



# Hypothenar Fat Pad Flap: Surgical Technique

9

James W. Strickland and Gary M. Lourie

## Introduction

Carpal Tunnel Syndrome remains the most common compression peripheral neuropathy treated. Conservative treatment is usually successful, with the remaining unsuccessful 10% of patients relieved of symptoms with simple release [1]. Unfortunately 10–25% of patients undergoing primary carpal tunnel release will fail. The etiology of this occurrence is multifactorial including incomplete release of the transverse carpal ligament or distal antebrachial fascia, tenosynovitis, postoperative development of adhesions surrounding the nerve, and intraneural fascicular scarring [2, 3]. Scarring of the median nerve with adherence to the radial leaf of the released transverse carpal ligament creates a neurodesis that often cannot be treated successfully with conservative treatment. These dysesthetic symptoms can become incapacitating and often require a surgical procedure to affect a successful outcome. Simple repeat release of the nerve has been met with universal failure. The litera-

ture is replete with surgical procedures to address the scar adhesions surrounding the median nerve. The procedures vary but all strive to create a barrier to epineural scarring. Soft tissue flaps including fat, fascia, muscle, and vein along with inert and non-inert commercial products comprised of allograft collagen and even small intestine submucosa have been described with encouraging clinical results [3–6]. The desired procedure must meet four requisites; it should be reproducible, safe, clinically effective, and in this day and age cost effective.

The hypothenar fat pad flap (HTFPF) procedure mobilizes a generous pad of vascularized fat from the hypothenar eminence as a pedicled pad and interposes the flap between the neurolysed median nerve and remaining radial leaf of the transverse carpal ligament. The fat pad flap serves to cover the nerve, prevent readherence, and return a smooth gliding bed for the median nerve. First described in 1985, this flap was refined by the senior author (JWS), his series published in the *Journal of Hand Surgery* in 1996 [1]. In this retrospective review of 62 hands with an average follow-up of 33 months, patient satisfaction was high with successful relief of persistent dysesthetic pain and low complication rate. Ensuing published reports confirmed equal results solidifying the hypothenar fat pad flap (HTFPF) as a viable, safe, efficacious, and cost effective procedure to alleviate recalcitrant idiopathic carpal tunnel syndrome [1, 2]. This chapter will discuss

J. W. Strickland  
St. Francis Hospital, Indianapolis, IN, USA

Department of Orthopaedics-Emeritus, Indiana  
University School of Medicine,  
Indianapolis, IN, USA

G. M. Lourie (✉)  
The Hand and Upper Extremity Center of Georgia,  
Atlanta, GA, USA

the vascular basis and surgical technique in stepwise fashion of this flap highlighting and emphasizing the salient point to affect a successful outcome.

---

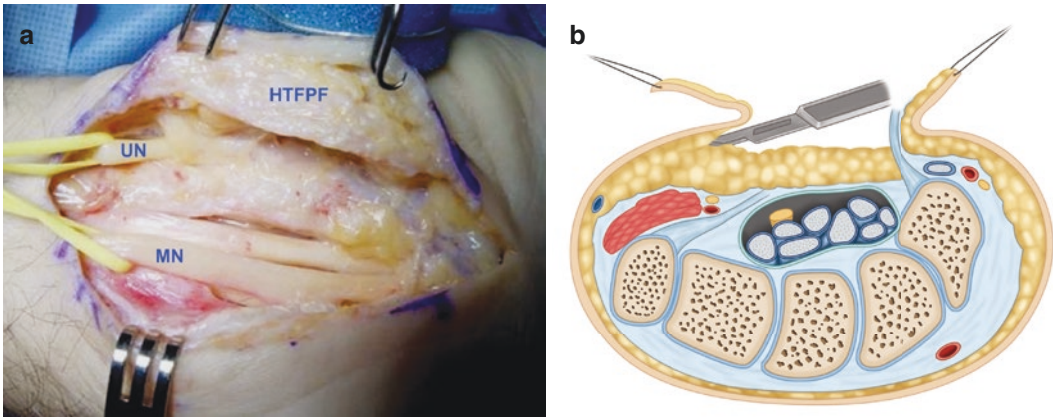
### **Anatomic Dissections and Vascular Basis for the Hypothenar Fat Pad Flap**

Anatomic dissections and clinical observations have shown that the hypothenar eminence consistently includes a generous layer of adipose tissue of sufficient width and thickness to provide coverage of the median nerve within the carpal tunnel. Cadaveric studies have documented that in latex-injected hypothenar tissue there is a consistent supply of arterial branches to the fat pad arising directly from the medial side of the ulnar artery in Guyon's canal and more distally from branches of the ulnar artery to the small finger and fourth web space [1]. These transverse branches originate from the ulnar artery in a ladder type fashion separated 1 cm apart beginning at the distal wrist flexion crease. Additional branches to the fat pad arose from arterial branches to the hypothenar muscles and palmaris brevis muscles. Dissection of skin overlying the hypothenar fat pad revealed a rich plexus of arteries running through the superficial adipose tissue. An important observation in dissecting the fat pad was that the ulnar digital nerve of the small finger and the common digital nerve to the fourth web space ran deep to the distal third of the fat pad after branching from the ulnar nerve in Guyon's canal. This has clinical importance for the surgeon dissecting the flap to avoid inadvertent neuropraxic injury to these nerve branches.

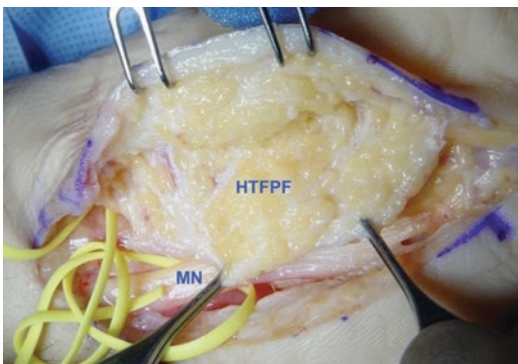
### **Surgical Technique**

The procedure is carried out under regional or general anesthesia. Intravenous antibiotics are not given routinely unless the patient demonstrates co-morbidities or risk factors. A linear incision was made in the midpalmar crease lateral to the hypothenar eminence crossing the

wrist in a zig-zag fashion in line with the radial aspect of the ring finger. An extended incision is often recommended to decompress the median nerve starting in the distal forearm in more native unscarred tissue. In the palm the dissection is carried down through the palmar aponeurosis and reconstituted transverse carpal ligament. The median nerve is identified and, if the nerve is found to be adherent within the carpal canal, often seen to be tethered to the released radial leaf of the transverse carpal ligament, then an external neurolysis is performed. In those patients having preoperative clinical hypersensitivity of the median nerve at the wrist or intraoperative findings of neurodesis, a HTFPF is performed. A surgical plane is developed by sharp dissection just deep to the subdermal plexus between the skin overlying the hypothenar eminence and the underlying adipose tissue (Fig. 9.1). Care must be taken not to make this cutaneous flap too thin so as not to devascularize the overlying skin. The superficial dissection is continued ulnar to the dermal insertion of the palmaris brevis. Care is taken to identify the digital nerves to the ring and small fingers distally and the ulnar artery and nerve proximally (Fig. 9.1). From the ulnar edge of the fat pad, the deep dissection elevates the flap from the thenar muscles. The deep dissection is carried in a lateral direction until the ulnar nerve and vessels are visualized in Guyon's Canal. The Guyon's canal can be initially released and the ulnar nerve and artery are identified and protected throughout the dissection of the flap. A segment of the ulnar leaf of the transverse carpal ligament is excised to aid in mobilization of the flap during this part of the deep dissection. The flap is then transposed to determine if it could be easily advanced over the median nerve to the radial wall of the carpal canal (Fig. 9.2). If it had not been sufficiently mobilized, additional undermining is carried out, with care taken to preserve the vascular pedicles of the flap and to not damage the ulnar artery or nerve. When sufficiently mobilized, the HTFPF is placed palmar to the median nerve and deep to the radial leaf of the transverse carpal ligament. With the contents of the canal retracted ulnarly, three horizontal sutures are placed from the edge of the HTFPF



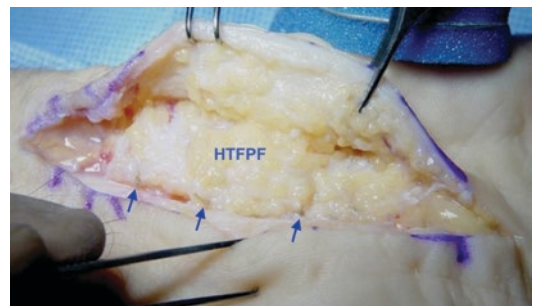
**Fig. 9.1** (a) The hypothenar fat pad flap (HTFPF) is raised by subcutaneous dissection in an ulnar direction. MN: median nerve, UN: ulnar nerve. Photo courtesy of Dr. Dean Sotereanos. (b) A corresponding axial illustration



**Fig. 9.2** The hypothenar fat pad flap (HTFPF) is tested to see if it advances easily over the median nerve (MN). (Photo courtesy of Dr. Dean Sotereanos)

into the radial wall of the carpal tunnel adjacent to the flexor pollicis longus tendon and back through the HTFPF (Fig. 9.3). Sutures are tagged to facilitate the placement of all stitches prior to tying them in sequence.

As the sutures are tied, the radial and ulnar borders of the hand are gently compressed to ease the delivery of the flap well down into the radial side of the carpal canal. A layered skin closure is then performed in usual fashion. After surgery, gentle transverse compression is applied within the dressing across the palm, with the thumb adducted to minimize tension on the HTFPF. The wrist is placed in slight dorsiflexion, with the fingers free for immediate postoperative motion. The surgical dressing and sutures are removed at 10–14 days after surgery. Patients are instructed



**Fig. 9.3** The hypothenar fat pad flap (HTFPF) is sutured to the radial remnant of transverse carpal ligament (arrows) without tension covering the median nerve. (Photo courtesy of Dr. Dean Sotereanos)

in scar massage and desensitization. Wrist motion is commenced with interval splinting for an additional 2 weeks. At 6 weeks after surgery, unrestricted use is permitted and a formal strengthening program is commenced.

## Pearls

1. Patient selection. The indications for this procedure need to be met by patient and the surgeon. Persistent and or recurrent symptoms of median nerve compression thought to be due to tethering or neurodesis of the nerve to the released radial leaf of the transverse carpal ligament unresponsive to conservative treatment remains the main indication for the HTFPF.

2. Surgical points. The initial superficial dissection should be well within the subdermal plexus to avoid devascularization of the hypothenar skin. The deep dissection should allow for identification of the digital nerves to the ring and small finger distal and the ulnar nerve and ulnar artery proximal to avoid iatrogenic damage.
3. Postoperative recommendations. The patient is encouraged to begin early digital range of motion in the early postoperative period to prevent adhesions to the HTFPF, along with diligence to wrist motion and scar massage to optimize relief of symptoms.

---

## Conclusion

Recalcitrant or recurrent carpal tunnel syndrome can be incapacitating for the patient. Many techniques for alleviating symptoms have been advocated including repeat release, along with introduction of tissue or materials to wrap and protect the nerve from adhesion formation. A successful procedure should be reproducible, safe, clinically effective, and cost effective. The hypothenar fat pad flap (HTFPF), developed and

refined by James W Strickland MD has met these 4 tenets and should be part of the hand surgeon's armamentarium in treating this challenging clinical condition [1, 2].

---

## References

1. Strickland JW, Idler RS, Lourie GM, Plancher KD. The hypothenar fat pad for management of recalcitrant carpal tunnel syndrome. *J Hand Surg Am.* 1996;21A(5):840–8.
2. Plancher KD, Idler RS, Lourie GM, Strickland JW. Recalcitrant carpal tunnel: the hypothenar fat pad flap. *Hand Clin.* 1996;12(2):337–49.
3. Dy CJ, Aunins B, Brogan DM. Barriers to epineural scarring: role in treatment of traumatic nerve injury and chronic compressive neuropathy. *J Hand Surg Am.* 2018;43:360–7.
4. Tollestrup T, Berg C, Netscher D. Management of distal traumatic median nerve painful neuromas and of recurrent carpal tunnel syndrome: hypothenar fat pad flap. *J Hand Surg.* 2010;35A:1010–4.
5. Zieske L, Ebersole GC, Davidge K, Fox I, Mackinnon SE. Revision carpal tunnel surgery: a 10-year review of intraoperative findings and outcomes. *J Hand Surg.* 2013;38A:1530–9.
6. Sarris IK, Sotereanos DG. Vein wrapping for recurrent median nerve compression. *J Am Soc Surg Hand.* 2004;4(3):189–94.