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## Comparison of functional outcome of mini versus open carpal tunnel release: A prospective study

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### Abstract

**Introduction:** Carpal tunnel syndrome is a complex disorder associated with localized compression of the median nerve at the carpal tunnel. Advanced stages with persistent clinical features need a surgical release from the compression. Surgery offers an effective way of treating the condition. Various techniques such as Standard open carpal tunnel release, limited open technique and endoscopic release have been used. In this study we aim to evaluate the safety, effectiveness and recurrence rate of mini open technique when compared to the standard open incision technique.

**Materials and Methods:** This was a prospective comparative study that was conducted for a period of 15 months from May 2016 to August 2017 which included 60 consenting patients who presented to the orthopedic department of Father Muller Medical College and diagnosed to have carpal tunnel syndrome. The patients included in the study were divided into 2 groups by random selection. The patients in Group 1 underwent Mini open blind technique while the patients in Group 2 underwent open carpal tunnel release.

**Results:** In our study 47 patients were females. 27 of them were home-maker. The mean age was 49.5 years. 24 patients had bilateral involvement. The day time and night time numbness was better post-operatively in mini-open group as compared to open release which was statistically significant with  $p$  value  $< 0.001$ . Cosmetic satisfaction and presence of scar was poorly tolerated in open release group as compared to mini-open group.

**Conclusion:** Mini-open technique has a better outcome functionally and post-operative morbidity in terms of incision site pain, post-operative complications and the surgical scar when compared to open surgeries. It is gaining fast popularity amongst surgeons in the present era.

**Keywords:** carpal tunnel syndrome; mini-open; open release

### Introduction

Carpal tunnel syndrome is a complex disorder associated with localized compression of the median nerve at the carpal tunnel. It is an important cause of pain, neurologic symptoms and functional limitation of the wrist and hand. It is considered the most common nerve compression disorder of the arm. Patients present with a constellation of symptoms including numbness and tingling of the hand in the distribution of the median nerve, nocturnal paresthesias as well as weakness and atrophy of the thenar muscles. Carpal tunnel syndrome constitutes a major part of the upper-extremity disorders and is associated with considerable health and indemnity costs<sup>[1]</sup>.

Non operative modalities is preferred in the early stages of the disease. Advanced stages with persistent clinical features need a surgical release from the compression. Surgery offers an Effective way of treating the condition. Various techniques such as standard open carpal tunnel release, limited open technique and endoscopic release have been used.

Endoscopic procedures have been widely performed to decrease post operative morbidity and to accelerate patient recovery, however it may lead to incomplete retinaculum division and showed to have increased percentage of symptom recurrence. Thus in this study we aim to evaluate the safety, effectiveness and recurrence rate of mini open technique when compared to the standard open incision technique.

### Materials and Methods

This was a prospective comparative study that was conducted for a period of 15 months from

May 2016 to August 2017 which included 60 consenting patients who presented to the orthopaedic department of Father Muller Medical College and diagnosed to have carpal tunnel syndrome. We included patients diagnosed with carpal tunnel syndrome in the age group of 18 to 65 years who opted for surgery as the primary modality of treatment. Patients in pregnancy period, with inflammatory arthropathy and cervical radiculopathy were excluded from our study. The patients included in the study were divided into 2 groups by random selection.

**Methodology**

The patients in Group 1 underwent Mini open blind technique



**Fig 1:** Mini-open Incision Marking



**Fig 2:** Mini-Open Incision



**Fig 3:** Open Carpal Tunnel Release (OCTR)

**Results**

In our study there was no statistical differences in the age in the two groups hence the two groups were comparable with respect to age-distribution. The overall age in our study was 49.5 years and most cases were females (47 of the 60 cases). 27 of the 60 cases studied were home maker .22 of these home makers had a history of working from home doing data entry. 47 of the 60 cases studied were either overweight or obese. In 24 patients it was bilateral involvement. Right side was involved in 20 patients and 16 patients had only left side involvement.

**Table 1:** Clinical signs in the cases at the time of pre-operative surgical evaluation

Clinical signs	Tinel's	Phalen's	Durkan's	Lateral Key hold	
Mini	-	11	11	1	8
	+	19	19	7	22
Open	-	14	14	13	13
	+	16	16	17	17

The improvement in the day time pain following surgery was evident immediately post op and in the first follow up, the

while the patients in Group 2 underwent open Carpal tunnel Release. The researcher who took the post-operative assessment was blinded to the procedure used. Post-operative pain assessment was done on day 1 performed using the Visual analog scale. Short term complications of both techniques were evaluated including injury to median nerve assessed by physical examination. Post-operative infection, skin gaping and cosmetic satisfaction of both procedures were compared. Return of physical activity and recurrence of symptoms were evaluated on 1 month and 3 month follow-up. Chi square test and Paired t-test was used to find out significant difference between the two methods.

improvement was significantly better in the mini open group as compared to the OCTR group. But compared to pre-operative, the pain was lesser significantly on the first follow up in both the groups. There was significant improvement in the daytime and night time following surgery was in the mini-open group as compared to the OCTR group. But compared to pre-operative the daytime and night time numbness was not significantly decreased on the first follow up in both the groups.

Median nerve injury was not present in any groups. The post-operative infection was found in one case in open release group which settled with oral antibiotics. Skin gaping was present in 2 cases in open release group. Cosmetic satisfaction and presence of scar was poorly tolerated in open release group as compared to mini-open group. But none of these parameters were found to be showing statistically significant difference.

**Discussion**

We found that the mean age of development of carpal tunnel was 49.8 years, which is comparable to Shreejith *et al.* [2] which showed that the mean-age was 55-years; Nathan *et al.* [3] in their study noted high incidence of carpal tunnel syndrome in female and obese people. There was a direct relationship of BMI with that of the development of carpal tunnel syndrome in our study. Studies have shown a higher incidence of CTS in workers who are involved in high force and repetitive work compared to workers who are not [4]. In our study there was a direct relationship of the development of carpal tunnel syndrome with the computer use. Bilateral involvement was common in those with computer use and housewives. In Kendall's [5] series of 327 patients, 313 (95.7%) reported paresthesia; 118 (38%) reported nocturnal symptoms only, 178 (58%) reported symptoms during the day and night, but worse at night, and 17 (5%) reported symptoms during the day only. In the Yamaguchi *et al.* [6] series, 99% of

the 433 surgical patients reported paresthesia. In Kendall's series of 327 patients, 313 (95.7%) reported paresthesia; 118 (38%) reported nocturnal symptoms only, 178 (58%) reported symptoms during the day and night, but worse at night, and 17 (5%) reported symptoms during the day only. In the Yamaguchi *et al* series, 99% of the 433 surgical patients reported paresthesia. These are comparable to our study. Almost all cases had pain in the study the night tingling and numbness was seen only those who had severe carpal tunnel syndrome.

In our study all parameters showed significant improvement in both the groups except for daytime numbness which improved over time. This was comparable with studies which showed similar findings like Murthy, Praveen G.<sup>[7]</sup> Who found significant differences between the two procedures with regard to patient-rated symptom severity or functional status outcomes were found. Both techniques were demonstrated to be effective treatment options for severe CTS.

In the open group the pain related to the surgical site needing analgesia was more.

A strength of this study is that it presents a large cohort of severe CTS patients who were randomly selected into two groups.

### Conclusion

Carpal tunnel syndrome remains one of the most well-known and frequent form of median nerve entrapment and this study has shown that the recent modalities in the treatment of Carpal-tunnel-syndrome that is minimally invasive surgery (mini open technique) has a better outcome and post-operative morbidity in terms of incision site pain, post-operative complications and the surgical scar when compared to open surgeries and is hence gaining fast popularity amongst surgeons in the present era.

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