Long-term Results of Carpal Tunnel Release

Using Agee's Single Portal Endoscopic Technique

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Purpose: *Open carpal tunnel release (OCTR) is the standard treatment after failed conservative management for carpal tunnel syndrome. Endoscopic carpal tunnel release (ECTR) has been developed and has been used increasingly over the last few years. According to several studies, ECTR results in a more rapid return to work and less scar tenderness than OCTR. Most studies have had short-term follow-ups and it is important to assess its long-term results. This study presents long-term results of ECTR by using a standard questionnaire.*

Methods: *There were 76 patients (94 hands) who underwent endoscopic carpal tunnel release (ECTR), using Agee's single portal technique since July 1992 till October 1994. The Boston questionnaire was used to evaluate the long term results and patient satisfaction of this procedure, 28 patients (36 hands) responded with a mean age of 55 years at the time of operation and the mean follow-up period was 120 months. No complications developed in any patient. The Boston questionnaire is a self-administered questionnaire for the assessment of the severity of symptoms and functional status in patients who have carpal tunnel syndrome. There are 11 questions for symptom severity scoring, and 8 questions for functional severity scoring. The score varies from 1 (no problem) to 5 (very severe problem). The mean scores and standard deviations for symptom severity and functional status scores were recorded and classified into a range, with a score of 1-2 representing satisfactory, 2-3 as acceptable, 3-4 as fair, and 4-5 as unacceptable.*

Results: *Mean symptom severity scores were 1.41 and mean functional status scores were 1.32. 96.43 % had no scar discomfort, and only 3.57 % had mild symptoms. All patients were satisfied with the results of the operation.*

Conclusion: *The subjective assessment of the long-term results of ECTR in our patients, using the Boston questionnaire was rated as satisfactory, and the results were comparable, if not better, than prior studies, which used the same questionnaire to assess conventional open carpal tunnel release.*

Keywords: *Open carpal tunnel release, Endoscopic carpal tunnel release, Agee's single portal technique, Boston carpal tunnel questionnaire*

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Introduction

Carpal tunnel syndrome (CTS) is the most common compressive neuropathy of the upper extremity, and surgical decompression of the carpal tunnel is the most commonly performed operation on the hand in the USA[(1)]. Carpal tunnel release is the treatment of choice after failed conservative management[(2)]. Conventional open carpal tunnel release (OCTR) has been widely accepted as an effective method for treating CTS. However, complications reported include failure to relieve symptoms, hypertrophic or painful scars, pillar pain, persistent symptoms, and infection[(3-5)]. Endoscopic carpal tunnel release (ECTR) has since been developed for surgical decompression of the carpal tunnel. According to several studies, ECTR results in a more rapid return to work and less scar tenderness than OCTR[(6,7)]. However, some studies referred to the major neurovascular complications reported in ECTR[(8-10)]. Incomplete release of the carpal ligament is a potential complication of this method as suggested by other studies[(11,12)]. But ECTR has been used increasingly over the last few years and it is important to assess its long-term results. Most studies have had short-term follow-ups, and there was one study which talked about results at 4 years follow-up of carpal tunnel release by Agee endoscopic technique[(13)]. To our

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knowledge, there is no study that mentions long-term results for ECTR.

The purpose of this study was to assess the subjective results in patients who underwent single portal ECTR at a long-term follow-up by using the Boston questionnaire established by Lanvine in 1993[15] as the self-administered questionnaire for the assessment of severity of symptoms and functional status. The questionnaire is excellently reproducible, and widely used for subjective assessment for the results of CTS management.

Materials and Methods

This is the retrospective review of all patients who had undergone single portal ECTR in our department between September 1991 to December 1994. All procedures were performed by our senior consultants (*TLC, YFC*). There were 135 patients (22 males, 113 females) with a mean age of 52 years (range 25 to 88 years). One hundred and three patients had unilateral carpal tunnel release performed, and 32 had bilateral carpal tunnel release. All patients had pre-operative electrophysiological studies that confirmed the presence of carpal tunnel syndrome.

Single portal ECTR was performed using standard Agee's technique under Bier's block. All the charts were traced, no major complications were noted. Of the 135 patients who underwent surgery, 52 patients were lost to follow-up, and 3 patients had developed dementia. Four patients who developed recurrence and required another operation were excluded from the study. The Boston questionnaire was then sent out to the remaining 76 patients (94 hands).

The Boston questionnaire, a self-administered questionnaire for the assessment of severity of symptoms and functional status in patients who have carpal tunnel syndrome developed by Levine, was used. This questionnaire was also translated into Mandarin, and prepared in a bilingual (English/Mandarin) fashion. Two additional questions with regards to patient satisfaction and scar discomfort were added.

A pilot trial of the bilingual questionnaire was performed on some patients in the ward, to confirm the accuracy of the presentation. Subsequently, a letter, with the self-administered Boston questionnaire enclosed was mailed out to all 76 patients. Non-responders were interviewed via telephone by independent doctors.

In the questionnaire, there are 11 questions for symptom severity scoring, including 2 questions on night pain; 3 questions on daytime pain; 1 question on numbness; 1 question on paresthesia; 2 questions on nocturnal numbness, and 2 on motor power. Eight questions on daily activities are for functional severity scoring. The score for symptom severity scale varies from 1 (no symptoms) to 5 (very severe symptoms), and the score for the functional scale varies from 1 (no difficulty) to 5 (cannot do that activity). The mean scores and standard deviation for symptom severity, functional status scales, and individual symptoms were calculated. We also classified the range, with a score of 1-2 representing absence to mild symptoms (satisfactory result), 2-3 as mild to moderate (acceptable result), 3-4 as moderate to severe (fair result), and 4-5 as severe to very severe symptoms (unacceptable result). Patient satisfaction was assessed under 4 categories excellent, good, poor, and very poor. Scar pain was graded as no pain, mild pain, moderate pain, severe pain, and very severe pain.

Results

Of the 76 patients who were sent a copy of the questionnaire, 28 patients (36 hands) responded (36.84%). The mean age was 55 years (range 37-68 years) at the time of operation, and the gender distribution was 23 females, and 5 males. Six patients had bilateral release and 22 patients had unilateral release done. The mean follow-up period was 120 months (range from 110-137 months). No complications were recorded intraoperatively, or postoperatively.

The mean (± SD) symptom severity score is 1.41 (± 0.68), and the mean (± SD) functional status score is 1.32 (± 0.5). Table 1 shows the mean values with standard deviations of symptom severity, functional status scores, and a breakdown of the mean values for individual symptoms.

Table 1 Mean (SD) values of symptom severity, functional status scores, and scores for individual symptoms

Symptom severity scores	1.41(0.68)
Functional status scores	1.32(0.5)
Night pain	1.41(0.79)
Day pain	1.39(0.86)
Numbness	1.57(1.03)
Weakness	1.48(0.73)
Paresthesia	1.32(0.55)
Nocturnal numbness	1.43(0.78)

Table 2 The severity of the individual symptoms

Symptom	No	Mild	Moderate	Severe
Night pain	24(85.72%)	3(10.71%)	1(3.57%)	
Day pain	23(82.14%)	3(10.71%)	1(3.57%)	1(3.57%)
Numbness	20(71.43%)	4(14.28%)	2(7.14%)	2(7.14%)
Weakness	20(71.43%)	6(21.43%)	2(7.14%)	
Paresthesia	20(71.43%)	7(25%)	1(3.57%)	
Nocturnal numbness	18(64.29%)	8(28.57%)	1(3.57%)	1(3.57%)

Values are number of patient (%)

Table 3 Comparison of the mean scores (SD) with the former studies (using Boston questionnaire for assessment)

	Our study (10 years ECTR) (n= 28)	Katz study (2 years OCTR)[15] (n=29)	Bradley study (1 year mini-open carpal tunnel release)[16] (n=34)	Lanvin study (1 year OCTR)[14] (n=38)
Symptom severity score	1.41(0.68)	1.87(1.03)	1.3(0.41)	1.9(1.0)
Functional status score	1.32(0.5)	1.87(1.09)	1.32(0.52)	2.0(1.1)
Night pain	1.41(0.79)	1.5(0.93)		
Day pain	1.39(0.86)	1.76(1.0)		
Numbness	1.57(1.03)	1.86(1.06)		
Weakness	1.48(0.73)	2.24(1.05)		
Paresthesia	1.32(0.55)	1.74(1.11)		
Nocturnal numbness	1.43(0.78)	1.74(0.95)		
Patient satisfaction	100% excellent/good	72% excellent/good	91% excellent/good	

Table 4 Comparison with long-term results of OCTR

Symptoms	Our study (n = 28)	Nancollas study 1995[17] (n = 60)
Pain	92.86%(G/E)* 7.14%(F/P)**	88.33%(G/E) 11.67%(F/P)
Numbness	85.72%(G/E) 14.28%(F/P)	85%(G/E) 15%(F/P)
Weakness	92.86%(G/E) 7.14%(F/P)	68.33%(G/E) 31.67%(F/P)
Night symptoms	94.65%(G/E) 5.35%(F/P)	85%(G/E) 15%(F/P)

*G/E: Good/Excellent **F/P: Fair/Poor

Thirteen of twenty-seven patients (50%) had no symptom deficit at all, and fifteen patients (57.14%) had no functional deficit at all. Table 2 shows the severity for the individual symptoms. One patient had severe pain, and another two had severe numbness. These patients were interviewed again on the phone, and offered further clinical examination at our clinic. However, only the patient with severe pain presented at the clinic, and re-examination revealed that her pain was due to osteoarthritis in both hands.

Thirteen patients (46.43%) rated the operation as excellent, and the remainder rated it as good (53.57%). Twenty-six patients (96.43%) had no scar pain, and only 1 patient (3.57%) had mild scar pain.

We then compared the scores from our study, with previous studies that used the same questionnaire for the assessment of results following conventional open carpal tunnel release (OCTR) and mini-open carpal tunnel release. The results are illustrated in Table 3.

Finally, we compared our study to a study on the subjective assessment of long-term outcomes of OCTR[17] (Table 4)

Discussion

James CY Chow introduced endoscopic carpal tunnel release by a double portals technique in 1987, and then single portal endoscopic carpal tunnel release (ECTR) was developed by JM Agee and FC Kiry in 1990. Since then, endoscopic techniques for carpal tunnel release have been well established and gained popularity over the last few years.

An endoscopic procedure offers a reduction in post-operative pain and more rapid rehabilitation, with an earlier return to work, compared to the conventional open carpal tunnel release procedure. However, the procedure is technically more demanding, with some major neurovascular complications being reported. But ECTR has been used increasingly over the past decade. Erhard et al. reported the results of ECTR using Agee's technique, at the mean follow-up of 4.5 years with 72% of patients being symptomfree[13]. Chow et al. reported thirteen years' experience with the double portals endoscopic technique in 2,402 hands, and at the final follow-up evaluation 2,284 (95%) hands were completely asymptomatic or had very minor problems and the patients were completely satisfied with the procedure[14]. As such, it is important to assess the long-term results and benefits of ECTR using the single portal technique.

The Boston self-administered questionnaire was first established by Lavine[15] in 1993, to assess the severity of symptoms and functional status in patients who have carpal tunnel syndrome. Six critical domains for the evaluation of carpal tunnel syndrome were identified and a symptoms severity scale incorporating these six clinical areas, consisting of 11 questions was developed. The overall symptoms severity score is calculated as the mean of the scores for the 11 individual items. Eight functional activities commonly affected by CTS were also identified, and make up the functional status scale. Two additional questions with regards to patient satisfaction and scar discomfort were added. The reproducibility and consistency of these scales allowed them to be used in studies evaluating the outcomes of treatment for carpal tunnel syndrome[15-17,19-22].

There were 4 patients who developed a recurrence of symptoms at 40, 52, 56, and 82 months, respectively, after the initial ECTR, a recurrence rate of 4.08%. ECTR was repeated on 3 of the patients, and OCTR was performed on 1 patient.

The long-term results of Agee's single portal ECTR have not been previously reported. Here we used the Boston questionnaire to evaluate Agee's ECTR at more than 10 years. Our results confirmed the excellent patient satisfaction and outcome more than 10 years after ECTR. Our results are comparable, if not better, when compared to the results of the other techniques of carpal tunnel release (namely the conventional open technique and SafeGuard mini-open technique [15-17]).

One shortfall of our study however is the small sample size with a low response rate (36 out of 94 hands). However, at the long-term follow-up, all patients were satisfied with the results, and both the symptom severity scores and functional status scores were classified as satisfactory, showing the beneficial results of ECTR over conventional techniques.

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ผลการรักษาระยะยาวของการผ่าตัดโรคพังผืดรัดเส้นประสาทที่ข้อมือด้วยวิธีใช้กล้องชนิดแผลเดียว

กวี ภัทราดูลย์, พบ, Tan SH, MD, Yong FC, MD, Teoh LC, MD

วัตถุประสงค์: *การผ่าตัดเลาะพังผืดรัดเส้นประสาทที่ข้อมือด้วยวิธีใช้กล้อง เป็นวิธีการผ่าตัดทางเลือกชนิดแผลเล็ก และลดผลข้างเคียงจากบาดแผลที่มีขนาดใหญ่จากการผ่าตัดชนิดเปิดแผลมาตรฐาน การศึกษานี้เพื่อแสดงผลของการรักษาระยะยาวของการผ่าตัดเลาะพังผืดในโรคพังผืดรัดเส้นประสาทที่ข้อมือด้วยวิธีใช้กล้องชนิดแผลเดียว*

วิธีการศึกษา: *ทำการศึกษาย้อนหลังในผู้ป่วยที่ได้รับการผ่าตัดเลาะพังผืดในโรคพังผืดรัดเส้นประสาทที่ข้อมือด้วยวิธีใช้กล้องชนิดแผลเดียว จำนวน 76 ราย (94 มือ) ตั้งแต่เดือนกรกฎาคม พ.ศ. 2535 จนถึง เดือนตุลาคม พ.ศ. 2537 โดยใช้แบบสอบถามมาตรฐาน (Boston questionnaire) เป็นเครื่องมือในการประเมินผลการรักษา และความพึงพอใจของผู้ป่วย โดยมีผู้ป่วยตอบแบบสอบถามทั้งหมด 28 ราย (36 มือ) โดยมีอายุเฉลี่ย 55 ปี และช่วงระยะเวลาติดตามผลเฉลี่ย 120 เดือน โดยไม่พบผลแทรกซ้อนจากการผ่าตัดในผู้ป่วย แบบสอบถามมาตรฐาน (Boston questionnaire) นี้ให้ผู้ป่วยประเมินตนเองในสองส่วนหลัก คือ ในด้านความรุนแรงของอาการแสดง และระดับการใช้งาน โดยคิดเป็นค่าคะแนนในแต่ละส่วนจาก 1 อันหมายถึง ไม่มีปัญหา จนถึง 5 อันหมายถึง มีปัญหามากที่สุด คะแนนเฉลี่ยที่ได้จากผลบันทึก นำมาแบ่งเป็นช่วงคะแนนเฉลี่ย 1-2 แปลว่า ผลน่าพอใจ คะแนนเฉลี่ย 2-3 แปลว่า ผลยอมรับได้ คะแนนเฉลี่ย 3-4 แปลว่า ผลพอใช้ และคะแนนเฉลี่ย 4-5 แปลว่า ผลที่ยอมรับไม่ได้*

ผลการศึกษา: *ค่าเฉลี่ยคะแนนของความรุนแรงของอาการแสดง คือ 1.41 และค่าเฉลี่ยคะแนนของระดับการใช้งาน คือ 1.32 และร้อยละ 96.43 ไม่มีอาการเจ็บที่แผลหลังผ่าตัด มีเพียงร้อยละ 3.57 ที่มีอาการเล็กน้อย นอกจากนั้นแล้ว ผู้ป่วยทุกรายมีความพึงพอใจต่อผลการผ่าตัด*

สรุป: *คะแนนเฉลี่ยของผลระยะยาวของการผ่าตัดเลาะพังผืดรัดเส้นประสาทที่ข้อมือด้วยการใช้กล้องแผลเดียว ในการศึกษานี้บ่งชี้ถึงผลการรักษาอันเป็นที่น่าพอใจ โดยคะแนนที่ได้มีความใกล้เคียงกับผลการรักษาที่น่าพอใจของวิธีการผ่าตัดเปิดแบบมาตรฐาน ซึ่งใช้แบบสอบถามมาตรฐานเดียวกันนี้ ในการศึกษาที่ผ่านมา และผู้ป่วยทุกรายพึงพอใจกับผลการรักษาโดยวิธีใช้กล้องนี้*