

Carpal Tunnel Release: Endoscopic or open?

F Ya'ish, D Power

Citation

F Ya'ish, D Power. *Carpal Tunnel Release: Endoscopic or open?*. The Internet Journal of Hand Surgery. 2006 Volume 1 Number 1.

Abstract

INTRODUCTION

Carpal tunnel syndrome (CTS) is known to be the most common compressive neuropathy of the upper limb. Open carpal tunnel release (OCTR) has shown to be effective and relatively safe procedure, and is established as the standard surgical treatment for CTS.^[1,2,3] The outcome of this procedure can be complicated by scar tenderness, grip and pinch weakness, and pillar pain ^[4,5,6].

Endoscopic carpal tunnel release (ECTR) has evolved to address these complications and improve the functional outcomes through smaller incisions sited away from the middle of the palm.^[7,8] In addition, preservation of the superficial fascia, subcutaneous adipose tissue overlying the flexor retinaculum and some of the insertion of thenar and hypothenar muscles is assumed to result in faster recovery of grip strength and earlier return to work.^[8,9] However, critics of ECTR report higher complication rates ^[10,11,12,13] and greater cost when compared to OCTR.^[8,14]

In this paper we discuss the advantages and disadvantages of both procedures with respect to their main outcome measures, aiming to provide clearer understanding and easier surgical decision making.

PILLAR PAIN AND SCAR TENDERNESS

The majority of publications acknowledge the superiority of ECTR with regards to post operative palm pain and scar tenderness.^[9,14,15,16,17] This advantage is mostly noticed in the early recovery phase, i.e. first three months, after which the symptoms are noticed to become similar.^[9,14] However, Ferdinand et al ^[8] noticed that patients developing scar tenderness after ECTR experience more persistent and intense symptoms related to contact with clothing or watch straps.

GRIP AND PINCH STRENGTH

Early reports have shown a greater drop in grip strength and slower recovery in the early postoperative phase after OCTR, ^[9,14,17] but recovery to preoperative levels occurs three months after both open and endoscopic release.^[9,14,15] Pinch strength demonstrated similar variation between the two procedures, but with faster recovery and improvement to levels better than preoperative measurements at three months after both open and closed release.^[14]

It is important to note the two recent prospective randomised controlled studies demonstrated no statistically significant advantage of ECTR over OCTR in grip strength changes throughout the recovery period.^[8,14]

RETURN TO WORK

Return to work is affected by many factors, including occupation, dexterity, psychosocial factors, and most importantly worker's compensation. Therefore, the benefit of ECTR in decreasing the time to return to work has been confirmed by some studies ^[9,18,19] and disproved by others.^[14,15,20,21] Further studies were recommended for more definitive conclusions.^[16,17] However, it has been noticed that time to return to work significantly decreases in ECTR patients not receiving workers compensation, while it is comparable for both open and endoscopic techniques in patients receiving compensation. ^[10,18,21]

COMPLICATIONS

There has been concern regarding higher complication rates in ECTR when compared with OCTR.^[10,11] These complications include neurovascular and tendon injuries ^[12,13,19] or incomplete release.^[6,13,22] This can be attributed to the high technical demand and steep learning curve in ECTR.^[8,23,24] On the other hand, prospective studies showed no difference in complication rates between the two techniques.^[8,9,14,23] This may be related to the fact that

ECTR in these studies was performed by experienced surgeons.

Although none of these prospective studies reported major nerve injuries,^[8,9,14,23] these injuries do occur in both procedures.^[25] Previous meta-analysis and systemic reviews reported that irreversible nerve injury is uncommon in both procedures while reversible injuries were more prevalent in ECTR.^[16,17] No irreversible nerve injuries were reported in prospective studies, while 2% are reported in observational studies.^[22]

In a decision analysis study, Vasen et al ^[22] reviewed the literature for complication rates of both procedures. OCTR rates varied between 0% and 1.5% with estimated mean of 0.1% while ECTR complication rates varied from 0.7 to 6%. Although the estimated mean for ECTR was 5%, they found that ECTR would be more costly, than OCTR, if its complication rate exceeds 6.2 %.

Risk of neurovascular injuries in ECTR is increased in the hands of inexperienced surgeons ^[26,27] and short patients.^[28] It is recommended that complication risks in ECTR should not exceed 1%.^[29,30].

COST EFFECTIVENESS

Cost effectiveness is increasingly influencing decision making in current medical practice. ECTR has been criticised for its higher cost as it involves more specific and complex instrumentation,^[8,14] and for the possibility of higher re-operation rate.^[14,15] On the other hand, ECTR is considered to be cost-effective due to earlier return to work ^[9] and the possibility of decreased need for rehabilitation because of less scar pain.

As described above, cost effectiveness of both procedures is highly influenced by their complication rates and time to return to work.^[22] In the decision analysis performed by Vasen et al ^[22], although the base case analysis showed similar costs for both procedures, ECTR showed to be cost effective if its mean time to return to work was 21 days less than OCTR. Taking into consideration the figures provided by the large prospective study performed by Agee et al ^[18], ECTR would be highly cost-effective in non-recipients of workers' compensation, while OCTR would be less costly in compensation recipients.^[22]

SURGICAL TECHNIQUE

OCTR is generally considered a safe procedure performed by junior surgeons and surgical technicians. ^[31] On the other

hand, ECTR is usually performed by experienced hand surgeons, and is considered to be a more difficult procedure with higher technical demand and learning curve.^[8,23,26] Intra-operative conversion to OCTR is reported in 2% of cases.^[22] It has also shown to require more operative time, even in experienced surgeons' hands.^[8]

FINAL OUTCOME

It is widely agreed that the final outcome in terms of relief of symptoms is similar and effective for both procedures.^[8,9,10,14,15,18,22,23]

CONCLUSION

Both OCTR and ECTR are effective as surgical treatment for CTS. OCTR is considered as safe, easy and widely accepted procedure. ECTR has the advantage of less scar tenderness and pillar pain in addition to the possibility of faster grip recovery and earlier return to work in non-recipients of workers' compensation. It may be beneficial when bilateral simultaneous carpal tunnel decompression is offered to patients to minimise time away from work. It is criticised for its potential for higher neurovascular complication rate owing to the technical demands of the procedure and its steep learning curve. Complications can be minimised in the hands of experienced surgeons.^[23,31] Therefore, the decision of which procedure to perform is affected by the surgeons experience and patient factors, including occupation, socioeconomic factors, preference, and possibly height.

CORRESPONDENCE TO

Feras Ya'ish Flat 8, Royal Plaza, 2 Westfield Terrace, Sheffield, S1 4GD Tel: (+44) 077 88 54 33 24 E-mail: firasyaish2@hotmail.com

References

1. Phalen GS. Neuropathy of median nerve due to compression beneath the transverse carpal ligament. *J Bone Joint Surg [Am]* 1950;32-A:109
2. phalen GS. Reflections on 21 years' experience with the carpal-tunnel syndrome. *JAMA* 1970;212:1365-1367.
3. Pfeffer GB, Gelberman RH, Boyes JH, Rydevik B. The history of carpal tunnel syndrome *J Hand Surg [Br]*. 1988 Feb;13(1):28-34
4. Gerritsen AA, de Vet HC, Scholten RJ, Bertelsmann FW, de Krom MC, Bouter LM. Splinting vs surgery in the treatment of carpal tunnel syndrome: a randomized controlled trial. *JAMA*. 2002 Sep 11;288(10):1245-51
5. MacDonald, RI, Lichtman DM, Hanlon JJ, Wilson JN. Complications of surgical release for carpal tunnel syndrome. *J Hand Surg [Am]*. 1978 Jan;3(1):70-6
6. Kulick MI, Gordillo G, Javidi T, Kilgore ES Jr, Newmayer WL 3rd. Long-term analysis of patients having surgical treatment for carpal tunnel syndrome. *J Hand Surg*

- [Am]. 1986 Jan;11(1):59-66.
7. Mackenzie DJ, Hainer R, Wheatley MJ. Early recovery after endoscopic vs. short-incision open carpal tunnel release. *Ann Plast Surg*. 2000 Jun;44(6):601-4.
 8. Ferdinand RD, MacLean JG. Endoscopic versus open carpal tunnel release in bilateral carpal tunnel syndrome. A prospective, randomised, blinded assessment. *J Bone Joint Surg Br*. 2002 Apr;84(3):375-9.
 9. Trumble TE, Diao E, Abrams RA, Gilbert-Anderson MM. Single-portal endoscopic carpal tunnel release compared with open release : a prospective, randomized trial. *J Bone Joint Surg Am*. 2002 Jul;84-A(7):1107-15.
 10. Chow JC. Endoscopic release of the carpal ligament for carpal tunnel syndrome: 22-month clinical result. *Arthroscopy*. 1990;6(4):288-96.
 11. Palmer DH, Paulson JC, Lane-Larsen CL, Peulen VK, Olson JD. Endoscopic carpal tunnel release: a comparison of two techniques with open release. *Arthroscopy*. 1993;9(5):498-508.
 12. Murphy RX Jr, Jennings JF, Wukich DK. Major neurovascular complications of endoscopic carpal tunnel release. *J Hand Surg [Am]*. 1994 Jan;19(1):114-8.
 13. Seiler JG 3rd, Barnes K, Gelberman RH, Chalidapong P. Endoscopic carpal tunnel release: an anatomic study of the two-incision method in human cadavers. *J Hand Surg [Am]*. 1992 Nov;17(6):996-1002.
 14. Atroshi I, Larsson GU, Ornstein E, Hofer M, Johnsson R, Ranstam J. Outcomes of endoscopic surgery compared with open surgery for carpal tunnel syndrome among employed patients: randomised controlled trial. *BMJ*. 2006 Jun 24;332(7556):1473. Epub 2006 Jun 15.
 15. Macdermid JC, Richards RS, Roth JH, Ross DC, King GJ. Endoscopic versus open carpal tunnel release: a randomized trial. *J Hand Surg [Am]*. 2003 May;28(3):475-80.
 16. Thoma A, Veltri K, Haines T, Duku E. A meta-analysis of randomized controlled trials comparing endoscopic and open carpal tunnel decompression. *Plast Reconstr Surg*. 2004 Oct;114(5):1137-46.
 17. Thoma A, Veltri K, Haines T, Duku E. A systematic review of reviews comparing the effectiveness of endoscopic and open carpal tunnel decompression. *Plast Reconstr Surg*. 2004 Apr 1;113(4):1184-91.
 18. Agee JM, McCarroll HR Jr, Tortosa RD, Berry DA, Szabo RM, Peimer CA. Endoscopic release of the carpal tunnel: a randomized prospective multicenter study. *J Hand Surg [Am]*. 1992 Nov;17(6):987-95.
 19. Brown RA, Gelberman RH, Seiler JG 3rd, Abrahamsson SO, Weiland AJ, Urbaniak JR, Schoenfeld DA, Furcolo D. Carpal tunnel release. A prospective, randomized assessment of open and endoscopic methods. *J Bone Joint Surg Am*. 1993 Sep;75(9):1265-75.
 20. Dumontier C, Sokolow C, Leclercq C, Chauvin P. Early results of conventional versus two-portal endoscopic carpal tunnel release. A prospective study. *J Hand Surg [Br]*. 1995 Oct;20(5):658-62.
 21. Jacobsen MB, Rahme H. A prospective, randomized study with an independent observer comparing open carpal tunnel release with endoscopic carpal tunnel release. *J Hand Surg [Br]*. 1996 Apr;21(2):202-4.
 22. Vasen AP, Kuntz KM, Simmons BP, Katz JN. Open versus endoscopic carpal tunnel release: a decision analysis. *J Hand Surg [Am]*. 1999 Sep;24(5):1109-17.
 23. Wong KC, Hung LK, Ho PC, Wong JM. Carpal tunnel release. A prospective, randomised study of endoscopic versus limited-open methods. *J Bone Joint Surg Br*. 2003 Aug;85(6):863-8.
 24. Cobb TK, Knudson GA, Cooney WP. The use of topographical landmarks to improve the outcome of Agee endoscopic carpal tunnel release. *Arthroscopy*. 1995 Apr;11(2):165-72.
 25. Palmer AK, Toivonen DA. Complications of endoscopic and open carpal tunnel release. *J Hand Surg [Am]*. 1999 May;24(3):561-5.
 26. Wheatley MJ, Hall JW, Pratt D, Faringer PD. Is training in endoscopic carpal tunnel release appropriate for residents? *Ann Plast Surg*. 1996 Sep;37(3):254-7.
 27. Kretschmer T, Antoniadis G, Borm W, Richter HP. [Pitfalls of endoscopic carpal tunnel release] *Chirurg*. 2004 Dec;75(12):1207-9. German.
 28. Schonauer F, Varma S, Belcher HJ. Endoscopic carpal tunnel release: practice in evolution. *Scand J Plast Reconstr Surg Hand Surg*. 2003;37(6):360-4.
 29. Lee WP, Strickland JW. Safe carpal tunnel release via a limited palmar incision. *Plast Reconstr Surg*. 1998 Feb;101(2):418-24.
 30. Chow JCY. Carpal tunnel syndrome. In: Watson HK, Ed. *The wrist*. Lippincott Williams & Wilkins. 2001;107-122
 31. Newey M, Clarke M, Green T, Kershaw C, Pathak P. Nurse-led management of carpal tunnel syndrome: an audit of outcomes and impact on waiting times. *Ann R Coll Surg Engl*. 2006 Jul;88(4):399-401.

Author Information

Feras M M Ya'ish, MRCS(Ed)

Trauma & Orthopaedic Registrar, Birmingham Hand Centre, Trauma & Orthopaedic Department, University Hospital Birmingham

Dominic M. Power, FRCS (Tr&Orth)

Consultant Hand Surgeon, Birmingham Hand Centre, Trauma & Orthopaedic Department, University Hospital Birmingham