Original Article

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Comparison Of Post-Operative Parameters Of Open And Endosopic Carpel Tunnel Syndrome Release

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Abstract

Background: Open carpel tunnel release is conventional standard technique for carpel tunnel release. But the open carpel tunnel release resulted in complication like post-operative scar tenderness, delay in gaining grip strength, pain was more, hypertrophied scar mark on skin, number of absence from work was more. There for new technique of endoscopic carpel tunnel release was introduced. Endoscopic carpel tunnel release promised better result than open carpel tunnel release and most of the complication were reduced. Therefore we conducted study open versus endoscopic carpel tunnel release.

Material And Method: 30 patients with carpel tunnel syndrome were included in this prospective study from year May 2017 to May 2018 with follow up period of three months. Group 1 was open procedure group and Group 2 was endoscopic procedure group. All the patients were compared in term of post-operative parameters at follow up of 2 weeks, 1 month and 3 month.

Results: Average VAS score at post-operative follow- up at 3 month were 3.3 and 2.2 for open and endoscopic group respectively. Average six item score at post-operative follow- up at 3 month were 0.73 and 0.57 for open and endoscopic group respectively. Average number of days to return to daily activity was less in endoscopic group than open group.

Conclusion: Endoscopic carpel tunnel release operated patients showed better functional outcome compare to open carpel tunnel release.

Keywords: Carpel Tunnel Syndrome (CTS), Six Item Carpel Tunnel Score (SICTS)

Introduction

The carpel tunnel syndrome is pathological condition seen recently in last few decades. The concept of median nerve compression was given by Pagets in 1854 and Moerschs was first to describe term carpel tunnel syndrome [1]. The Carpel Tunnel Syndrome is caused by entrapment of median nerve in carpel tunnel leading to symptoms like tingling numbness in hand which further advances to paraesthesia which leads to decrease skill work performance. It also causes wasting of muscles leading to decrease in working ability of affected hand. Initial treatment of carpel tunnel syndrome is by NSAIDs, steroid injection and for pain reduction physiotherapy was started. Carpel tunnel release is treatment of choice for carpel tunnel syndrome. It done by two type, as open procedure which was done since old time and recently new way is by endoscopic release. The open carpel tunnel release was effective and had good outcome. The open procedure had complication like post-operative pain was more, hypertrophied scar mark on skin, number of absence from work was also more [2,3,4]. So the most of the surgeon have shifted from open carpel tunnel release procedure to endoscopic carpel tunnel release.

Recent concept in carpel tunnel release is endoscopic release mention therotically to give better results than open release\ [5]. Recently the endoscopic releases is perform at same rate as open.5 It can be done as single portal or double portal technique. Most of the complications of open release were eliminated by endoscopic release. Endoscopic release is minimally invasive while open release requires long incision. The post-operative pain was also supposed to reduce after endoscopic release [2,3]. The functional recovery time of patient was also supposed to reduce after endoscopic release.4 There were some drawback seen in endoscopic carpel tunnel release which included cost of procedure, incomplete release, equipments and training problem [6].

Therefore we conducted prospective study for assessment of the functional outcome of open and endoscopic carpel tunnel release. Also compare the complication of both open carpel tunnel release and endoscopic carpel tunnel release in carpel tunnel syndrome. We also noted the rate of recurrence, persisting symptoms and revision of surgery required.

Materials And Methods

Pre-Operative Planning

30 patients with carpel tunnel syndrome were included in this prospective study from year May 2017 to May 2018 with follow up period of three months. Patients who had no relief on conservative management for carpel tunnel syndrome. The conservative management included NSAIDs and splints for carpel tunnel syndrome. Patients were kept on conservative management for atleast 3 months. Patients who were not relief on conservative management after 3 months of treatment were selected for operative procedure and were enrolled in this study. Patients complaining night pain, pain in median nerve distribution were selected and clinical examine for carpel tunnel syndrome by Phalen's Test, Durkan's Test and Tinel's

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Table 1: Showing demographic details of Group 1 and Group2

Patients Details	Open Procedure	Endoscopic Procedure
Age (Mean)	44	40
Dominant side	12	10
Gender (Male/Female)	12/3	12/3

sign if positive were diagnosed for carpel tunnel syndrome. The diagnosis was confirm by EMG NCV study. EMG NCV was done pre-operatively and at 3 months follow up to access the recovery. Patients were randomly divided in two group, group 1 were patients treated with open procedure and group 2 patients treated endoscopic procedure. There were total 24 male and 6 female in our study. Group 1 had 12 male and 3 female of mean age 44 years. And group 2 had 12 male and 3 female of mean age 40 years.(Table 1)

Inculsion Criteria included age between 25-60 year, symptoms of at least three months, inadequate response to six weeks' treatment with medicines and wrist splint, nerve conduction test showing median neuropathy at the wrist but no other abnormalities. Exclusion criteria inflammatory joint disease, pregnancy, trauma to the affected hand during the preceding year, previous carpal tunnel release surgery in the affected hand, any surgery on same wrist during preceding year, cervical disc disease. Data was collected from the patients who fulfill the inclusion and the exclusion criteria. The scope of the study was explained to them and their permission will be sought for collecting the data. Approval of ethics committee of college was taken. Post-operative outcome were measured by parameters like physical examination, six item CTS Scale, VAS pain scale at 2 weeks and 3months and post op NCV at 6 months. Pre-Operative examination and post-operative examination was done by same surgeon. And pre-operative and post-operative EMG-NCV was done by same neurologist. All patients received same anesthesia block preoperatively irrespective of groups. Tourniquet was used in all cases.
Operative Procedure.

Open Procedure

An 4-5 cm incision was taken over the hand about 3-4mm on ulnar side of thenar crease and from below Kalpan line. Skin was open through forceps and transverse carpel ligament and superficial palmar fascia was seen. The transverse carpel ligament and superficial palmar fascia was separated and cut on ulnar side protecting the median nerve. After that soft tissue was released proximally and distally. Closure was done.

Endoscopic Procedure

Single hole procedure was used. An transverse incision of about 1cm was made over crease of wrist over distal wrist.

Table 2 : Comparing pre-operative parameters between two groups (p>0.05)

Pre-Operative Parameters	Open procedure	Endoscopic procedure
Involvement of hand		
Right	10	9
Left	5	6
Duration of symptoms (months)		
43526	0	0
43588	8	7
43714	7	8
Pain sensation by VAS		
0-3	2	1
43620	9	11
43745	4	3
Numbness		
Mild	5	4
Moderate	7	7
Severe	3	4
Wasting of APB	4	7
Response to conservative treatment		
Excellent	0	0
Good	5	3
Poor	10	12

Mostly it was seen than incision was on palmaris longus tendon. Incision was made and palmaris longus was taken radially. Care was taken of median nerve while going deep from incision. Median nerve seen near flexor retinalculum and was retracted with synovial tissue. Dilator was inserted from incision. Then scope cannula was pass over dilator and care was taken that it was not inserted above 3cms to prevent injury to superifical plamar arch. Over the cannula device is introduce and transverse carpel ligament is seen. Then the blade is trigger by hand of device so that blade is elevated and the tranverse ligament is cut. Tranverse carpel ligament is check again for complete tear. Scope removed and closure was done.

Post-Operative Care

Post-operatively soft dressing was given over incision site. Hand was supported by splint. Antibiotic was given for 24 hrs after surgery. Dressing was kept till suture removal done on 14 day. After 2 weeks patients were started assisted movement followed by passive movements then active.

Post-Operative Evaluation

Post-operative evaluation was done at 2 weeks, 1 month and

Table 3: Comparing scores Pre-operative and post-operative for open procedure (p<0.05)

Parameters (Mean)	Pre-operative	Post-operative at 2 weeks	P value
Six Item Score For CTS	24.8	16.7	0
VAS	9.6	7.13	0.001

Table 4: Comparing scores Pre-operative and post-operative for endoscopic procedure (p<0.05)

Parameters (Mean)	Pre-operative	Post-operative at 2 weeks	p value
Six Item Score For CTS	24.5	15.9	0.001
VAS	9.8	6.7	0

6 month. Recovery of symptoms was assess at each visit. Patient was check for recovery from previous symptoms like tingling numbness, pain, night numbness, hand numbness. Time taken by the patient to resume the activity was also recorded.

Statistical Analysis

The data obtained at the end of study was analyzed by using SPSS software and MS Excel. The data study was made by calculating normal parameters like mean, median, standard deviation, ration for normally distributed data. And for non-normally distributed data Mann-Whitney U and Wilcoxon test was used.

Result

Pre-Operative Parameters

30 patients showed follow up. The mean age of patients for open procedure group was 44 years (range 32-48). The mean age of patients for endoscopic procedure was 40 years (range 32-50). Statically no difference was seen (p=0.76). There were 12 males and 3 female in open procedure group, endoscopic group also had 12 male and 3 female, statically inginificant(p>0.05). Average duration of symptoms for open procedure was 5.2 months and for endoscopic procedure was 5.4 months, which was statically insignificant (p>0.05). Symptoms like tingling numbness, paresthesia was seen all the patients while wasting of abductor pollicis brevis was seen in 5 patients in open procedure and 3 patients in endoscopic procedure group.(Table 2)

Post-Operative Parameters: At 2 weeks

Relief from symptom of carpel tunnel syndrome started from post-operative day 4 in 10 patients and on day 10 in 3 patients and day 12 in 2 patients in open procedure patients, while in endoscopic procedure symptom were relieved on post-operative day 5 for 2 patients, day 10 for 8 patients and day 14 for 5 patients. The incidence of suture site pain was more in patients operated with open procedure. 10 patients of 15 had site tenderness 6 had mild and 4 had severe site tenderness compare to endoscopic procedure had only 5 patients with mild suture site tenderness. There were no sign of new tingling numbness or tendon tear. No post-operative neurovascular complication was in patients of either group. Mean of six item score at post-operative 2 weeks were 16.7 and 15.9 for open and endoscopic procedure respectively.(Table 3) (Table 4)

Post-Operative Parameters: At 1 month

Post-operative mean at 1 month for six item carpel tunnel syndrome for open procedure and endoscopic procedure were 7.1 and 5.7 respectively. Difference was statistically significant (p=0.028). Post-operative average of VAS at 1 month was 5.6 and 4.5 for open and endoscopic procedure respectively. Difference was statistically significant (p=0.001). Residual numbness was present 1 in open procedure and 3 in endoscopic procedure.(Table 5)

Post-Operative Parameters: At 6 month

All 30 patients followed up at 6 month. Average of six item score for open and endoscopic procedure was 2.0 and 0.27 respectively. Difference was statically significant (p=0.16). And average VAS score for open and endoscopic procedure was 3.2 and 2.2 respectively. Difference was statically significant (p=0.001). 7 patients of open procedure showed complete relief while in endoscopic procedure 14 showed complete relief. Post-operative scar tenderness was present in three patients and one continued to have residual numbness in open procedure. In endoscopic procedure two patients had residual numbness. No scar related tenderness was present in endoscopic procedure group. Average of patients to return to their daily activity was 16 days in endoscopic procedure and in it was more in open procedure upto 22 days. Average of grip strength calculated pre operatively for both open and endoscopic was 16.2 kg and 15.2 respectively. Post operatively there was increase in mean grip strength from 16.2 to 19.7 for open procedure and from

Table 5: Parameters at 1 months

Parameters	Open procedure	Endoscopic procedure
Six item score for carpel tunnel	7.1	5.7
VAS score	5.6	4.5
Residual numbness	1	2
Subjective improvement		
Excellent	7	9
Good	6	4
poor	1	1

Table 6: Parameters at 6 months

Parameters	Open Procedure	Endoscopic procedure
Six item score for CTS (Mean)	0.73	0.57
VAS Score (Mean)	3.2	2.2
Complication		
Scar tenderness	2	0
Residual numbness	1	2
Average Grip strength (kgs)	19.7	20.4
Average Return to daily activity (days)	22	16
Subjective Improvement		
Excellent	7	14
Good	8	1
Poor	0	0

15.2 to 20.4 for endoscopic procedure.(Table 6)

Discussion

The patients with carpel tunnel syndrome who underwent the conservative treatment and had no relief on conservative treatment were treated with operative procedure. The standard treatment for carpel tunnel syndrome was open carpel tunnel release. But the open procedure had complication like scar tenderness, late recovery, reduced tenderness [6]. Since last decade the endoscopic procedure has been started practicing by some surgeons. The endoscopic procedure promised early recovery, no scar tenderness and early pain relief form pain [7]. We did a prospective study on carpel tunnel syndrome operated by both open and endoscopic procedure with 15 patients in each group and concluded that patients treated with endoscopic procedure showed early pain relief, no scar tenderness, return to daily activity was early, and increase in grip strength early than open procedure. Vasiliadis et al. conducted a meta-analysis on release of carpel tunnel syndrome by open and endoscopic procedure and concluded that patients treated with endoscopic procedure had early recovery to daily activity, early relief from pain at 1 months follow up. Patients operated by open procedure had complication at follow up compare to endoscopic procedure, statistics shows late follow difference between open and endoscopic procedure. Keith's et al reported that damage to median nerve was more in endoscopic procedure

Table 7: Final mean VAS score difference of other studies

Studies	Endoscopic VAS score	Open VAS score
Erdmann et al12	0.04	1
Larsen et al13	0.6	0.5
Rab et al14	0.6	0.2
Wong et al 15l	0.3	0.5

Table 8: Mean difference of grip strength (kgs) value post-operatively of other studies.

Studies	Endoscopic Group	Open Group
Atroshi et al16	31.5	29.9
Brown et al17	23.18	20.9
Rab et al14	13.8	18
Erdmann et al18	26.36	22.23
Malhotra et al19	22.8	22.2

Table 9: Mean differnece of nerve injury events post-operatively of other studies.

Studies	Endoscopic Group	Open Group
Atroshi et al16	0	0
Brown et al17	3	0
Rab et al14	0	0
Erdmann et al18	1	1
Malhotra et al19	0	0

Table 10: Mean difference of scar tenderness events post-operatively of other studies.

Studies	Endoscopic Group	Open Group
Atroshi et al16	10	11
Brown et al17	28	50
Erdmann et al18	2	13
Malhotra et al19	0	0

Table 11: Mean difference of day required to return to daily activity events post-operatively of other

Studies	Endoscopic Group	Open Group
Atroshi et al16	28	33
Brown et al17	14	28
Erdmann et al18	14	39
Malhotra et al19	16	20
Larsen et al13	7	20

compare to open procedure [9]

The postoperatively pain score by VAS calculated by in our study showed lower values in endoscopic procedure and more in open procedure. Agee et al in his study reported same result on post-operative pain score on open versus endoscopic repair [6]. Our study showed that time require for patient to return to their daily activity was more in open procedure than endoscopic procedure. Wong KC et al in his study reported the same results as seen ours [10]. Einhorn et al during his work reported the complication of endoscopic procedure like costly, inability to perform by instruments and space occupying lesions were not detected [11].

Chow and Kong in their study on pain management post-operatively for carpel tunnel syndrome suggested that the patients operated with endoscopic spine requires analgesic paracetamol about 0-2 tablet while the frequency of analgesic was more in open group [20] Trumble TE et al showed endoscopic procedure helps patients to return to their daily activity early than open procedure [21]. Similar result are seen in our study. Kang et also reported that pain intensity immediate post-operative and pain at time follow up when compare with open and close procedure the results were similar [22]

Conclusion

The endoscopic release of transverse carpel ligament is newly introduced treatment for carpel tunnel syndrome has major advantages than conventional open carpel tunnel release procedure. Return to daily activity was early and scar tenderness was less in endoscopic group when compare to open release while other complications were insignificant. With proper training of surgeon, endoscopic carpel tunnel release is treatment of choice for carpel tunnel syndrome.

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