A STUDY OF EVALUATION OF MINI OPEN DECOMPRESSION FOR CARPAL TUNNEL SYNDROME AS A DAY CARE SURGERY


1Assistant Professor, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
2Professor, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
3Assistant Professor, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
4Senior Resident, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
5Resident, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
6Resident, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
7Resident, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.
8Senior Resident, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad.

ABSTRACT

BACKGROUND

Carpal tunnel syndrome is one of the most common compression neuropathies in the upper limbs and requires surgery if conservative treatment fails. This study evaluates the outcome in patients diagnosed with carpal tunnel compression neuropathies in whom conservative treatment has failed and operative procedure is performed as a day care procedure under local anaesthesia with a minimum incision.

MATERIALS AND METHODS

This is a clinical study done on 64 patients of whom 42 were female and 22 were males with a mean age of 39 years (ranged 31 - 58) and were diagnosed to be having carpal tunnel compression neuropathy based on clinical symptoms, signs and nerve conduction studies who were treated with minimal incision decompression of the carpal tunnel as a day care procedure under local anaesthesia during a period of 12 months. The outcome is evaluated with Global Symptom Score (GSS) in aspect of pain, numbness, paraesthesia, weakness and nocturnal awakening and mean GSS was 8 (5 - 10). Post-operatively, the patient was evaluated for incision scar hypersensitivity and cosmetic result with Visual Analogue Patient Satisfaction Scale (VAPSS). The patients were evaluated post-operatively at two weeks, 1 month, 2 months, 4 months and 12 months.

RESULTS

A total of 64 patients were selected for surgical release of whom 42 were male and 22 were female and 36 were right hand involvement and 28 had their left hand involved. None of the patients had bilateral involvement. Post-operative wound completely healed in all patients and 3 patients had delayed wound healing. All patients were followed up for a minimum period of 7 months with mean follow-up of 10.6 months (7 - 12). At 4 months, symptoms of all the patients disappeared and muscle power improved. Postoperative GSS scoring improved in the first month post-operatively. Mean GSS was 8 (5 - 10) and VAPSS improved over a period of 4 months, mean being 10.8 (7 - 12). All the patients returned to work after 2 weeks.

CONCLUSION

Treatment of carpal tunnel syndrome with a mini incision decompression has advantages over the classical incision in being safe, shorter operative time, less invasive, smaller incision, day care procedure, recovery and getting back to previous level of activity is faster. So under a mini incision transverse carpal ligament can be cut and median nerve can be thoroughly decompressed under direct vision, it is a safe and effective surgical approach and also by placing the incision medially compression over the median nerve by the resulting scar tissue can also be avoided.

KEYWORDS

Carpal Tunnel Syndrome, Local Anaesthesia, Mini Skin Incision, Day Care Procedure, Economical.


BACKGROUND

The Carpal Tunnel Syndrome (CTS) is one of the most common peripheral neuropathies and is caused by the compression of the median nerve at the wrist region. It results in symptoms of dysesthesia and burning pain in the hand and it mainly affects the middle-aged population. CTS accounts for 90% of all entrapment neuropathies and its incidence is approximately 1% in the general population affects the middle-aged female population. Palmer et al reported in 1995 that between 400,000 and 500,000 cases require surgical treatment per year in the United States. History, physical examination and electrophysiological results must be evaluated for the diagnosis of CTS. Patients with mild symptoms of CTS can be managed with conservative treatment including non-steroidal anti-inflammatory drugs, vitamin B6, local steroid injections or...
hand braces.\(^{(10,14)}\) Surgical treatment is generally required in patients with moderate and severe symptoms.\(^{(14)}\) Various methods have been described for the surgical treatment of CTS. Standard open carpal tunnel release with a long palmar curvilinear incision still remains to be the preferred surgical procedure for many departments and even neurosurgeons.\(^{(0,15,9)}\) but this procedure has many complications including pillar pain, scar tenderness, cosmetic problems, loss of grip and pinch strength or time losses due to inability to work.\(^{(3,4,8,12,16,9)}\) Endoscopic techniques and different limited skin incisions are described in the literature to minimise these complications.\(^{(17,18,12,19,20,21,22,23)}\) The aim of this study was to analyse the results of patients who were operated by using microsurgical limited single skin incision.

**MATERIALS AND METHODS**

The study was conducted at Malla Reddy Hospital/Malla Reddy Institute of Medical Sciences (MRH/MRIMS) for a period of twelve months in 64 patients, of which 42 were female and 22 are male with a mean age of 39 range (31 - 52), only unilateral cases were included; 36 were on the right hand and 28 were on the left hand. The mean follow up period was 10.6 months.

Each patient was evaluated with his/her history, physical examination and nerve conduction studies, only those patients with neurological symptoms were operated. Brachialgia paraesthetica nocturna (night pain) and numbness were observed in all patients. Additional symptoms and signs were positive for Phalen’s test, B.P cuff test and positive Tinel’s sign. The pain status of patient was evaluated preoperatively and post-operatively by Global Symptom Score (GSS). Incision scar hypersensitivity and cosmetic results were evaluated with the Visual Analog Patient Satisfaction Scale (VAPSS) post-operatively.

All operations were performed in the operating room under sterile conditions in supine position under local anaesthesia. Before surgery the affected hand, wrist and forearm were cleaned with 10% povidone iodine solution. The area to be operated was draped with sterile drapes, local anaesthesia was given with 2% xylocaine and a tourniquet was used at about 210 mmHg pressure. The hand should be in extended position and the surgeon’s view should be along the carpal tunnel. After these routine operation preparations, a longitudinal incision about 2 cm was taken just above the wrist, care was taken to place the incision slightly medially between the third and fourth finger. The incised skin was retracted with the help of a mini retractor and subcutaneous fat tissue was dissected laterally (Figure 1).

The proximal part of the carpal was passed with a surgical blade and then the ligament was cut with scissors. After the irrigation and homeostasis, the skin was sutured with 4/0 sutures subcutaneously and it was not required to remove the sutures. The mean operation time was 15 mins. range (10 - 20). The mean hospital stay was 5 hrs, range 3 - 6.

To evaluate the clinical effect, we used the Global Symptom Score (GSS) used by Jin G0, Yang J and others in which points are given on a 1 - 10 scale for pain, numbness, paraesthesias, weakness and nocturnal awakening and a Visual Analogue Patient Satisfaction Scale described by Kilincer and Zileli in 2006\(^{(24)}\) to evaluate the patients for cosmetic results (0 - 3), return to daily activities (0 - 3), palmar tenderness (0 - 3) and scar sensitivity (0 - 3). The mean GSS was found to be 8 (5 - 10) and the mean VAPSS was 10.8 (7 - 12).

**RESULTS**

A total of 64 patients were selected for surgical release, of whom 42 were male and 22 were female and 36 had their right hand involvement and 28 had their left hand involved; none of the patients had bilateral involvement. Post-operative wound completely healed in all patients and 3 patients had delayed wound healing. All patients were followed up for a minimum period of 7 months with a mean followup of 10.6 months (7 - 12). At 4 months, symptoms of all the patients disappeared and muscle power improved. Post-operative GSS scoring improved in the first month post-operatively; mean GSS was 8 (5 - 10) and VAPSS improved over a period of 4 months, mean being 10.8 (7 - 12). All the patients returned to work after 2 weeks.

**Figure 1. Showing the Site of Incision**

**Figure 1a. The Incision Intraoperatively - The Probe is Inserted along the Median Nerve to Verify the Compressing Site**

**Figure 1b. The Released Median Nerve**
DISCUSSION

CTS is a common condition causing burning hand pain, paraesthesia and dysfunction. It effects mainly middle aged population and mostly females.[3,4,8,13] In moderate and severe cases surgery is the only treatment option that provides cure and there are many surgical techniques for releasing carpal tunnel. Until recent years, standard incision with a long curvilinear incision was the most performed technique by many, even neurosurgeons. This technique is safe and effective as reported by authors, but it has some complications.[4,8,15] Early complications including incomplete release of carpal ligament, injury to the palmar cutaneous and recurrent motor branch of median nerve or injury to the superficial palmar arch and ulnar artery are rare, because the operation is performed under direct vision.[4,8] Late complications on the other hand have a relatively high incidence. These are hypertrophic scar formation, scar tenderness, pillar pain, loss of grip strength and sympathetic dystrophy resulting in the delay of returning to daily activities or work and emotional distress.[4,8,12,25] To reduce these complications, various limited incisions or endoscopic techniques are described by authors.[17,19,5,21,26,27,28,29] During the last two decades, endoscopic carpal tunnel release procedures have become popular and have been widely used by surgeons. In spite of the many advantages of endoscopic techniques, there are also some disadvantages. In 2008, Nazi and Franzini reported a technique that allows the use of an operative microscope[11,25] although we did not use a microscope. The incision is performed at the wrist region and the proximal part of distal flexion crease where the skin is thinner than the distal side and palmar surface; therefore, we thought that the complications including cosmetic problems, palmar tenderness and scar sensitivity would be less. In this study we did not see any complication caused by the type of incision and the mean VAPSS score was 10.8 when the patients were evaluated for cosmetic results, return to daily routine activities, palmar tenderness and scar sensitivity.

As reported by authors, but it has some complications. [4,15] Early complications including incomplete release of carpal ligament, injury to the palmar cutaneous and recurrent motor branch of median nerve or injury to the superficial palmar arch and ulnar artery are rare, because the operation is performed under direct vision. [4,8] Late complications on the other hand have a relatively high incidence. These are hypertrophic scar formation, scar tenderness, pillar pain, loss of grip strength and sympathetic dystrophy resulting in the delay of returning to daily activities or work and emotional distress. [4,8,12,25] To reduce these complications, various limited incisions or endoscopic techniques are described by authors. [17,19,5,21,26,27,28,29] During the last two decades, endoscopic carpal tunnel release procedures have become popular and have been widely used by surgeons. In spite of the many advantages of endoscopic techniques, there are also some disadvantages. In 2008, Nazi and Franzini reported a technique that allows the use of an operative microscope [11,25] although we did not use a microscope. The incision is performed at the wrist region and the proximal part of distal flexion crease where the skin is thinner than the distal side and palmar surface; therefore, we thought that the complications including cosmetic problems, palmar tenderness and scar sensitivity would be less. In this study we did not see any complication caused by the type of incision and the mean VAPSS score was 10.8 when the patients were evaluated for cosmetic results, return to daily routine activities, palmar tenderness and scar sensitivity.

In 2008, Nazi and Franzini reported a technical note about their experience of three different non-endoscopic minimally invasive surgical techniques for carpal tunnel release.[30] They obtained 90% complete remission of symptoms with their first technique, which is the same as with our incision type. Two neurosurgeons Hasan Serdar ISIK, Uğur Bostancı of Turkey published their results in 143 operations in 126 patients using a similar incision and had 132 patients (92%) complete remission of pain and acceptable remission of numbness during the followup period.[2] In 2008 Jin GO, Yang J, Ming XP and others of Henon China,[1] in 2010 Isik HS, Bostancı U of Turkey [2] treated 18 and 143 patients respectively with mini incision technique and found it to be advantageous than standard incision. In 2011, Cirpar M and others treated 91 hands with mini incision technique.[22] In 2012, Aslani HR et al conducted a comparison study between three different techniques and found that endoscopic surgery and minimally invasive surgery are better with less complications.[23]

In the literature, it is reported that either the recurrent thenar branch or palmar arteries have a potential risk of injury during all endoscopic and limited incision techniques.[4] The recurrent thenar branch may leave the median nerve from various anatomic places. These variations may cause difficulties for the surgeon to release or protect the recurrent thenar branch. The palmar arteries and particularly the superficial palmar arch also have a potential risk due to the difficulties in visualisation with these limited incisions or endoscopic techniques. However, just like the studies of Franzini and Aydin et al, and we also did not experience any artery, nerve or tendon injury.[12,13,30]

CONCLUSION

The mini-surgical limited skin incision technique for carpal tunnel release is a safe and effective procedure. It can be used in the surgical treatment of CTS to achieve better palmar appearance, excellent cosmetic results as a day care procedure under local anaesthesia and to reduce the complications of other standard techniques like endoscopy and curvilinear incision and also with the costs incurred by the patient for the procedure.
REFERENCES
2. Isik HS, Bostanci U. Experience of Carpal tunnel syndrome that operated using a limited uni skin incision. Turk Neurosurg 2011;21(2):177-80.