Original Article

Nepal Journal of Neurosciences 16:3-7, 2019

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Date submitted : 05 June 2019
Date accepted : 30 August 2019

Carpel ligament release for carpel tunnel syndrome (CTS) under local anesthesia: our experience with 277 cases

Carpel tunnel syndrome (CTS) is one of the common neurological condition where median nerve is compressed by transverse carpel ligament at wrist. About 5% of general population suffer from this problem and most commonly occurred in young and middle-aged women. 30% of patients suffering from CTS can be managed by medications and physiotherapy and 70% may require surgical decompression at some stage. Surgical treatment is to decompress median nerve by releasing transverse carpel ligament either by open or endoscopic procedure. Both procedures have shown similar results.This is a retrospective study of 277 patients who underwent 349 decompressive surgical procedures under local anesthesia for CTS between May 2007 and April 2017 in our institute. Diagnosis was made from clinical signs and symptoms and confirmed by either NCV or EMG. All patients were operated in day care basis. Data were retrieved from OPD and OT records. Followed up duration ranged from 6 months to 10 years.There were 257 female and 20 male. 74% had unilateral and 26% had bilateral CTS. 93% CTS were idiopathic. 10% suffered postoperative complications.26% achieved immediate pain relief after decompression, 73% after three weeks and 98.5% after three months. Open decompression of CTS is a quick and simple OPD based surgical procedure.

Keywords: Carpel Tunnel Syndrome, Carpel Tunnel Release, Transverse carpel ligament

Carpel tunnel syndrome (CTS), first explained by Paget's in 1854[17], is one of the common neurological condition where median nerve is compressed by transverse carpelligament (TCL) at wrist. About 5% of general population suffer from this problem and most commonly occurs in young and middle-aged women. Risk factors associated with CTS are obesity, work involving repetitive wrist work, pregnancy, rheumatoid arthritis and hypothyroidism.

Cardinal symptoms of CTS are pain in the hand, unpleasant tingling, pain or numbness in the distal distribution of the median nerve (thumb, index, middle

finger and the radial side of the ring finger) and reduction of the grip strength as well as decrement in the function of the affected hand. Clumsiness is reported during the day with activities requiring wrist flexion and symptoms are worst during night time.[9]

Diagnosis is confirmed from clinical symptoms aided by positive Tinel's sign at wrist[8] and electrophysical diagnosis which includes Nerve Conduction Velocity (NCV) and Electromyography (EMG). Quite recently ultrasonography has also evolved.[18]

The treatment of CTS falls under two categories: conservative and surgical. Conservative treatmentwith medication, physiotherapy, splinting or local infiltration can be initially[11] offered to patients with mild to moderate symptoms. Surgical treatment of CTS is in the form of either Open Carpal Tunnel Release (OCTR) or Endoscopic Carpel Tunnel Release(ECTR). Approximately 70-90% of patients have good to excellent long-term outcomes following CTR.

Materials and Method:

This is a retrospective study of 277 patients who underwent OCTR under local anesthesia (LA) in a day care surgery for CTS between May 2007 and April 2017 in a single institute. All the patients were called up for follow up which ranged from 6 months to 10 years and other necessary data were collected from Operative records. They were evaluated and diagnosed in the Department of Neurosurgery based on clinical symptoms (Table 1) and electrophysiological investigation. 72 cases had bilateral CTS and more symptomatic hand was decompressed first and second surgery was offered after 3 months, hence the total of 349 procedures. Female dominance was seen with 257 females and 20 males (Figure 1) the mean age distribution being 43.13 (range 20-70 years (Table 2).93.14% (N=258) were due to idiopathic causes but rest 19 cases were associated with other risk factor which included Diabetes Mellitus (6), Hypothyroidism(4), Rheumatoid Arthritis (3), Ganglion (3),Colle's Fracture (1), Hemangioma (1) , Lipoma(1)(Table 4).All cases were operated using OCTR method by a single surgeon.

Either NCV or EMG were done in all the cases as a part of neurological evaluation both pre-operatively and post-operatively. Various other compression neuropathies were ruled out. Surgery was advised to those patients whose pain did not subside by medication and/or physiotherapy or if there was evidence of hand muscle atrophy.

Operative Procedure:

All cases were operated under LA. Lidocaine was the drug of choice which was administered into the carpel tunnel and adjacent subcutaneous tissue.

Clinical presentation	No. of cases
Nocturnal Pain	203
Tinel's Sign +ve	185
Phalen's Sign +ve	100
Limb raised +ve	127
Thenar muscle atrophies	37

Table 1: Summary of clinical presentationOf all 277 cases

Age Distribution	No. of cases
20-30	10
31-40	83
41-50	151
51-60	28
61-70	5

Table 2: Number of cases according to age

Male	200
Female	257
Unilateral	205
Bilateral	72
Right Hand	201
Left hand	76

Table 3: Case Summary

Cause	No. of cases
Idiopathic	258
Diabetes Mellitus	6
Hypothyroidism	4
Rheumatoid Arthritis	3
Ganglion	3
Hemangioma	1
Lipoma	1
Colle's fracture	1

Table 4:Etiology of the 277 cases

Skin marking was done as shown in figure 2. A vertical incision was given parallel and just ulnar to the thenar crease, in line with the long axis of the ring finger,overlying the TCL. The incision was extended distally to a point just shy of the level of the superficial palmar arch.Once down to the subcutaneous tissue, dissection of subsequent tissue of the palmer aponeurosis both radially and ulnarly was done to achieve better exposure. Using self retaining retractor, the TCL was exposed and divided longitudinally along its ulnar aspect from distal to proximal.

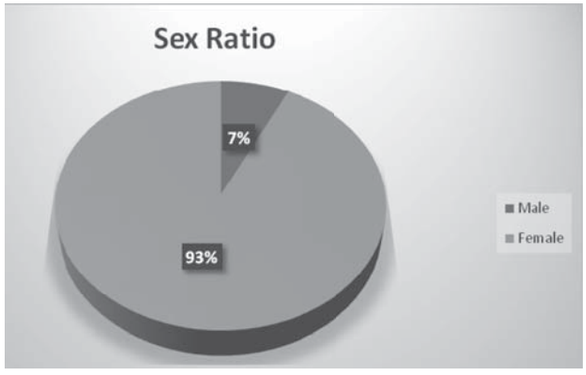

Figure 1: Pie Chart Illustrating male and female ratio

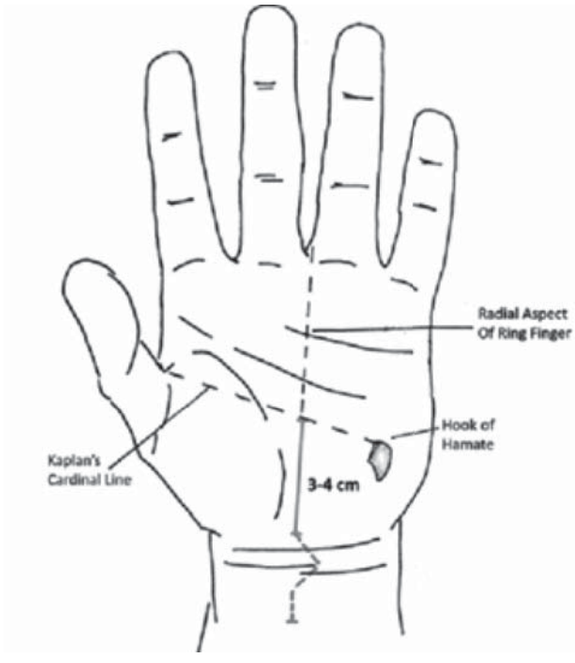

Figure 2: Illustration revealing the skin markings for incisionto operate on LeftCTS

After marking the distal TCL by identifying the adipose tissue surrounding the superficial arterial arch,TCL was incised proximally under direct visualization to the level of its junction with antebrachial fascia at the wrist crease. Once released, motor branch of median nerve and the contents of carpel tunnel are inspected.After complete transaction of TCL along its ulnar border and median nerve is completely decompressed from distal forearm fascia to superficial palmer arch, woundwas irrigated and hemostasis achieved.Incision was closed with interrupted mattress suture using non-absorbable suture and covered with a soft dressing and compressive bandage.Wound was inspected on 1st post operative day and suture was removed on 10th post-operative day.

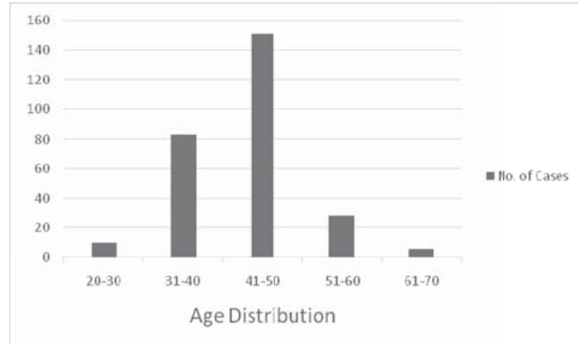

Figure 3: Age distribution of the 277 cases

Measurements of outcome:

Patient's symptomatic relief was considered as a major outcome factor which included subsidization of nocturnal pain and tingling sensation.In many occasions NCV or EMG were used to monitor the neurological improvement. Surgical complications and recovery were recorded in subsequent follow ups.

Result:

Out of the 277 cases,immediate pain relief was achieved in 73 (26%) patients following OCTR. On subsequent follow ups at three weeks and three months ,203 (73%) and 273 (98.5%) cases respectively reported pain relief. Our series experienced Keloid formation(12),wound infection (5), local swelling (7) and wound dehiscence (2) as common complications.

1.5% of patients had persistent pain in follow up and did not benefit from the surgery.

Discussion:

CTS is one of the most common peripheral nerve entrapment for which two major surgical approach has been identified to release the carpel ligament; 1)Open and 2)Endoscopic. Over the past few decades, different variants such as mini open, limited incision, one or two port endoscopic release has emerged.[5]

Open Carpel tunnel Release, first performed by Learmonth in 1933 is a classical and gold standard technique to treat CTS, however, issues such as scar tenderness, pinch and grip weakness and pillar pain were often a concern of debate.[12]To minimize these complication Endoscopic CTR was introduced by Chow and Okutsu in 1989 and is claimed to have better patient satisfaction, minimal pain and quicker return to work.[3,16] Despite these advantages, complications such as incomplete release of ligament, vessels and nerve injuries and neuropraxiado occur .In addition to these recurrent hematoma and infection can occur as well.[7,10,22]

Analysis of literature about OCTR entails a success rate of greater than 95% with a complication rate of less than 3% although recent study suggest similar complication when comparing OCTR and ECTR.[10,22]Despite no difference in the overall outcome of the disease when performing both the procedure,ECTR requires a steep learning curve as a surgeon needs effective hand-on course and cadaveric maneuvers which is technically demanding and requires more equipment when compared to OCTR.[2,7,22,23]Moreover, ECTR has three times more risk of reversible post-operative nerve injury and chances of injury to median nerve is high.[20,23]During ECTR,identifying distal edge of TCL is difficult as well as the incomplete ligament release ranges from 5% to as high as 50%.[13,14] Therefore, less experience surgeon should discontinue ECTR and convert into conventional OCTR.[21]Some studies suggest decreased incidence of hand pain when performing ECTR but if there is alteration in carpel arch or in the origin of the hypothenar and thenar muscle, one can expect pillar pain in both ECTR and OCTR regardless of the size of incision.[19]

Several methods have emerged but transecting the TCL under direct visualization(OCTR) is the mainstay of surgical management as nerve is directly seen so chance of injury is rare.[19]Also, OCTR requires less skill in use of tools and technique. OCTR when performed with adequate local surgical site anaesthesia, eliminates pre-operative investigation, peri-operative anesthesia and monitoring and recovery period from the anaesthesia. Interestingly, patient undergoing OCTR under LA was found to have less anxiety level.[4]

A study carried out by Litchman,Florio and Mack showed complete resolution of the pain of the 93 patients out of 100 at 6 months follow up with 7% complication rate where as our study showed a 10% complication rate with 273 out of 277 experiencing subsidization of pain after 3 months.[15] It is worthy to note that the complication in CTR arises due mishap in the technical knowledge rather than the choice of anaesthesia. Another study done by Altissimi and Mancini showed only 3 cases out of 108 were dissatisfied with choice of Local anaesthesia(LA) while a subjective questionnaire on subsequent follow up in our study also showed all patients would like to go under the same procedure protocol. Gibson (1990) reported a very low complication rates with his experience in 108 cases done under local anaesthesia.[1,6]

Conclusion:

OCTR under LA is a safe procedure which can produce a great symptomatic relief for patient suffering from CTS with minimal complication.

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