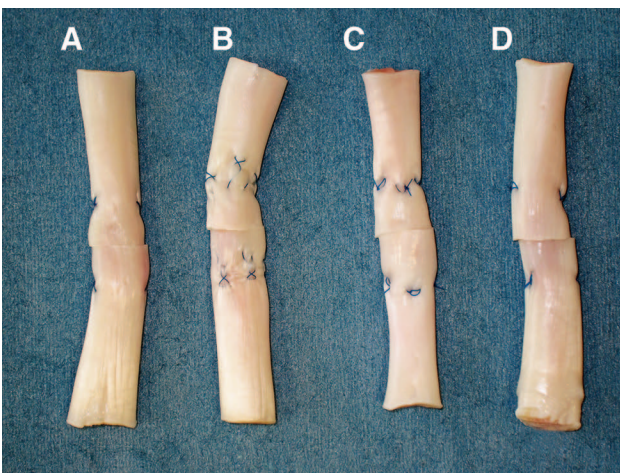


Fig. 3. Configurations of various repairs using a porcine tendon: (A) 8-strand cross-locked cruciate repair, (B) Savage repair, (C) triple Tsuge repair, and (D) Lim-Tsai repair.

treated flexor tendon lacerations with the presented repair using an additional 6-0 cross-stitch circumference epitendinous suture and early postoperative active motion exercise, with good results. Eight strands using a 4-0 caliber thread are stronger than 4 strands using a 3-0 caliber thread⁷; however, it is unclear whether they are stronger than 6-strand repair using a 3-0 caliber thread. Thus, biomechanical studies and more clinical trials are required.

Kentaro Watanabe, MD, PhD

Department of Orthopaedic Surgery
Nagoya Ekisaikai Hospital
4-66 Shonen-cho, Nakagawa-ku
454-8502 Nagoya, Japan
E-mail: watanabeke@ekisai.or.jp

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