Carpal Tunnel Release:

Using a Short Vertical Incision above the Flexor Crease of the Wrist

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Abstract

Background: Numerous surgical incision techniques have been used to treat carpal tunnel syndrome. The advantages and disadvantages of each are a matter of debate. However, the technique should be cost effective and also decrease the amount of time needed before the patient can return to work. A minimally invasive surgical procedure for the treatment of carpal tunnel syndrome is described in this report.

Methods: Ninety-six patients with carpal tunnel syndrome (106 wrists) were operated on through a 2 cm vertical incision, above the flexor crease of the wrist, under local infiltration anesthesia, without tourniquet control. The mean time length of the operation was nine minutes.

Results: Numbness and night pain disappeared in all cases postoperatively. The mean time period to return to work and full activity was 18 (12–26) days.

Conclusion: Decreasing the time needed before the patient can return to work, minimizing the rate of complications and reducing hospital costs are advantages of this technique.

Key Words: Carpal tunnel syndrome, carpal tunnel release, median nerve entrapment.

Introduction

NUMEROUS SURGICAL INCISION TECHNIQUES have been used to treat carpal tunnel syndrome (CTS), such as the classical open releasing technique, a short palmar incision and the endoscopic method. The advantages and disadvantages of each are a matter of debate (1–6), but their common goal is to release the median nerve by transectioning the transverse carpal ligament (TCL). And whatever the technique, the palmar cutaneous and recurrent motor branches of the median nerve and the superficial palmar arch must be protected during the operation. Also, the technique should be cost effective and decrease the amount of time needed before the patient can return to work. Healing uneventfully and avoiding late complications like scar tenderness and pillar pain should likewise be kept in mind.

In this report, we describe a minimally invasive procedure through a 2 cm vertical incision, above the flexor crease of the wrist. This approach allows surgeons to perform outpatient surgery using local infiltration anesthesia (LIA), thereby eliminating the need for a tourniquet. Hospitalization is also not needed.

Materials and Methods

Ninety-six patients underwent carpal tunnel decompression (106 wrists) using this technique, between January 1998 and May 2003. Fifty-eight patients were female and 38 were male. The mean age was 44 years (24–72). Surgery was performed on the right hand in 49 patients, on the left in 27 and bilaterally in 20. The mean follow-up period was 24 (12–50) months. We based the diagnosis on patient's history and subjective complaints of numbness and increasing pain at night. Phalen's maneuver, Tinel's sign and grip strength were also noted. The diagnosis was confirmed by electromyographic study (EMG) preoperatively. Splinting, physical therapy and non-steroidal anti-inflammatory drugs (NSAIDs) were used as the first choice of treatment for all cases. Surgical treatment was planned for patients

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with persistent CTS. The Boston self-administered questionnaire was used for the assessment of severity of symptoms and functional status for both preoperative and postoperative evaluations (7). Outcome measures were analyzed with the SPSS program.

This technique was initially practiced on cadavers. A 2 cm vertical incision above the flexor crease, corresponding to the proximal part of the classical incision, was done on twelve wrists in six cadavers. Transection of the TCL was performed through this approach percutaneously. After that, the incision was extended distally and the procedure was converted to the classical open technique. The adjacent tissues were examined and the effectiveness of the release was checked directly. No injuries of the recurrent motor and palmar cutaneous branches of the median nerve and the superficial palmar arch were noted. In three wrists, the transection of the TCL was found to be incomplete distally. Checking the TCL with a blunt hook has been used as an essential step of the procedure since then.

Surgical Technique

The operation is carried out under LIA. The 2 cm incision is on the ulnar side of the palmaris longus, above the flexor crease of the wrist, and should be extended 5 mm distal to the flexor crease. Thus, the median nerve and TCL are visualized. Following the incision (Figure), the palmaris longus tendon is retracted radially to protect the palmar cutaneous branch of the median nerve. A clamp is placed between the ligament and the nerve for protection and the TCL is transected with a no. 15 blade, with the sharp side up, beginning through the incision from proximal to distal, percutaneously. The resistance of the TCL can easily be felt during the transection. Particular attention should be paid when approaching the distal end of the ligament. After completion, the blade is removed and the TCL is checked with a blunt hook before it is released. Tissues are closed properly.

The mean operating time was 9 minutes. Bleeding problems were not observed. A compression bandage was used postoperatively, without the use of a splint. A waterproof covering was applied on the first postoperative day. Active motion of the wrist was encouraged.

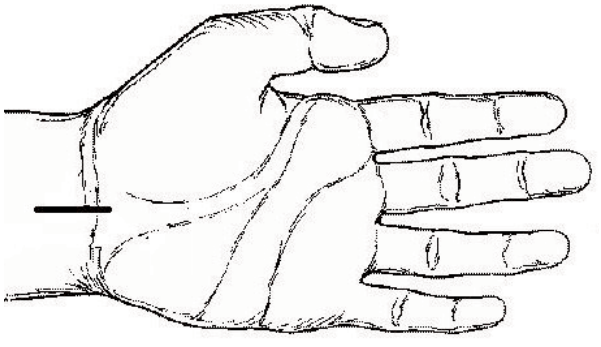

Figure. Short vertical incision above the flexor crease of the wrist.

Results

All patients were seen 1, 3, 6 and 12 months postoperatively. A physical examination was done. Patients' satisfaction and adjustment to daily activities were recorded, based on the Boston Questionnaire. Scores of symptom severity and functional status were obtained both pre- and postoperatively, and were analyzed. The mean symptom severity score improved from 3.8 (±0.4) to 1.6 (±0.3) and the mean Functional Status score improved from 3.9 (±0.3) to 2.0 (±0.3) on the third month postoperatively. Significant recovery of the patients was noted both functionally ($p<0.001$) and symptomatically ($p<0.001$) (Wilcoxon signed ranks test).

Hypertrophic scar formation was noted in six cases. This resolved with massage and silicone sheet application, in three months. One patient had pillar pain, which resolved by the sixth postoperative month. Numbness and night pain resolved in all cases. The mean period to return to work and full activity was 18 (12 – 26) days. Eighty-five percent of the cases had full grip strength back by the third month postoperatively. Improvements of sensory and motor nerve conducting velocity were noted at the twelfth month postoperatively.

Discussion

The surgical treatment techniques of CTS can be classified as either open or endoscopic. The goals of both techniques are to transect the TCL completely without damaging the adjacent structures and to allow the patient to return to work as soon as possible. During the operation, the palmar cutaneous branch; the recurrent branches of the median nerve, ulnar nerve, ulnar artery, superficial palmar arch; and the communicating branches of the ulnar nerve are potentially at risk (2, 5, 8). Complications associated with injury to these structures are re-

ported at rates of 5–15% for the open technique and 2–35% for endoscopic surgery (9–11). The open technique is relatively inexpensive, and vulnerable structures can be easily visualized throughout the procedure, but disadvantages include scar tenderness, pillar pain and a longer period before return to work (2, 4). Endoscopic technique offers the advantage of a shorter period before return to work; however, it has the disadvantages of being an expensive procedure with increased risk of damage to the adjacent tissues and incomplete transection of the TCL (1, 5, 6, 12).

Serra et al. described an open technique that decreased the time to return to work and minimized morbidity (4). The cases were treated through a short palmar incision, and no hypertrophic scar was observed. All patients resumed their daily activities the first week postoperatively. In that study, 104 of 112 patients returned to work within 3 weeks after the operation. Serra claimed that the technique had all the advantages of both open and endoscopic techniques. Mackenzie et al. performed the same technique and compared it with the endoscopic method. He reported that endoscopic carpal tunnel release (CTR) using the single portal provided better results as compared to short-incision, open CTR (13). Our results are similar to those of open CTR with short incision and endoscopic CTR using the single portal.

The short length of the incision decreases the time to return to work. Every 1 cm increase in the length of the incision prolongs the time to return to work by nearly 5 days (14). Our incision is fairly short and, moreover, it is not in the palmar area. No complaints associated with daily activities were observed. Although no predilection for hypertrophic scar formation was reported for this region, this complication did appear in 5.5% of the cases; all were solved by simple treatment methods. This technique provides faster recovery of grip strength, and it protects the palmar fascia and the skin above the interthenar crease, so that the neuroma formation leading to scar tenderness is prevented.

The diagnosis of CTS was based on history, complaints of the patient and physical findings, indicated as positive Phalen's maneuver and Tinel's sign. Measurements of the hand grip and pinch strength were not useful tests for differential diagnosis. These tests consistently had the lowest specificity and sensitivity, and predictive values (15, 16). Some authors support a combination of clinical history and physical examination as the primary method of diagnosing CTS, claiming that EMG confirmation is unnecessary in most cases (16). However, we routinely perform EMG as an objective diagnosing test, in order to evaluate both the median nerve and the ulnar nerve, as well as the recurrence of the CTS. In Trumble's opinion, surgery is unnecessary for the EMG-negative cases (12). All cases that were treated surgically had positive EMG results, supporting CTS.

A vertical incision above the flexor crease of the wrist allows better visualization than does the transverse incision. The transverse incision also has a higher risk of damaging the cutaneous palmar branch of the median nerve, and in addition, most of the anatomical variations and congenital anomalies of the nerve cannot be seen through it (17, 18).

Mesgarzadeh et al. noted four general findings by MRI in CTS, regardless of the etiology: swelling of the median nerve, flattening of the nerve at the hamate level, palmar bowing of the flexor retinaculum, and increased T2 signal of median nerve. Two of these changes, swelling and flattening of the nerve, can be seen directly through our approach (19).

Conclusion

This prospective study was planned because of the need for developing a practical exposure for release of carpal tunnel compression syndrome. With this technique, clinical recovery is rapid and the quality of life of the patients is quite good during the healing period. Outpatient surgery, use of LIA, and avoidance of a tourniquet are additional advantages of the technique. Moreover, no specialized equipment is needed for this procedure, and costs are relatively low.

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