Endoscopic Carpal Tunnel Release

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KEYWORDS

• Median nerve compression • Carpal tunnel syndrome • Endoscopic carpal tunnel release
• Minimal invasive surgery

KEY POINTS

- Minimal invasive surgery
- Effective local anesthetic surgery
- Reduces rehabilitation time
- No difference compared with open surgery after 3 months
- Operation costs higher than with open surgery
- May be more cost-effective than open surgery because of faster rehabilitation

INTRODUCTION

Nature of the Problem

Carpal tunnel syndrome (CTS) is a common compression neuropathy arising from increased pressure in the carpal tunnel. Wrist fracture, trauma, and vibration tools may lead to CTS, but in most patients the condition is idiopathic. If conservative treatment fails, a procedure to release the carpal tunnel is normally indicated.

During a carpal tunnel release (CTR), the surgeon divides the flexor tendon retinaculum, decompressing the pressure within the carpal tunnel, a technique introduced more than 60 years ago.[1] In the conventional open CTR (OCTR), the surgeon dissects directly down to the flexor tendon retinaculum through a skin incision extending from the wrist creases to the middle of the palm. The retinaculum is then split using a scalpel or scissors, resulting in decompression of the carpal tunnel. This technique necessitates an incision in the palm, which can be painful and limit recovery.

The introduction of arthroscopy for joint surgery generated the idea that arthroscopic technology could be used to treat CTS with minimal subcutaneous dissection. This idea led to the development of the endoscopic CTR (ECTR),[2] which divides the retinaculum through small portals without dissecting in the subcutaneous space above the retinaculum. Two different techniques were introduced: the 2-portal system by Chow and Hantes[3] and 1-portal systems by Okutsu[2] and by Agee and colleagues.[4] Since the initial advent, other techniques and devices have been developed, but all are variations of the original systems.

INDICATIONS/CONTRAINDICATIONS

Before any operative procedure, the first step is to ensure that the diagnosis of CTS is correct (**Table 1**). A history and physical examination often confirm the diagnosis, and the use of preoperative nerve conduction studies (NCSs) may reduce the risk of misdiagnosing symptoms

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Table 1
Indications/contraindications

Primary Indication	Relative Contraindication[a]
Idiopathic CTS	CTS secondary to trauma/fracture
	CTS associated with inflammatory disease
	Recurrent CTS
	Severe obesity
	Anticoagulated

[a] Consider OCTR instead.

related to other diseases, such as cervical nerve compression.

Most patients are candidates for ECTR because idiopathic CTS can be safely treated with this technique. ECTR decreases the acute morbidity after CTR, and thus, some have advocated performing simultaneous ECTR in patients with bilateral disease,[5] depending on the severity of the symptoms. Fehringer and colleagues[6] found a decrease in the time to return to work in the simultaneous group compared with the staged group, and the simultaneous group also required fewer physician visits. Overall, patient satisfaction was equal, and the use of simultaneous surgery seems to be of economic benefit to both the patient and the hospital, reducing the cost of operation and sick leave.

There are several instances in which ECTR should be approached with caution. The first group is those patients with CTS secondary to inflammatory diseases, such as rheumatoid arthritis. These patients may have synovial adhesions and hypertrophy, which can interfere with the introduction of the endoscopic device and impair the visibility in the carpal tunnel. Also, ECTR should be considered carefully in patients with a history of wrist fractures, because their previous trauma may have resulted in scarring and changes in the bony architecture of the carpal tunnel. For these patients, preoperative radiographic examination with carpal tunnel view may identify posttraumatic space-occupying changes. There has also been concern about ECTR in patients who have had a previous CTR. It is possible to perform ECTR as a revision surgery for recurrent CTS.[7–9] The most common cause of recurrence is incomplete division of the retinaculum, and this may be treated with ECTR. However, the surgeon should always consider that the cause of the failure of the previous surgery might have been a compressive lesion, such as a lipoma, an osteophyte, or an arteria mediana. These anatomic variants may not be found during an endoscopic procedure, and if they are suspected, the conventional open technique should be chosen. Also, fibrous scarring may cause compression and recurrence of CTS and should not be treated with ECTR. So, ECTR should be used with caution in recurrent cases and reserved for cases in which the patient had relief after the first surgery but had recurrence after several months. In general, the surgeon should use an open technique if any doubt exists regarding the cause of the recurrence.

ECTR should be used with care in the severely obese patient, because a large palmar fat pad may protrude into the carpal tunnel, impairing vision during the endoscopic division of the retinaculum. In addition, in the obese patient, the tourniquet may fail, resulting in a need to convert to OCTR. Another group to approach with caution is patients taking anticoagulants. OCTR should be considered for these patients, because hemostasis is easier with this technique.

SURGICAL TECHNIQUE/PROCEDURE

Preparation and Patient Positioning

The patient is placed with the arm abducted on the operation table. The surgeon is positioned so that they can use the dominant hand for maneuvering the endoscope.

Several anesthetic techniques have been described. Most commonly, the procedure is performed using local infiltration analgesia (LA) or in a regional block. General anesthesia is used only in patients who are unable to tolerate LA or block. LA is well tolerated, easy to manage, and has been proved to be more effective than a regional block, reducing costs and with less postoperative pain.[8,10]

We use the LA technique, which is simple and well tolerated. Ropivacaine 7.5 mg/mL or an equivalent local anesthetic may be used. The infiltration is performed with 4 mL administered in the proximal direction under the subcutaneous fascia of the forearm, 2 mL subcutaneously transversely in the distal wrist crease, and 4 mL subcutaneously in the palm (**Fig. 1**) along the crease between the thenar and the hypothenar. The tourniquet is then inflated to 80 mm Hg greater than systolic blood pressure 10 minutes after the administration of the local anesthetic and immediately before the skin incision.

Good visibility during the endoscopic procedure is critical to reduce the risk of complications. Using LA with epinephrine reduces the bleeding only in the skin and not in the carpal tunnel. So a tourniquet should always be used, because bleeding inevitably impairs the vision during the procedure and leads to a highly increased risk of nerve damage.