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## Functional outcome following ‘mini open surgical release’ for Carpal Tunnel Syndrome

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### Abstract

**Background:** Carpal tunnel syndrome is the most common compression neuropathy in clinical practice. Various treatment modalities have been tried singly or in combination each with advantages and disadvantages. To avoid various complications and to make surgery easier, we attempted this simple and safe technique and evaluated it prospectively.

**Subjects and Methods:** This prospective study includes 180 patients (204 hands) with idiopathic carpal tunnel syndrome who presented to us between May 2008 and May 2012.

**Inclusion Criteria:** Diagnosed Cases undergoing Carpal Tunnel Release after failed conservative management, Age – 21 to 60 years, all cases who were confirmed by nerve conduction studies.

**Exclusion Criteria:** History of cervical, shoulder, elbow disorders, history of diagnosed neuromuscular skeletal disorders, post burn contracture, pregnancy, post trauma and Carpal tunnel syndrome due to systemic illness. About 1.5cm transverse skin incision was given. Transverse carpal ligament was released by protecting the nerve with the help of a modified insulin syringe. The pre & post-operative symptoms and functional status of hand are measured with visual analogue scale (VAS) for pain, Boston questionnaire for disability, grip strength and pinch strength. The follow up was measured until 12 months for all patients.

**Results:** The maximum symptomatic improvement (symptom severity scale ) was noted immediately within a day of surgery and maximum functional improvement (functional status scale , grip Strength and pinch strength)was noted between 10th post operative day to 3rd month.

None of the patient underwent second surgery for the same.

**Conclusion:** Transverse mini incision surgical release noted to be a simple, day care, economical, cosmetically well acceptable treatment option. Use of a syringe to protect the median nerve made the release easier and safer.

## Introduction

Carpal tunnel syndrome is the most common compression neuropathy in clinical practice and is also the most extensively studied<sup>1,2,3</sup>. It accounts for approximately 90% of all entrapment neuropathies and middle aged female are commonly affected. A good clinical history and detailed clinical examination are needed for the diagnosis. Diagnosis is either easy or difficult depending on the severity and duration of symptoms. Nerve conduction studies are routinely used for confirmation<sup>4</sup>.

In majority of patient the exact cause and pathogenesis of carpal tunnel syndrome remains evasive in spite of research. This vacuum in understanding the etiopathogenesis has led to plethora of treatment modalities, each claiming advantage over the other.

Various treatment modalities have been tried singly or in combination each with advantages and disadvantages. To avoid various complications and to make surgery safer we decided to take up one method and evaluate it prospectively. The objective of this study was to study the functional outcome in the form of subjective and objective changes in idiopathic carpal tunnel syndrome following transverse mini open carpal tunnel release.<sup>11,12</sup>

**Subjects and Methods:** This prospective study includes 180 patients (204 hands) with idiopathic carpal tunnel syndrome who presented to us between May 2008 and May 2012.

**Inclusion Criteria:** Diagnosed cases undergoing carpal tunnel release after failed conservative management, age – 21 to 60 years, all cases confirmed by nerve conduction studies.

**Exclusion Criteria:** History of cervical, shoulder, elbow disorders, history of diagnosed neuromuscular skeletal disorders, post burn contracture, pregnancy, post trauma, and Carpal tunnel syndrome due to systemic illness

## Procedure and post operative protocol:

All patients with clinical suspicion of carpal tunnel syndrome based on symptoms and clinical tests<sup>5</sup> were confirmed by NCV study. Investigations were done to rule out other causes of carpal tunnel syndrome.

**Procedure** – After infiltrating the skin with local anesthesia about 1.5 cm transverse incision was given over the distal wrist crease medial to the Palmaris longus tendon to avoid injury to the palmar cutaneous branch. After soft tissue dissection distal forearm antebrachial fascia identified and incised longitudinally. Flexor retinaculum is identified and modified insulin syringe is passed gently underneath the full length of carpal tunnel sliding over the median nerve. Plunger of the syringe is removed and scissors inserted through the slot of the modified syringe and flexor retinaculum is divided (**Fig 1a-1f**). Complete release of the retinaculum is confirmed by the easy glide of the syringe into the tunnel following release. Modified syringe not only protect the median nerve but it also protect structures medial and lateral to it. After skin closure light compression dressing applied.

**Postoperative care:** the hand is actively used as soon as possible after surgery, but the dependent position is avoided. Usually dressing can be removed by the patient at home 2 to 3 days after surgery, and then gentle washing and showering of hand is permitted. The sutures are removed after 10 to 12 days.

The pre and post operative functional status of hand is measured with VAS for pain, standard carpal tunnel syndrome questionnaire(Boston Questionnaire) for disability which includes symptom severity scale & functional status scale<sup>7,8</sup>, grip strength using standard-adjustable-handle Jamar dynamometer and pinch strength using Pinch gauge.All the surgeries were done on outpatient basis. Average time taken was about 10mins. Follow up done on 10<sup>th</sup> day, 3<sup>rd</sup>month 6<sup>th</sup> month & 1year.

**Insulin syringe modification:** After cutting the nozzle the end of the syringe is made round. A longitudinal slot of 4mm width is made along the length of barrel .All sharp edges are grinded and smoothed.

## Results:

Standard carpal tunnel syndrome questionnaire was asked to all patients, which includes eleven questions for Symptom severity and eight questions for functional status. Each question graded from 0-4.

SEVERITY SCALE: 0=none or Never; 1=Mild; 2=Moderate; 3=Severe; 4=Very severe

**Symptom severity scale (SSS 44-0)** - SSS From a mean pre-operative value of 28.72, improved to 8.22. **Functional status scale (FSS 32-0)** - The mean FSS score improved from 24.14 to 5.12.

The maximum improvement was noted immediately after the release in case of symptoms and between 10<sup>th</sup> Post operative day to 3<sup>rd</sup> month in case of functions (Fig-2).

**Visual analogue scale (0-4):** The mean score of the study population was a score of 3.3. The score improved to a score of 0.16(TABLE 1).

Table-1

Period	Pre OP	10 <sup>th</sup> POD	3 <sup>rd</sup> month	6 <sup>th</sup> month	1yr
Score(max-4&min-0) (mean)	3.3	1.12	0.48	0.36	0.16

**Grip Strength<sup>27</sup>-in kg**

From a mean pre-operative value of 21.55 on right hand & 19.40 on left hand, the value increased to 32.37 & 31 respectively(Fig-3).

**Pinch strength- in kg**

From a mean pre-operative value of 2.32 on right hand & 1.8 on left hand, the value increased to 4.56 & 3.9 respectively(Fig-4).

**Discussion:**

Carpal tunnel decompression with division of the transverse carpal ligament is a successful procedure for the treatment of carpal tunnel syndrome<sup>17,18</sup>. Controversy still exists regarding the choice of surgery for this condition.

Three different surgical techniques have been described in the literature the classic or standard approach, endoscopic approach either single or multiport, and limited incision approach<sup>19,20,26</sup> each with advantages and disadvantages

The traditional approach with long palmar incision has been criticized for greater scar tenderness and longer time to return to work<sup>19,21</sup>. In an effort to overcome this, endoscopic and limited incision approaches have emerged.

Although the endoscopic carpal tunnel release has been demonstrated to reduce recovery time, a previous study raised concerns about an increased rate of complications<sup>22</sup>.

Considering various complications and to make surgery easier we conducted a prospective study to evaluate the safety and functional outcome of transverse mini incision technique with the help of a modified insulin syringe.

Surgical success for carpal tunnel release is achieved in most cases, but subjective evaluation appears to provide the best outcome measures for carpal tunnel syndrome<sup>23</sup>. We used the Boston Questionnaire scales, which have been demonstrated as a valid and reliable assessment tool for hand dysfunction, having previously been used to study the effectiveness of the open carpal tunnel release<sup>8</sup>.

The maximum symptomatic improvement was noted immediately within two days of surgery and maximum functional improvement<sup>27</sup> was noted between 10<sup>th</sup> post operative day to 3<sup>rd</sup> month. However full recovery took almost one year based on severity.

No cases had scar tenderness as a late complication other complications<sup>25</sup> described were not observed.

Even though it is a blind procedure, use of the modified syringe made it a safe procedure. No technical problems with respect to nerve, tendon, or artery injuries were noted.

**Conclusion:** Transverse mini incision surgical release is an effective method for releasing carpal tunnel syndrome and is associated with significant symptom relief, minimal scar tenderness and an improvement in overall hand function. It is noted to

be simple, day care, economical, cosmetically well acceptable, long lasting & reproducible treatment option. Use of a syringe made the release easier and safer.

**Fig1a-1f**







Fig.2

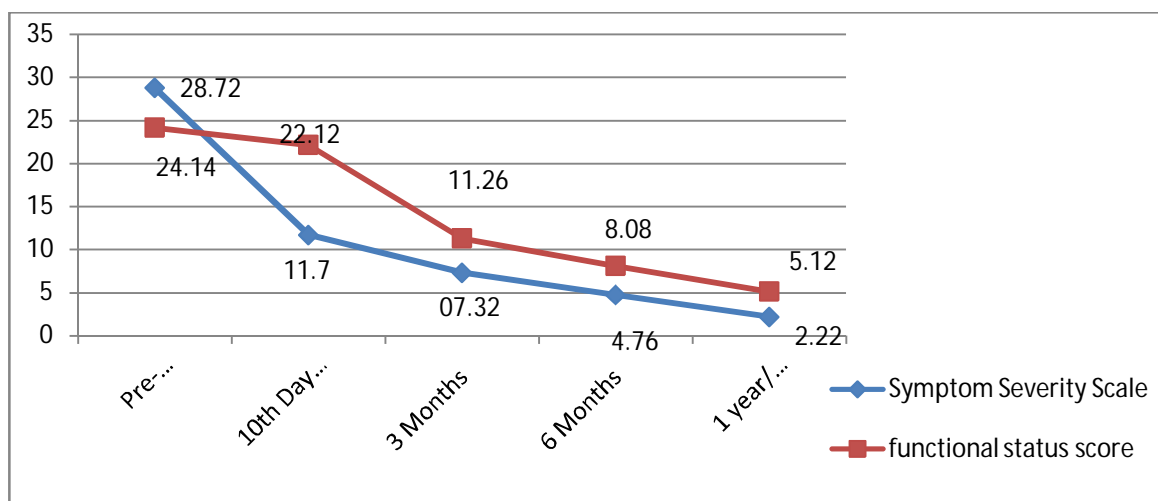


Fig.3

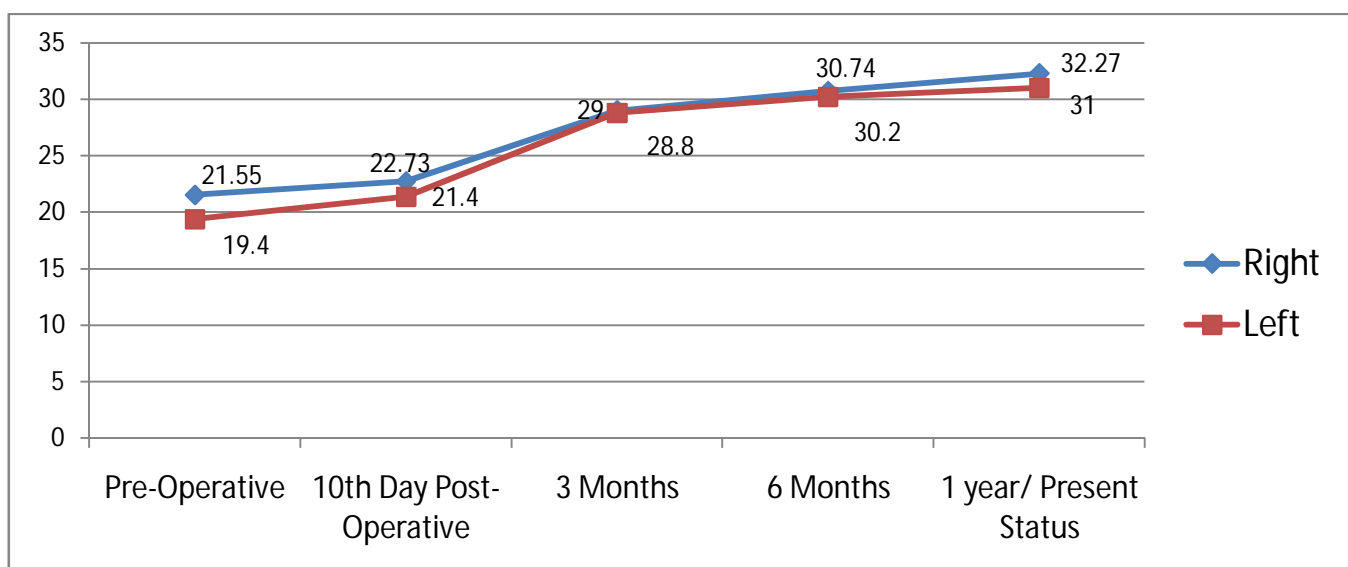
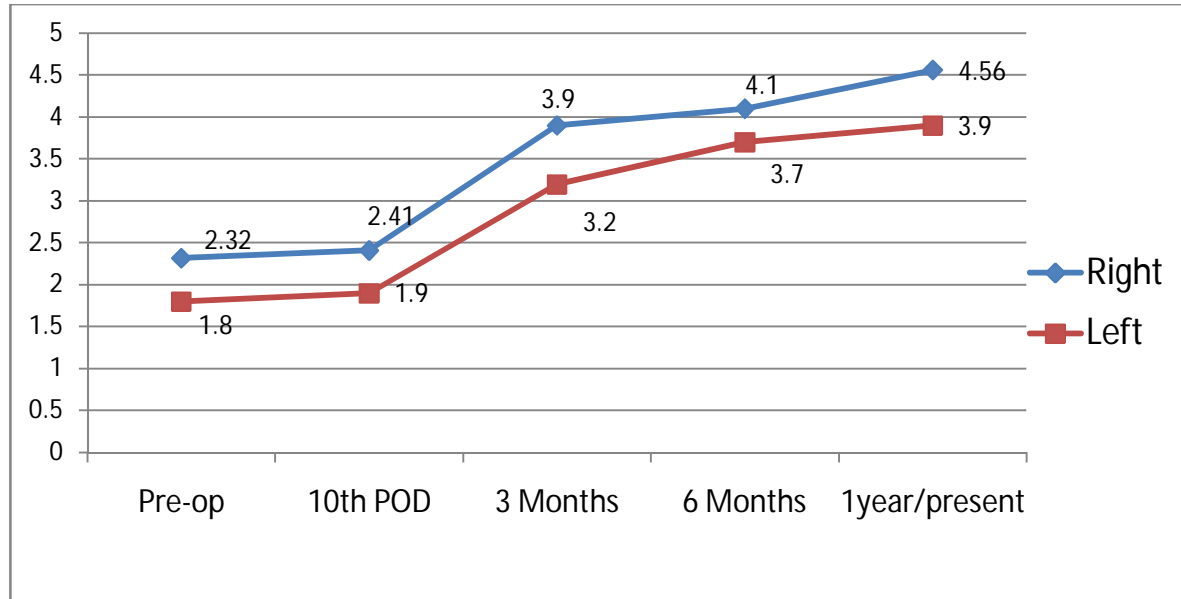


Fig.4



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