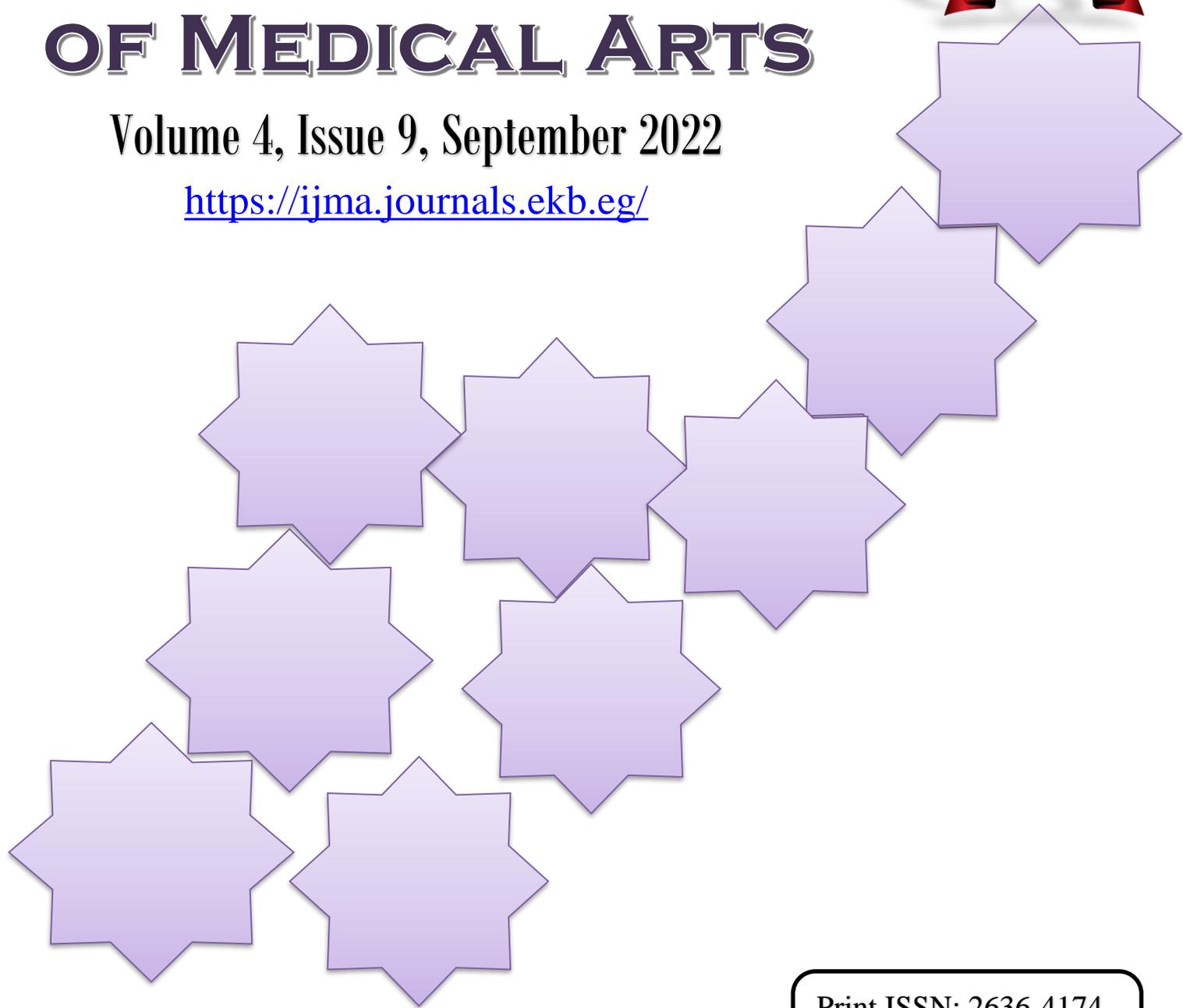


INTERNATIONAL JOURNAL OF MEDICAL ARTS

Volume 4, Issue 9, September 2022

<https://ijma.journals.ekb.eg/>



Print ISSN: 2636-4174

Online ISSN: 2682-3780



Available online at Journal Website
<https://ijma.journals.ekb.eg/>
 Main Subject [Neurosurgery]



Original Article

Effectiveness of Proximal Small Transverse Incision for Carpal Tunnel Decompression

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ABSTRACT

Article information

Received: 07-12-2022

Accepted: 31-12-2022

DOI:
10.21608/IJMA.2022.179298.1567

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Citation: Rabei A, El-Shandawelly MSI. Effectiveness of Proximal Small Transverse Incision for Carpal Tunnel Decompression. IJMA 2022 September; 4 [9]: 2627-2632. doi: 10.21608/IJMA.2022.179298.1567

Background: The classic open carpal tunnel decompression technique, the endoscopic approach for carpal tunnel and the “mini-open” technique, representing surgical approaches for managing carpal tunnel syndrome. We study a surgical technique for carpal tunnel release using single proximal transverse skin incision and evaluate its safety and effectiveness.

Aim of the work: To study the safety and efficacy of a proximal transverse small incision technique in management of CTS.

Patients and methods: A prospective study was conducted on twenty individuals diagnosed with CTS, the study performed at Al-Azhar University Hospitals and El-Salam General Hospital in period, between December 2018 and January 2020. Patient subjected to surgical decompression using proximal transverse small incision. Post-operative patient followed for a mean period of 3 months.

Results: The current study included 20 [4 males and 16 females] patients confirmed with diagnosed as idiopathic carpal tunnel syndrome. Their age ranged between 28 to 61 years, and subjected to surgery using proximal small transverse skin incision for carpal tunnel decompression. The duration of the surgery ranged from 10-20 minute. No intraoperative complication [e.g. hemorrhage or neurovascular injury]. Three months post-operative clinical and cosmetic satisfaction were reported by all patients and no one subjected to recurrent surgery.

Conclusion: A surgical approach for carpal tunnel decompression with proximal transverse small incision at the wrist joint represent a safe, effective approach associated with low cost, less rate of complication and excellent patient satisfaction.

Keywords: Carpal tunnel decompression; Transverse carpal ligament; Distal crease; ENMG studies.



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INTRODUCTION

Carpal tunnel syndrome [CTS] represents a common entrapment neuropathy in human body and caused by median nerve entrapment under the flexor retinaculum on its way to the hand [1]. Carpal tunnel syndrome causes discomfort and paresthesia in the afflicted hand and is one of the most common causes of occupational impairment [2].

Pain and/or paresthesias in the lateral half of the hand and in the lateral three fingers are the common manifestation in CTS which occurs more at night, and awake the patient of sleep. The patients may also developed anesthesia, weakness and atrophy of muscles innervated by affected nerve [3].

History taking, general and local examination, ENMG studies and musculoskeletal U/S are important for the diagnosis of CTS. Surgical management is indicated in patients with failure of medical treatment [4].

A surgical procedure with open classic incision crossing the wrist flexion skin crease seems to be a more effective technique in carpal tunnel release. However, it has many disadvantages including pain and tenderness of the scar, cosmetic complications, weak hand grip, and prolonged recovery time [5].

The disadvantages of endoscopic carpal release include: highly cost surgery, prolonged time and more complications which include injury of the median nerve or its branches and ulnar nerve, vascular injury and inadequate opening of the ligament [6,7].

In this study, we evaluate safety, and effectiveness of a surgical technique using single proximal transverse small skin incision in the opening of the FR and management of CTS.

THE AIM OF THE WORK

The aim of the study is to study the safety and efficacy of a proximal transverse small incision technique in management of carpal tunnel syndrome.

PATIENTS AND METHODS

A prospective non comparative study included 20 patients with carpal tunnel

syndrome diagnosed clinically and by ENMG studies. Patient subjected to surgical decompression using small proximal transverse approach in the neurosurgery departments, Al-Azhar University Hospitals and El-Salam General Hospital in period from December 2018 and January 2020. Post-operatively, patients were followed clinically and electro-physiological for a mean period of 3 months.

Inclusion criteria: Idiopathic carpal tunnel syndrome not improved with conservative treatment.

Exclusion criteria

- Patient with suspected abnormal anatomy [e.g: wrist fractures, tumors].
- Patient associated with neurological diseases [e.g. radiculopathy or peripheral neuropathy] and recurrent CTS.

Surgical tools: Surgical knife with blade No. 15, Two small retractors, One dissector, One needle holder, One tissue forceps, One straight blunt- scissors & One 3/0 nylon suture

Surgical technique

The operation is carried out in the surgery room, with local infiltration anesthesia. The hand held in place with a wrist extension, and abduction of the thumb. A 1.5 cm transverse skin incision is done at the middle of distal wrist crease and medial to palmaris longus tendon.

Exposure of antebrachial fascia with retraction of the skin incision where it is continuous with the distal edge of the transverse carpal ligament.

Dissection in between superficial palmar fascia and the deeply located antebrachial fascia and the transverse carpal ligament and opening the carpal tunnel by longitudinal incision with the surgical knife on the proximal third of the transverse carpal ligament.

Insertion of curved dissector in carpal tunnel below the ligament and cutting the transverse carpal ligament under direct vision by straight scissors towards the longitudinal axis while the tip of the scissors directed up. Finally, superficial retraction of the palmar skin and fascia, allow better visibility and optimum

transection of the distal portion of the carpal ligament, upon completing the release.

At the end, complete opening of ligament indicated by smooth withdrawal of the tip of curved dissector from the tunnel and clear observation of median nerve throughout the tunnel.

Skin closure with one mattress 3-0 prolene suture then wound dressing and the patient should conduct modest vigorous movement with his fingers right away, hand elevation for the first two days, analgesics for one week and taking prophylactic antibiotic for two weeks, and stitch removal after two weeks.

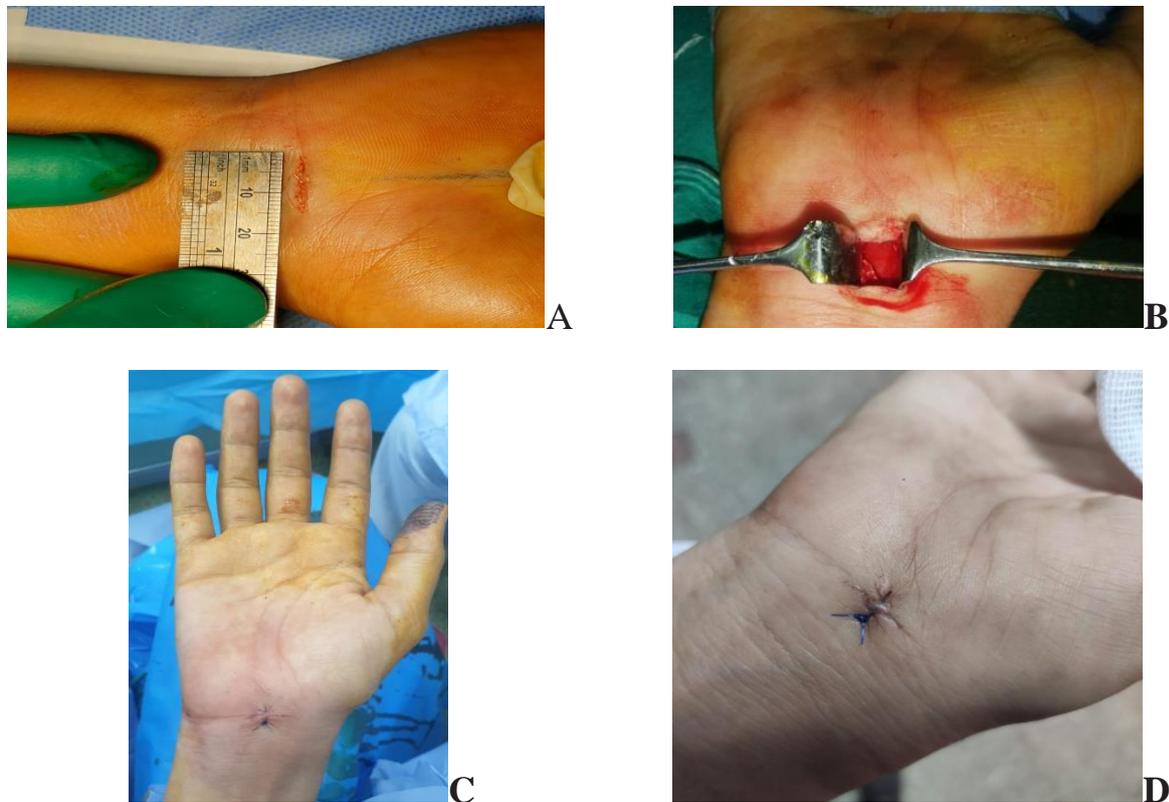


Figure [1]: Surgical procedures. A: Incision length and location; B: Retraction using two small retractors; C: One simple prolene stitch; D: Wound after 2 weeks

Statistical analysis: Frequencies and percentages were used to represent the information gathered. SPSS for Windows was used for statistical analysis [SPSS version 16, Chicago, Illinois].

RESULTS

The current study included 20 [4 [20%] male and 16 [80%] female] patients diagnosed clinically and neurophysiologically as idiopathic carpal tunnel syndrome. with duration of symptom extends from 2 to 24 months. Their age ranged between 28 to 61 years, and subjected to surgery using proximal small [1-1.5cm] transverse skin incision approach for carpal tunnel decompression. There were two patients with diabetes and one with rheumatoid arthritis. Surgery time ranged from 10-20 minute with no intraoperative complication [e.g.

hemorrhage or neurovascular injury]. In the first post-operative evaluation significant clinical improvement and resolved nocturnal troubles were observed in all cases except one patient developed intense pain, swelling and tenderness in the hand and diagnosed as complex regional pain syndrome which responds to corticosteroid, neurotonic and pain killer. In late follow up after 3 months, clinical and cosmetic satisfaction were reported by all patient. No patients were re-operated. There was only one female patient with scar tenderness. No significant change reported in postoperative electrophysiological examination despite the excellent good satisfaction were reported by all cases [table 1].

In our study there is no assessment of long term results of this approach because of short follow-up periods.

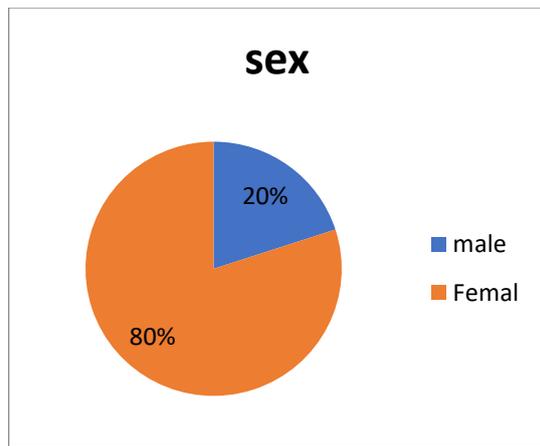


Figure [2]: Sex distribution in our study demonstrate significant increase in female patients

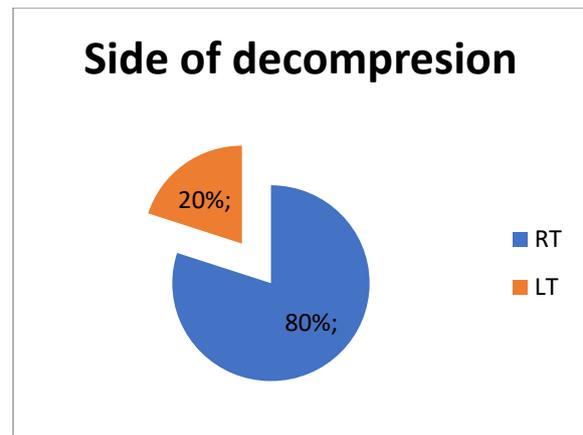


Figure [3]: Demonstrate more affection in right side

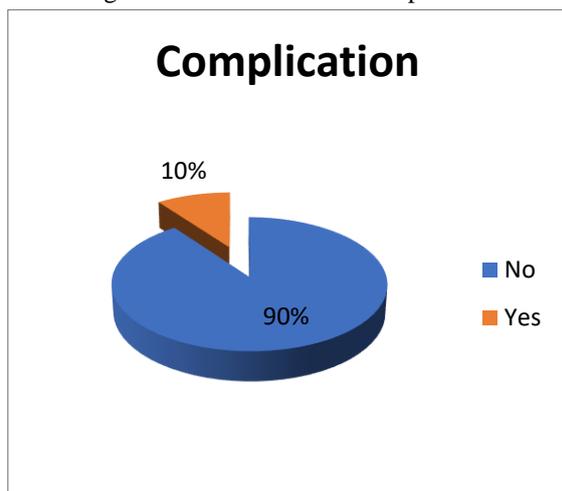


Figure [4]: showing less complication with this approach

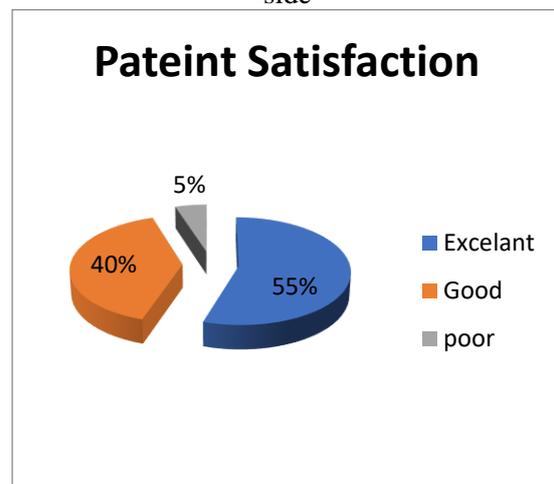


Figure [5]: Satisfaction of patients with the procedure with significant result

Table [1]: Patient demographic and result in all cases of our study

	Age	Sex	Side	Duration [month]	ENMG	Complication	Patient satisfaction
1	56	F	RT	12	Moderate	No	Excellent
2	44	F	RT	6	Severe	Yes [CRPS]	Poor
3	37	M	RT	2	Moderate	No	Excellent
4	31	F	RT	18	Moderate	No	Excellent
5	57	M	RT	4	Moderate	No	Good
6	48	F	RT	13	Severe	No	Excellent
7	36	F	RT	20	Mild	No	Good
8	28	F	RT	4	Moderate	No	Excellent
9	54	F	RT	8	Moderate	No	Excellent
10	36	F	RT	12	Moderate	No	Good
11	41	F	LT	9	Moderate	No	Excellent
12	61	F	RT	2	Moderate	Yes [tender incision site]	Good
13	37	F	RT	15	Moderate	No	Good
14	52	F	RT	12	Moderate	No	Excellent
15	40	M	LT	12	Mild	No	Good
16	44	F	RT	6	Moderate	No	Good
17	52	F	RT	24	Moderate	No	Excellent
18	53	F	RT	6	Moderate	No	Excellent
19	46	F	RT	15	Severe	No	Good
20	39	M	RT	9	Severe	No	Excellent

CRPS: Complex regional pain syndrome

DISCUSSION

The surgical approach for management of carpal tunnel syndrome including the classic open carpal tunnel release techniques, the endoscopic approach and the limited visualization techniques, including their variations [8]. The classic technique was associated with low rate of complications as hand pain, tender scars and long recovery time [9]. The endoscopic techniques have high complication and recurrence rates [10].

No significant differences have been reported between the open and endoscopic techniques regarding the operating time and cost of surgery [11].

In this study, we perform a small proximal transverse skin incision about 1.5 cm at the distal wrist flexion crease with no cosmetic problems, palmar tenderness and scar sensitivity. This consisted with study published by **Carter** [12], using a transverse wrist incision, in 100 cases with no complications and study of **Bromley** [13], used a small palmar incision, with excellent results.

Our study reports a short time procedure [range from 10-20minutes] which consisted with short operating times reported by other authors used the same incision technique [14].

Our cases show that significant clinical and functional improvement in in the early follow up period post-operative and improvement continued up to late follow up.

Bai et al. [15] compared a small-incision method [1-2 cm long] to a traditional open approach and found that the small-incision technique was related with better surgical results, less problems, and a better cosmetic look.

Polat [16] assessed the feasibility and efficacy of the mini-open incision technique in carpal tunnel release, concluding that it is successful and safe, with fewer problems and better patient satisfaction. However, instead of the transverse incision employed in our investigation, they used a vertical incision.

In our study significant shortening of operative time, significant reduction of postoperative pain, better outcome is responsible for higher patient satisfaction. Our

study has multiple limitations including less number of patients and short follow up period.

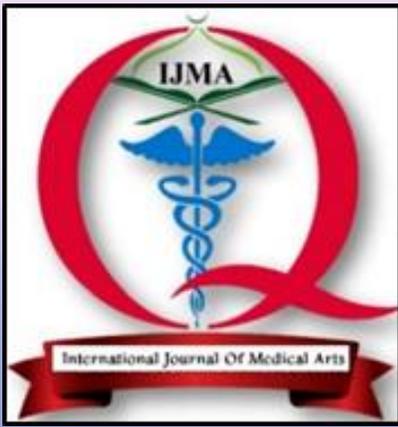
Conclusions: A surgical approach for management of carpal tunnel syndrome with proximal small transverse incision at distal crease above the wrist joint represent a safe, effective and associated with low cost, less rate of complication and excellent patient satisfaction.

Conflict of interest: No conflict of interest.

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Print ISSN: 2636-4174

Online ISSN: 2682-3780

of Medical Arts