

Flexor Tendon Repair of The Right Fifth Finger Using Modified Kessler Tenorrhaphy and Palmaris Longus Tendon Graft: Case Report

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ABSTRACT

Chronic flexor tendon injuries of the hand represent a major technical challenge due to degenerative changes, tendon retraction, and fibrosis that prevent primary repair. We report the case of a 63-year-old female patient who suffered a laceration on the right fifth finger that was inadequately treated and, one year later, presented with complete loss of active flexion. Tendon reconstruction was performed using an autologous palmaris longus tendon graft and a modified Kessler tenorrhaphy, preserving the anatomical pulleys and initiating early rehabilitation under a modified Kleinert protocol. The postoperative course was favorable, with progressive recovery of motion and complete functional restoration at six months, without complications or donor-site deficits. This case demonstrates that even in long-standing injuries, reconstruction with an autologous palmaris longus graft and an appropriate suture technique can successfully restore grasping function and manual dexterity.

KEYWORDS: Tendon injury, surgical repair, Kessler technique, digital flexors, hand trauma, case report.

ARTICLE DETAILS

Published On:
30 November 2025

Available on:
<https://ijmscrs.com/>

INTRODUCTION

Flexor tendon injuries of the hand represent a significant challenge in surgical practice, as they compromise fine motor function and dexterity essential for daily activities. The flexor tendons are anatomically complex structures whose repair requires meticulous technique to restore strength and mobility while avoiding adhesions or secondary ruptures. Surgical repair through a modified Kessler tenorrhaphy has become one of the most widely employed techniques due to its

balance of tensile strength, simplicity, and preservation of tendon glide. This method ensures adequate coaptation of the tendon ends and allows for early rehabilitation—two critical factors for functional success.¹

We present the case of a 63-year-old female patient with a chronic rupture of the flexor tendon of the right fifth finger, treated with a modified Kessler tenorrhaphy and an autologous palmaris longus tendon graft. The surgical findings, technical details, and postoperative course are

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described, emphasizing the importance of anatomic reconstruction and early rehabilitation in achieving optimal hand function.^{1,2}

CASE REPORT

A 63-year-old right-handed female patient with a history of controlled hypertension suffered a laceration to the palmar surface of the right fifth finger caused by a glass fragment while performing household tasks approximately one year prior. At that time, she was treated in an emergency department, where only wound cleaning and skin suturing were performed, without tendon exploration or subsequent follow-up. Since the event, she had been unable to actively

flex the finger but retained full passive flexion and extension. Over time, she noticed weakness in grip and difficulty performing fine motor tasks requiring precision.

At her specialized consultation one year later, examination revealed a two-centimeter linear palmar scar on the fifth finger, without inflammatory signs or tenderness. Passive flexion was complete, but active flexion of the proximal and distal interphalangeal joints was absent, while digital sensation and perfusion were intact. Ultrasound and MRI studies demonstrated discontinuity of the flexor digitorum profundus tendon with proximal retraction and distal fibrotic degeneration, confirming a chronic rupture.



Figure 1 and 2: Preoperative images.

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Figure 3: Preoperative images.

Surgical reconstruction using an autologous palmaris longus tendon graft was indicated. Under regional anesthesia with axillary block and pneumatic tourniquet control, a zigzag Brunner-type incision was made along the palmar surface of the affected finger, extending into the palm. Careful

dissection revealed extensive fibrotic adhesions and partial loss of the tendon sheath. The distal tendon stump was absent, and the proximal stump was retracted and degenerated, unsuitable for direct repair.

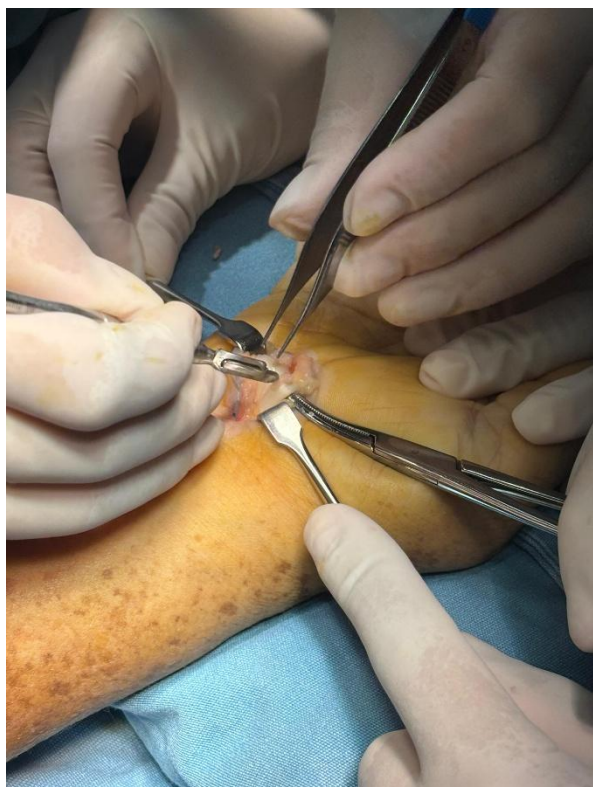


Figure 4: Harvesting of the palmaris longus tendon graft.



Figure 5: Tenorrhaphy procedure.

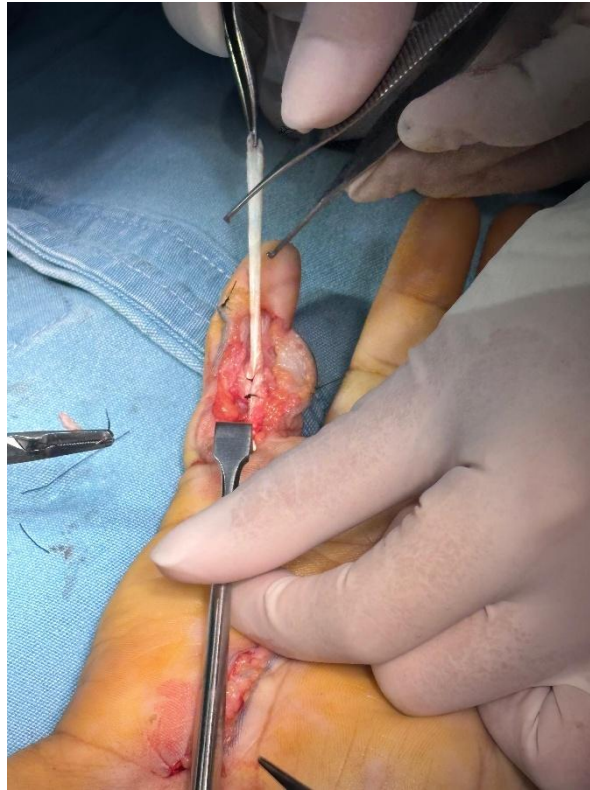


Figure 6: Tenorrhaphy procedure.

The palmaris longus tendon was harvested from the same forearm through a three-centimeter longitudinal incision. After dissection, a 12-centimeter graft was obtained, irrigated, and kept moist until implantation. In the recipient bed, pulleys A2 and A4 were released but preserved intact, and scar tissue was removed. The graft was proximally attached to the flexor digitorum profundus stump using a modified Kessler tenorrhaphy with 4-0 polypropylene suture. Distally, it was inserted into a transverse bone tunnel at the base of the distal phalanx and anchored with non-absorbable suture, reinforced circumferentially with 6-0 epitendinous stitches. Passive motion confirmed smooth glide and adequate tension.

The wound was irrigated and closed in layers. The hand was immobilized in a dorsal Kleinert splint with the wrist flexed 30°, metacarpophalangeal joints at 70°, and interphalangeal joints extended.

The postoperative course was uneventful. Passive controlled motion began 48 hours later under a modified Kleinert protocol combining passive flexion and active extension with elastic bands. At four weeks, active flexion exercises were initiated under supervision. At three months, partial flexion recovery was observed, with progressive improvement in grip strength. At six months, active flexion reached approximately 80% of the normal range, with full extension and no evidence of adhesions or rupture. At one year, the patient demonstrated full functional mobility of the fifth finger, adequate grip strength, and no residual pain.

DISCUSSION

Flexor apparatus injuries of chronic evolution remain one of the most complex problems in reconstructive hand surgery

due to the anatomical, functional, and biological alterations that develop over time. After an untreated tendon rupture, the proximal stump retracts, the tendon degenerates, fibrosis develops within the sheath, and the synovial tunnel may be partially or totally lost.³ These changes hinder tendon gliding and compromise functional outcomes, making direct repair unfeasible. In such cases, reconstruction using an autologous tendon graft becomes the best therapeutic option to restore anatomical continuity and biomechanical function.⁴

The palmaris longus tendon is considered the graft of choice for such reconstructions, having been used for decades with excellent outcomes due to its appropriate length, diameter compatibility, and ease of harvest. Its removal produces no functional deficit, as it is an accessory tendon absent in up to 15% of individuals. Compared with other potential grafts such as the plantaris or toe extensors, the palmaris longus offers the advantage of being in the same operative field, minimizing operative time and donor-site morbidity.⁵

The modified Kessler tenorrhaphy is one of the most widely accepted suture techniques for tendon repair. Its core cross-stitch design provides strong tensile resistance, distributes load evenly, and minimizes rupture risk during early mobilization. Biomechanical studies have shown that repairs with at least four core strands reinforced by epitendinous sutures offer sufficient strength for early active rehabilitation.⁶

A key factor in chronic lesions is meticulous preparation of the tendon bed. Removal of scar tissue and careful release of pulleys A2 and A4 are essential to restore the anatomical tunnel that allows physiological tendon motion. Preservation of these pulleys is crucial in preventing adhesions and maintaining efficient digital flexion, avoiding the “bowstringing” phenomenon.⁶

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Postoperative rehabilitation is critical. Early mobilization within 48–72 hours promotes tendon nutrition and reduces adhesions. The modified Kleinert protocol—combining passive flexion and active extension—permits controlled tendon motion without excessive stress. Gradual active exercises later strengthen the graft and encourage collagen reorganization, achieving functional restoration.⁷

The results of this case were excellent: the patient achieved full active motion, strength, and fine motor control with no complications. These findings are consistent with published reports showing functional success rates above 85% for reconstructions using palmaris longus grafts and modified Kessler sutures.⁸

Systemic and local factors such as age, comorbidities, and tissue quality also influence prognosis. Despite being 63 years old, the patient's vascularization, tissue viability, and adherence to therapy favored success. Therefore, advanced age should not be considered a contraindication when the patient's general condition and motivation are adequate.⁹

This case highlights that, even after a one-year delay, flexor tendon reconstruction with a palmaris longus graft can restore nearly normal function. Precise surgical technique, proper tensioning, preservation of anatomical structures, and early, supervised rehabilitation are essential for achieving optimal outcomes.¹⁰

CONCLUSION

Delayed repair of chronic flexor tendon injuries using an autologous palmaris longus tendon graft and modified Kessler tenorrhaphy is a reliable and effective surgical approach. The success of this technique relies on accurate diagnosis, meticulous surgical planning, respect for the integrity of the pulley system, and structured postoperative rehabilitation. Even after long intervals following injury, satisfactory functional recovery can be achieved, restoring hand strength, dexterity, and quality of life.^{11,12}

This case reinforces the importance of early referral and specialized management in hand trauma. When primary repair is not possible, reconstruction with an autologous graft remains a viable and safe alternative. Through careful technique and multidisciplinary follow-up, complete restoration of motion and function is achievable, allowing patients to regain independence and return to daily activities without limitations.¹³

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