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## SHORT REPORT

## Two incision mini open carpal tunnel release — a minimally invasive alternative to endoscopic release

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### Abstract

Surgical techniques for carpal tunnel release are constantly evolving to reduce complications. This retrospective study was planned to identify the outcome and complications associated with a new operating technique for release of carpal tunnel using two incisions. It was conducted at the Aga Khan University Hospital, Karachi, and comprised patients undergoing surgical release of carpal tunnel syndrome (CTS) between January 2011 and December 2014. Of the 54 patients, 38 (70.4%) cases were of right-sided CTS. The mean operating time was 12.5±4.9 minutes. Complete relief from symptoms was observed in all the patients and the only complication noted was superficial infection in 2 (3.7%) patients. The outcomes and complications associated with this technique were comparable with other standard techniques. No major complication (e.g. neurovascular injury) was reported, which showed that this technique was safe and had no additional risks. Therefore, it can be used as an alternative to endoscopic release which is expensive and requires special training and equipment.

**Keywords:** Carpal tunnel release, Complications, Two incisions.

### Introduction

Carpal tunnel syndrome (CTS) is a commonly encountered peripheral neuropathy with a prevalence of around 3.8%.<sup>1</sup> It usually presents with paresthesia in the affected hand, which can progress to numbness in the thumb and three middle fingers in severe cases. Neurological exam is generally unremarkable and investigations including electromyography and nerve conduction velocity tests are useful for diagnosis.<sup>2</sup>

Treatment options for CTS include physiotherapy, steroid injections and surgery, which is usually considered in severe cases or after failure of conservative measures.<sup>3</sup> Current surgical options include open-incision technique, mini-open incisions and endoscopy, but treatment modalities are constantly evolving with introduction of new techniques.<sup>4</sup>

The standard surgical procedure is open carpal tunnel

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release in which a 3-4cm longitudinal incision is given over the transverse carpal ligament (TCL). This technique is simple and inexpensive, but it is associated with certain complications including a large and tender scar, long healing period and pillar pain.<sup>2,5,6</sup> In the mini-open incision technique, a 1.5cm to 2cm incision is given over the TCL in the proximal aspect of the palm. This results in a smaller scar and a shorter recovery period compared to the standard procedure. However, it carries an increased risk of incomplete splitting of TCL and nerve damage.<sup>2,7</sup>

Endoscopic release of carpal tunnel was developed as an alternative to open release and has two variants. Agee method consists of a single portal technique while Chow method uses a dual portal technique. The advantages of endoscopy include shorter recovery period, reduced tenderness and better cosmetic outcome compared to open-incision technique. But it is more expensive and requires special training as it is technically more demanding. It is also associated with an increased risk for median nerve damage.<sup>2,5,6</sup>

The current study was aimed at reporting our four-year experience and complications associated with a new operating technique for release of carpal tunnel using two incisions.

### Methods and Results

This retrospective study was conducted at the Aga Khan



**Figure-1:** Instrument tray.



**Figure-2:** Post-operative picture of right hand.

University Hospital (AKUH), Karachi, and comprised patients undergoing surgical release of CTS from January 2011 to December 2014. The procedure was carried out under local anaesthesia and two small incisions of 1cm each were made. The first transverse incision was made at the distal palmar flexion crease on the ulnar side of palmaris longus tendon, in order to avoid damage to the palmar cutaneous branch of the median nerve. The second longitudinal incision was made at the distal end of the valley between the thenar and hypothenar eminences (at level of transverse carpal arch). Through the first incision, the proximal edge of the TCL was identified, a McDonald retractor (Figure-1) was passed underneath it and its tip was retrieved through the distal incision. Then the carpal ligament was cut over the McDonald retractor by a size 12 curved blade (Figure-1). Both incisions were

approximated with a single suture each (Figure-2). It took approximately 10-12 minutes to do the whole procedure.

All surgeries were performed by a senior fellowship trained hand surgeon using the abovementioned technique. Diagnosis of CTS was based on clinical findings and electrodiagnostic investigations where necessary. Medical record files of these patients were reviewed for the following: age, gender, complications (palmar cutaneous branch injury, recurrence, median nerve injury and post-surgical infection), operative time and resolution of symptoms.

Of the 54 patients, 44(81.5%) were females 10(18.5%) were males. Besides, 38(70.4%) cases were of right-sided CTS. The overall mean age was  $49 \pm 11.5$  years. All cases were performed under local anaesthesia with a mean operating time of  $12.5 \pm 4.9$  minutes.

The patients were followed for a minimum of 3 months and were observed for various intra-operative and post-operative complications. Complete release of TCL was achieved and complete resolution of symptoms was observed in all patients. No neurovascular injury was noted and palmar cutaneous branch and median nerve was preserved in all cases. Post-operatively, 2(3.7%) cases of superficial wound infections were identified, both of which were managed with oral antibiotics. No other complication, including recurrence or need for reoperation, were noted during the 3 months of post-operative follow-up.

### Conclusion

Novel techniques are constantly being introduced for carpal tunnel release due to the complications associated with available procedures. Cengiz Cokluk et al. reported better post-operative cosmetic appearance and a shorter recovery period using double mini skin incision technique compared to standard open procedure,<sup>7</sup> while Kenneth M. Wilson reported comparable outcome measures (pain, pillar tenderness and pinch strength) for double-incision open technique and endoscopic release.<sup>8</sup>

The demographic characteristics reported in the current study in terms of gender distribution and mean age of patients are comparable to other studies.<sup>3,5,7</sup> The mean operating time for this technique is similar to that of modified Chow technique for endoscopic and Lee and Strickland technique for open carpal tunnel release.<sup>5</sup> In our experience, the only complication noted was superficial infection in two patients, both of whom were diabetic. In comparison, Sudqi A. Hamed also reported minor complications including superficial infection, wound haematoma and paresthesia along distribution

of ulnar nerve using mini-open wrist crease incision.<sup>6</sup> Furthermore, single incision mini open technique also carries a higher risk of incomplete release.<sup>2</sup> This particular two-incision technique reduces the risk of incomplete TCL splitting because of increased manoeuvring space between the incisions.

While comparing endoscopic and open techniques, similar rates of reoperation have been found and both techniques have been associated with neurovascular injuries, including injuries to median and ulnar nerve, superficial palmar arch and ulnar artery.<sup>9,10</sup> Injuries, particularly to vascular structures and tendon, are reported to be considerably higher in endoscopic release due to technical errors and anatomic variations. Therefore, requirement of special skills and training is identified as a disadvantage of endoscopic release and it is also suggested that endoscopic release should only be performed after clear understanding and knowledge of the target space.<sup>10</sup>

Our results show that this two-incision mini open technique is comparable with existing standard procedures as well as other novel techniques in terms of operating time and complications. The absence of any major complication proves that this technique can be practised safely and carries no additional risks. Therefore, considering that endoscopic release is expensive and requires special expertise, this technique is useful in developing countries like Pakistan where affordability and availability of proper equipment for endoscopy is a major concern.

A major limitation of this study was its retrospective design which can lead to information bias. In

addition, because of the retrospective design, the study did not analyse various outcome measures for the mentioned surgical procedure, including post-operative pain, improvement of symptoms, cosmetic appearance, etc. To further evaluate its effectiveness, a prospective study is required analysing various outcomes and comparing them with the current surgical procedures.

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