Hunter procedure for tenosynovitis management. A case report

Jennifer Hernández Licona M.D.
Rodrigo Emmanuel Ferrero Balado M.D.
Elizabeth del Carmen
Rodriguez Rojas M.D.
Amador Jimenez Leyva M.D.
Luis Alfredo Lara Ralon M.D.
Erik Beltran Serrano M.D.

Mexico City, Mexico

Case Report

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Background: Pyogenic flexor tenosynovitis (PFT) is a closed space infection that can lead to stiffness, functional loss and even amputation. In zone II lesions complicated with severe adhesions and disruption of the pulley system, two-stage reconstruction using the Hunter procedure represents an effective management option.

Case report

We present a 65-year-old male patient with a history of diabetes mellitus and smoking, who developed PFT secondary to a puncture wound in the third finger of the right hand, with evolution to functional sequelae after primary tenorrhaphy. Neotendinous sheath reconstruction was performed by Hunter's procedure, using a 20 Fr silicone feeding tube as a substitute for Hunter's rod due to lack of availability. During surgery, extensive fibrosis and absence of the pulley system were identified, so they were reconstructed using removed superficial flexor tissue. The patient presented favorable postoperative evolution, with preservation of sensibility, without complications, with progressive improvement of mobility, and is currently in protocol for the second phase of reconstruction.

Discussion

The Hunter procedure allows restoration of digital function in complex zone II lesions, being especially useful in cases with severe adhesions and pulley disruption, even in resource-limited settings using alternatives such as feeding tubes instead of the traditional silicone rod. A structured rehabilitation protocol is essential to maximize functional recovery.

Conclusion

Two-phase reconstruction with the Hunter technique is an effective strategy for the management of functional sequelae after PFT in zone II, allowing recovery of digital function in cases of severe structural damage, with options adaptable to resource-limited settings.

Key words: Flexor tendon reconstruction, Hunter procedure, Pyogenic flexor tenosynovitis, Two-stage tendon reconstruction

Pyogenic flexor tenosynovitis (PFT) is a closed-space infection of the flexor tendon sheath system of the fingers of the hand. PFT is a problem that remains common, with a prevalence of 2.5% to 9.4% of all hand infections. (1) PFT can be caused by local inoculation, through lacerations, puncture wounds, and bites. (2) The most frequently involved microorganisms are methicillin-resistant Staphylococcus aureus (MRSA) (38%) and methicillin-sensitive Staphylococcus aureus (MRSA) (22%), as well as streptococcus species (18%) and other common skin flora. (3) This infection can lead to complications such as digital stiffness, impaired function and even amputation of the affected finger, so early diagnosis and proper treatment of these infections are crucial. (2)

Flexor tendon injuries in zone II are the most difficult to treat, previously conservative treatment was preferred, as the area was described as “no man's land”. (4) Currently this concept has changed, opting for primary and secondary repair of the flexor tendons of the digital sheath, reserving reconstruction with tendon grafts for the loss of tendon substance or for irreversible retraction of the tendon ends in case of deferred treatment due to patient negligence or misdiagnosis. (5,6) In case there is an excessive amount of adhesions in the surgical bed or an altered pulley system, the treatment to be chosen is a two-stage reconstruction, being the Hunter procedure the most widely accepted treatment (7, 8)

Therefore, we present the case of a patient who developed functional sequelae following pyogenic tenosynovitis secondary to a puncture wound

From the Department of Plastic and Reconstructive Surgery at Regional Hospital “Lic. Adolfo Lopez Mateos” ISSSTE, Mexico City, México. Received on July 18, 2025. Accepted on July 21, 2025. Published on July 23, 2025.

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Figura 1. X-ray of the right hand with pyogenic tenosynovitis, without evidence of osteomyelitis.

in the third finger managed by tendon sheath reconstruction using the Hunter procedure.

Case report

The patient is a 65-year-old male with a history of diabetes mellitus, arterial hypertension under treatment and carpal tunnel syndrome that required median nerve release and smoking for 40 years. His current condition began when he was washing a knife and suffered an unintentional injury at the level of the third finger of the right hand at the level of flexor zone II, he had a deep puncture wound with bleeding, so he came to this unit, initially managed with primary tenorrhaphy of the superficial flexor tendon, presented two weeks later with pyogenic tenosynovitis as a complication (Figure 1), managed with antibiotic therapy and mobilization, during the follow-up showing sequelae in the limitation of the arcs of movement for flexion and extension of the third finger of the right hand, Therefore it was decided to perform reconstruction of the flexor neotendinous sheath by means of a hunter procedure, performing as first surgical time a Bunnel incision in the axis of the third finger to the palmar region, providing wide exposure of the flexor tendon, providing a wide exposure of the flexor tendon from the middle of the palm to the distal phalanx of the third finger, it was dissected by planes identifying abundant fibrosis at the level of the flexor sheath, the FSD and the FDP were cut and extracted, likewise, the

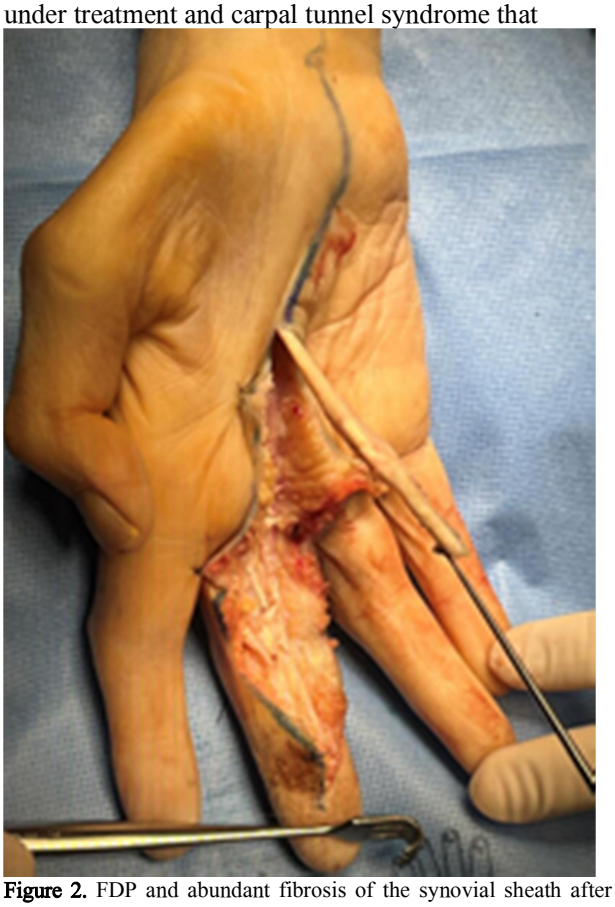

Figure 2. FDP and abundant fibrosis of the synovial sheath after dissection by planes of zone II and zone III of the third finger.

Figure 3. Placement of the 20 Fr silicone probe at the level of the flexor sheath of the third finger.

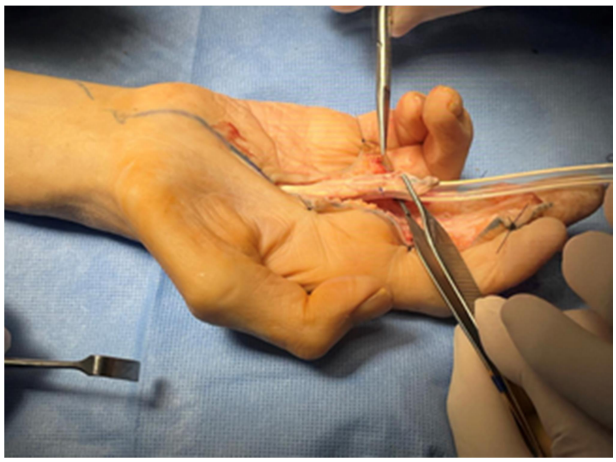

Figure 4. The proximal end of the probe is fixed to the dorsal region of the FPD at the level of the palm.

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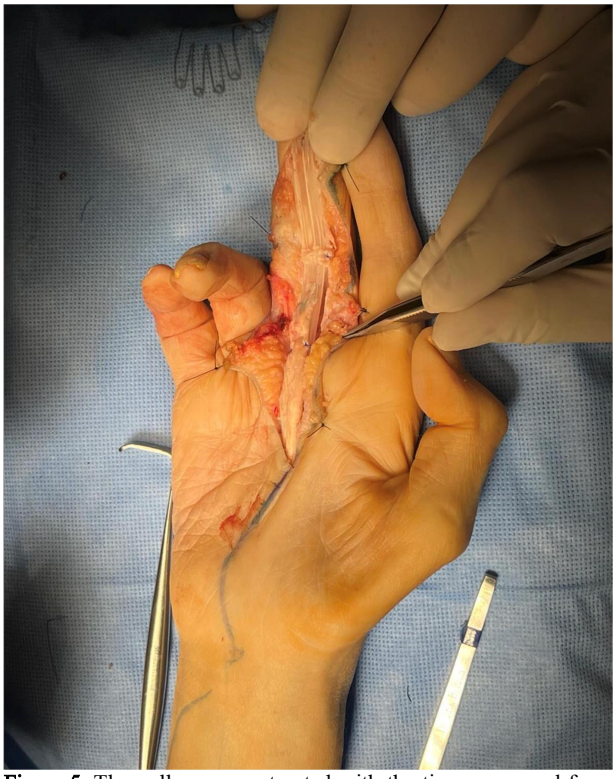

Figure 5. The pulleys reconstructed with the tissue removed from the FSD and the fixation of the distal end of the zone to the distal phalanx are observed.

pulleys were not observed secondary to inflammation and previous surgery (Figure 2). A 20 Fr silicone feeding tube was inserted in the trajectory of the FDP at the level of the flexor sheaths of the third finger (Figure 3), the distal end of the tube was sutured to the distal phalanx and the proximal end was fixed to the FDP at the level of the palm (Figure 4), the pulleys were reconstructed with the tissue extracted from the FSD, fixing them along the entire trajectory of the tube with 4-0 prolene (Figure 5), the skin was closed with 3-0 Nylon. During postoperative follow-up, the surgical wound was found to be free of infection with preserved sensitivity and limited flexion and extension movements. A weekly follow-up was given, indicating passive mobilization 3 weeks after the procedure, without postoperative complications, currently in pre-surgical protocol to perform tendon transposition as a second reconstructive time.

Discussion

Work-related flexor tendon injuries account for 25% of acute traumatic flexor tendon injuries, most frequently in construction and extraction occupations (44%), food preparation and service (14%), and transportation and material moving (12%) (9). The most common mechanism of injury is the puncture wound, which may progress to pyogenic flexor tenosynovitis (PFT) due to direct penetrating inoculation, responsible for 61-76% of cases (10).

PFT is an infection of the deep space of the deep flexor sheath that can affect any finger and can progress rapidly and cause severe structural damage. Despite early treatment, the complication rate can be as high as 38%. The main complication associated with TFP is stiffness secondary to flexor tendon adhesions, thickening of the joint capsule or destruction of the sheath and pulley system as a result of infection or iatrogenic injury, and in some patients the infection can spread to osteomyelitis or joint stiffness that can lead to amputation of the finger, with an incidence of 17% to 29% (11, 12).

In these scenarios, reconstruction becomes an option to restore tendon function, provided there is adequate vascularization and patient commitment to rehabilitation (13). Tendon reconstruction can be one-stage or two-stage and each has its indications. Two-stage reconstruction is recommended when there is involvement of the pulley system or the presence of adhesions or in tendon lesions of poor prognosis in Boyes classification 2-5 (5, 8), being the hunter procedure the most widely accepted treatment. In our case we chose to perform this procedure due to the surgical history and the PFT, which suggested a great involvement of the pulleys and abundant adhesions.

The Hunter procedure (HP) described by Hunter and Salisbury (14), consists of a two-phase staged reconstruction, where in the first phase a silicone rod (3 to 6 mm) is placed in the anatomic location of the deep flexor tendon to recreate the flexor sheath, The distal fixation of the rod can be performed by fixing it to the distal stump of the FDP, while the proximal fixation has been described in two variants, a fixation of the rod at the level of the palm or at the level of the forearm, with no difference in the results between one and the other. In this first stage, advantage should be taken to repair associated lesions such as nerves and to treat any limitation of extension such as skin retraction. Subsequently, the patient should undergo rehabilitation for 3-6 months to improve the range of motion of their joints. The second phase consists of completing the reconstruction by replacing the Hunter rod with a flexor tendon graft. The options to perform this reconstruction can be with extrasynovial tendons such as the palmaris longus or plantaris as they are the easiest to harvest and less morbidity at the donor site. (8) Complications of this procedure include exposure of the rod, infection and synovitis. (15)

In a retrospective study, Şahin et al. (7) compared the clinical results between the use of Hunter rod and nasogastric tube in two-stage reconstruction, finding satisfactory functional results in both groups and no significant differences in complications, highlighting the use of the nasogastric

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tube as an alternative in contexts of resource limitations, although with slightly inferior functional results. In our case, we opted for the Hunter technique using a 20 Fr silastic feeding tube as a substitute for the Hunter rod due to lack of availability, with favorable post-surgical evolution, without associated complications and with adequate preservation of sensitivity and progression of range of motion, keeping the patient in protocol for the second phase of reconstruction.

Conclusion

Flexor tendon reconstruction using the Hunter technique is an effective option for restoring digital function in zone II injuries with severe structural damage and multiple post-infection adhesions, even in resource-limited settings using alternatives such as a feeding tube, provided it is accompanied by an appropriate rehabilitation protocol to maximize functional recovery.

Conflicts of interests

It is declared that there are no conflicts of interest related to the publication of this work.

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References

1. Chapman, T., & Ilyas, A. M. (2019). Pyogenic Flexor Tenosynovitis: Evaluation and Treatment Strategies. *Journal Of Hand And Microsurgery*, *11*(3), 121-126.
2. Ray G, Sandean DP, Tall MA. Tenosynovitis. [Updated 2023 May 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan
3. Dos Santos Freitas, L., Jacques, R. A., Richter, M. F., Silva, A. L., & Caramão, E. B. (2008). Pressurized liquid extraction of vitamin E from Brazilian grape seed oil. *Journal of chromatography. A*, *1200*(1), 80–83.
4. Ahmad, T., Bashir, S. A., Zaroo, M. I., Wani, A. H., Rashid, S., & Jan, S. (2016). Silicone Foley’s catheter as an effective alternative to Hunter’s rod in staged flexor tendon reconstruction of the hand. *Indian Journal Of Plastic Surgery*, *49*(03), 322-328.
5. Hadigal, S., Sharma, S., Wagner, M. H., Ryals, S., & Berry, R. B. (2019). Sudden Improvement in PAP Download Indices Without Treatment Change. *Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine*, *15*(5), 791–793.
6. O'Shea, K., & Wolfe, S. W. (2013). Two-stage reconstruction with the modified Paneva-Holevich technique. *Hand clinics*, *29*(2), 223–233.
7. Şahin, E., Özdemir, A., Ergin, M., Durgut, F., & Acar, M. A. (2023). Clinical differences between nasogastric tube and Hunter’s rod for staged Zone II flexor tendon reconstruction. *Joint Diseases And Related Surgery*, *34*(3), 700-706.
8. Kamble, R., Shah, R., Kiely, A. L., Nolan, G. S., & Wong, J. (2022). Secondary Flexor Tendon Reconstruction: Protocol for a Systematic Review and MetaAnalysis. *International Journal Of Surgery Protocols*, *26*(1), 49 56.
9. Thomopoulos, S., Parks, W. C., Rifkin, D. B., & Derwin, K. A. (2015b). Mechanisms of tendon injury and repair. *Journal Of Orthopaedic Research®*, *33*(6), 832-839
10. Mehta, P., Thoppil, J., Koyfman, A., & Long, B. (2023). High risk and low prevalence diseases: Flexor tenosynovitis. *The American Journal Of Emergency Medicine*, *77*, 132-138.
11. McCool, K. C., & Napodano, R. J. (2025b). Pyogenic flexor tenosynovitis. *Visual Journal Of Emergency Medicine*, *40*, 102308.
12. Draeger, R. W., & Bynum, D. K., Jr (2012). Flexor tendon sheath infections of the hand. *The Journal of the American Academy of Orthopaedic Surgeons*, *20*(6), 373–382.
13. Orman, O., Ünkar, E. A., & Öztürk, K. (2022). Comparing the outcomes of fingertip-to-palm and fingertip-to-forearm two-stage flexor tendon reconstruction for isolated flexor digitorum profundus tendon injuries. *Journal Of Plastic Surgery And Hand Surgery*, *57*(1-6), 365-369
14. Hunter JM, Salisbury RE. Flexor-tendon reconstruction in two stages: Hunter-Salisbury technique. *J Bone Joint Surg Am.* 1971 Jul;53(5):829-58.
15. Foucher, G. (2003). Lesiones traumáticas de los tendones flexores. EMC - Aparato Locomotor, 36(4), 1–17. doi:10.1016/s1286-935x(03)72295-3

Jennifer Hernández Licona
Department of Plastic and Reconstructive Surgery
Regional Hospital “Lic. Adolfo Lopez Mateos” ISSSTE
Mexico City, México

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