Locally made instruments for endoscopic carpal tunnel release

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ABSTRACT

Endoscopic carpal tunnel release (ECTR) was introduced into Thailand when this technique became widely accepted. However, the technique was limited to only a few institutions because of the training required and the very high cost of the instruments. Because of the economic crisis in Thailand, most hospitals in the public health ministry had no budget to invest in new instruments. However, new technology cannot be ignored so the authors modified some unused instruments in conjunction with an arthroscope in order to perform ECTR. A 5 cm by 4 mm slot was made at the mid-portion of an old unused 5 mm arthroscopic sheath. One end of this sheath was reshaped to fit the meniscectomy hook blade. A 4.5 mm Steinmann pin was reshaped to be the obturator of the arthroscopic sheath. ECTR was performed with this instrument in conjunction with an arthroscope (modified from Chow’s 2-portals technique). The transverse carpal ligament was clearly viewed and identified, and the transverse carpal ligament was completely divided by the meniscectomy hook blade. The operation time was 10 to 20 minutes. 30 patients received ECTR with this set of instruments, and they were completely relieved from the symptoms and returned to work early without any complications. The advantages of this instrument are that it is very cheap, it has a low learning curve, and it is safe and effective.

Key words: carpal tunnel syndrome, endoscopic carpal tunnel release

INTRODUCTION

Endoscopic carpal tunnel release (ECTR) was first reported by Chow and Okutsu in 1989. Their technique was the 2-portal approach and transbursal. Agee reported a one-portal technique for ECTR in 1990. Both techniques were withdrawn due to serious complications. ECTR became more widely accepted after modification of the instruments and techniques to lessen the complications. ECTR is technically demanding, needs sophisticated instruments and has a steep learning curve. Thus its use is limited to some academic institutions in Thailand. Because Thailand was affected by an economic crisis in the past 2 years, this resulted in no budget for purchasing new instruments. Also, the training of medical staff in most hospitals in Thailand was tight. However, we wanted...
to keep abreast of the newer technology, so the authors
developed and modified some old unused instruments
in conjunction with an arthroscopic set in order to
perform ECTR. This report describes the instruments
and the results.

MATERIALS AND METHODS

Instrument preparation

A 50 x 4 mm slot is made at the mid-portion of an old
unused arthroscopic sheath (outer diameter 5.0 mm
and inner diameter 4.5 mm; inner diameter at one end
of the arthroscopic sheath 4.00 mm). All the edges of
the slot are smoothed. The 4.0 mm diameter end of
the arthroscopic sheath is resected. A bevel is made at
the end of the arthroscopic sheath (Fig. 1).

The tip of a 4.5 mm Steinmann pin is reshaped from
a trocar tip to a pencil tip. This Steinmann pin is used
as the obturator (Fig. 2).

A meniscal hook blade is bent to let the tip of the
hook blade protrude beyond the slot by 2 to 3 mm (Fig.
3).

Figure 1  The unused arthroscopic sheath was reshaped at
the tip and a slot was made at the mid portion of the sheath.

Figure 2  The tip of the reshaped Steinmann pin compared
to the trocar tip Steinmann pin.

Figure 3  The tip of the meniscal hook blade protrudes beyond the slot of the arthroscopic sheath 2–3 mm (arrow).
Operative technique

This operative technique is modified from Chow’s technique by adding the step increment dilatation of the carpal tunnel, and the procedure of the transverse carpal ligament incision is reduced from 5 steps to one step.3,4

A 5 mm skin incision is made at the wrist ulnar to the plamaris longus tendon. The median nerve is identified. The 4.0 mm obturator is inserted into the carpal tunnel aiming at the ring finger. The obturator is passed along the carpal tunnel until the tip of the obturator hits the skin at mid palm. A second skin incision is made at the tip of the obturator. The 4.5 mm obturator is inserted along the first tract. The 5.0 mm arthroscopic sheath is passed along the 4.5 mm obturator. The 4.5 mm obturator is removed. The carpal tunnel is dilated step by step from 4.0 mm to 5.00 mm. The arthroscope is passed along the sheath to identify the transverse carpal ligament and its 2 edges. The end of the slot is placed just distal to the edge of the transverse carpal ligament. The meniscal hook blade is passed into the sheath from the other side. The transverse carpal ligament is incised by the hook blade until it is completely divided in one step from proximal to distal direction. The end of the slot will stop the hook blade and prevent unintentional hook blade slip injuring the neurovascular structure. The arthroscope and the hook blade are removed. The surgical wound is sutured (Fig. 4a–g)

From September 1997 to June 1999, 30 patients with carpal tunnel syndrome were treated by ECTR with this set of instruments. Their age ranged from 17 to 50 years, average 32 years. Six were males and 24 were females. One was a student, 12 were sedentary workers, 8 were household workers and the other 9 were labourers. 28 cases were right handed, and another 2 cases were left handed. All the patients had failed conservative treatments e.g. oral medication, rest or local steroid injection. The Tinel’s sign and Phalen’s test were positive in all patients. One case had thenar muscle atrophy. Nerve conduction study was not performed in this series.

RESULTS

The operative time ranged from 10 to 20 minutes, average 16 minutes. All the patients were followed up after one week, 2 weeks and 2 months. The suture material was removed one week after the operation. The Phalen’s test was negative in all cases at the first follow-up. Numbness and paresthesia improved one to 3 weeks after the operation. Gripping strength was nearly normal when compared to contralateral side 2 weeks after operation, except for the one who had thenar muscle atrophy. 13 patients were able to start work one week after the operation. 17 patients who were household workers and labourers went back to work 2 weeks after the operation. The symptoms were relieved but there was no recovery of muscle atrophy in the thenar muscle atrophy case. There were no complications in this study.

DISCUSSION

Many studies report the advantages of ECTR over open decompression for carpal tunnel syndrome. The ECTR has a smaller skin incision. The patient will gain full grip strength earlier, have less pain and can return to work earlier. However ECTR needs sophisticated equipment and a well trained surgeon 5,6,7 In a period of economic crisis, it is very hard to spend funds on expensive technology, and so these locally made instruments are the solution for this problem. The results in this study were comparable to other studies.1,8 The dilation of the carpal tunnel step by step will lessen the acute pressure and injury to the nerve in the stenosing tunnel. The instruments and this technique are quite safe even in the hands of an inexperienced surgeon. The depth of the hook blade can be pre-set before the operation and both ends of the slot can stop the hook blade and prevent unintentional hook blade slip injuring the neurovascular structure. The arthroscope and the hook blade are removed. The surgical wound is sutured (Fig. 4a–g)

ECTR instruments were developed from old unused arthroscopic sheaths and Steinmann pins in combination with a meniscal hook blade and arthroscopic set. 30 patients with failed conservative treatment of carpal tunnel syndrome were treated by ECTR with locally made instruments. All the patients had a good result without complications and could return to work early. These instruments are not only inexpensive but also safe and effective.
Figures 4(a-g) The steps of the operative procedure: (a) The second skin incision at mid palm. (b) The 4.0 mm obturator in the carpal tunnel. (c) The 4.5 mm obturator in the carpal tunnel. (d) The 5 mm arthroscopic sheath in the carpal tunnel. (e) The arthroscope and meniscal hook blade on the other side of the arthroscopic sheath. (f) The meniscal hook blade cutting the transverse carpal ligament (arrow). (g) The transverse carpal ligament is completely divided (arrows).
REFERENCES