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Manifestations of the Long-term Outcomes of Open and Endoscopic Surgical Interventions of CTS

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ABSTRACT

Objective: To compare the outcomes of open and endoscopic surgical interventions for CTS and determine the superiority of one technique over the other.

Methodology: This is a descriptive cross-sectional study that analyzed data from 132 patients with Carpal Tunnel Syndrome who underwent open surgery or endoscopic surgery at a military hospital in Pakistan from July 2022 to January 2023. The study was approved by the University of Lahore's institutional review board and patients gave informed consent. Participants were between the ages of 25-60 and had a clinical and electrical diagnosis of CTS. Data was collected using a Performa and analyzed with SPSS V23.

Results: The common age group for CTS surgery was 41-50 years and the frequency of CTS was higher in females (74.2%) than in males (25.8%). Endoscopic surgery was more common (53%) than open surgery (47%). Results on follow-up patients showed that complications were higher after open surgery compared to endoscopic surgery.

Conclusion: The study concluded that endoscopic release procedure is superior to open procedure as it showed comparable results in alleviating symptoms, reducing severity, improving function, reducing pain and similar complications. Endoscopic procedure has benefits such as quicker return to daily activities, earlier return to work and smaller incision.

Keywords: Open surgical intervention, endoscopic surgical intervention, CTS.

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Introduction

Carpal Tunnel Syndrome (CTS) is a common condition that affects the hand and fingers, characterized by the compression of the median nerve within the carpal tunnel.[1] The symptoms of CTS can range from mild to severe and include pain, numbness, tingling, and weakness in the hand and fingers.[2] The symptoms may be experienced in the thumb, index finger, middle finger, and the outer side of the ring finger. [3] These symptoms can have a significant impact on a person's quality of life and ability to perform daily activities. Factors that increase the likelihood of developing CTS are obesity, repetitive wrist movements, pregnancy, family history, and rheumatoid arthritis.[4] CTS affects 2.7% to 5.8% of the general population, according to reports.[5, 6] Approximately 4% to 5% of the world's population is believed to have CTS, with the highest risk group being individuals between 40 and 60 years old.[7] CTS is more common in women than in men, for example, a study using the UK General Practice Research Database found that the prevalence of CTS was 88 cases per 100,000 males and 193 cases per 100,000 females.[3] Further studies indicate a higher incidence of CTS in women aged 45-54 years and in men aged 75-84 years. [8] No current definitive test exists for diagnosing CTS.[9, 10] Nerve conduction studies are widely considered the most accurate method for

diagnosing CTS.[11-13] surgical intervention is often considered as a treatment option for CTS, with both open and endoscopic techniques being commonly used.[14] Open surgery, also known as open release, involves making a large incision to release the transverse carpal ligament and relieve pressure on the median nerve. Endoscopic surgery, on the other hand, involves the use of a small camera and specialized instruments to release the transverse carpal ligament through small incisions. Both techniques have been shown to be effective in relieving symptoms and improving function in the short-term. However, the long-term outcomes of these surgical interventions remain uncertain. A number of studies have been conducted to evaluate the effectiveness of open and endoscopic surgery for CTS, but the results have been inconsistent. Some studies have reported good long-term outcomes, while others have found that the benefits of surgery may not be sustained over the long-term. Additionally, there is a lack of consensus on the optimal surgical technique, with some studies suggesting that endoscopic surgery may be superior to open surgery, while others have found no significant difference between the two techniques. The aim of this study is to examine the manifestations of the long-term outcomes of open and endoscopic surgical interventions for CTS. The primary focus of this study is to evaluate the long-term effectiveness of these interventions in terms of symptom relief, functional improvement, and complication rates. The study will also examine other important outcomes such as patient satisfaction, return to work, and reoperation rates. The findings of this thesis will provide valuable information on the long-term outcomes of open and endoscopic surgical interventions for CTS. The results of this study will help clinicians and patients make informed decisions regarding the management of CTS and will also provide insight into the optimal surgical technique for the treatment of CTS. In conclusion, the manifestations of long-term outcomes of surgical interventions for CTS is an important area of research, as it can provide insight into the effectiveness of these interventions over an extended period of time. The current study will provide a comprehensive examination of the long-term outcomes of open and endoscopic surgical interventions for CTS and will contribute to the current understanding of the optimal management of this condition.

Table I: Age group of Patients.

	N	%	Valid Percent	Cumulative Percent
25-40	32	24.2	24.2	24.2
41-50	73	55.3	55.3	79.5
51-60	27	20.5	20.5	100.0
Total	132	100.0	100.0	

Methodology

It is a descriptive cross sectional study included data from July 2022 to January 2023. A data of 132 patients was collected from a plastic surgery & orthopedic department of combined military hospital in Pakistan. The data was used after informed consent and ethical approval from institutional review board of the University of Lahore, Gujrat Campus. Individuals between the ages of 25-60 with a clinical and electrical diagnosis of carpal tunnel syndrome are included in current study.

Data was collected with the help of well-designed Performa from the patients who underwent the surgery of carpel tunnel release both by open surgery and endoscopically and come on follow-up. Data was analyzed using SPSS V23. And outcomes percentages and frequencies are written in the form of tables and pie charts.

Results

The study involved surgical procedures for Carpal Tunnel Syndrome (CTS) on 132 patients. Among them, 98 (74.2%) were female, while 34 (25.8%) were male, conclusion is that CTS is more prevalent in females than in males, with females accounting for about three-quarters of the patients in the study.

Table I presents the age distribution of patients who underwent surgery for Carpal Tunnel Syndrome (CTS) in the study. The table shows that out of the 132 patients, 32 (24.2%) were in the age group of 25-40, 73 (55.3%) were in the age group of 41-50, and 27 (20.5%) were in the age group of 51-60, with conclusion that the majority of patients who underwent surgery for CTS fell into the age group of 41-50, accounting for over half of the patients in the study.

Table II presents the types of surgeries that were performed on patients with Carpal Tunnel Syndrome (CTS) in the study. The table shows that out of the 132 patients, 62 (47%) underwent open carpel tunnel release surgery, while 70 (53%) underwent endoscopic carpel tunnel release surgery. The table's conclusion is that endoscopic carpel tunnel release surgery was more common than open carpel tunnel release surgery in the study.

Table III presents the complications of open carpel tunnel release surgery that were observed in the study. The table shows that out of the 62 patients who underwent open surgery, 40 (64.5%) had normal postoperative recovery without any complications. However, some patients did experience complications, with scar pain being the most common complication, reported by 11 patients (17.7%). Other complications reported by patients included infection 4 (6.5%), bleeding 2(3.2%), and general pain 5 (8.1%). The table's conclusion is that while most patients who underwent open surgery experienced normal postoperative recovery, a significant number of patients reported complications such as scar pain, infection, bleeding, and general pain.

Table II: Showing types of surgeries.

	N	%	Valid Percent	Cumulative Percent
Open carpel tunnel release	62	47.0	47.0	47.0
Endoscopic carpel tunnel release	70	53.0	53.0	100.0
Total	132	100.0	100.0	

Table III: Complication of open carpel tunnel release.

	N	%	Valid Percent	Cumulative Percent
Normal	40	64.5	64.5	64.5
Scar Pain	11	17.7	17.7	82.3
Infection	4	6.5	6.5	88.7
Bleeding	2	3.2	3.2	91.9
General Pain	5	8.1	8.1	100.0
Total	62	100.0	100.0	

Complications of endoscopic carpel tunnel release surgery that were observed in the study. Out of the 70 patients who underwent endoscopic surgery, 61 (87.1%) had normal postoperative recovery without any complications. Only one patient (1.4%) reported scar pain, and eight patients (11.4%) reported general pain. These study findings reveal that endoscopic carpel tunnel release surgery had a lower rate of complications compared to open surgery. The majority of patients who underwent endoscopic surgery had normal postoperative recovery without any complications, and only a small percentage reported scar pain or general pain.

Discussion

Sir James Paget first mentioned carpal tunnel syndrome in 1853. Since then, the surgical release of the transverse carpal ligament has become one of the most frequent procedures in the United States.[15, 16] There are various surgical methods for releasing the transverse carpal ligament, such as the traditional open approach with slight modifications using smaller incisions, as well as the Okutsu-developed ECTR (endoscopic carpal tunnel release) modified by Chow into a two-portal method.[17, 18] Since its introduction, the ECTR method has faced criticism and examination regarding its efficacy and safety compared to the open technique.[19-21] a study was conducted by P Yazdanpanah et al in which he stated that the ratio of CTS is more prevalent in females[22] so, the current study findings are also relatable to this study. Isam Atroshi et al. stated that the most common group having carpel tunnel syndrome is average 44 years old [23], current study results regarding common age group is also relatable to this study. Some studies shows that OCTR is more prevalent that ECTR[24] But some studies show that OCTR is only common in Midwest and ECTR is more prevalent in other areas.[25] So, the results of this study is also relatable to current study. A study by Andrew K.Palmer et al showed that the complications rate in OCTR is more prevalent than ECTR which include scar pain, infection etc.[26] So, findings of current study are also relatable to this study. Similarly, Chen and colleagues found that the incidence of permanent nerve damage was greater in hands that underwent the traditional open procedure compared to those that underwent the endoscopic procedure.[27] Chen et al. believed that the endoscopic procedure was safer than the traditional open procedure due to the reduced rates of permanent nerve damage. One patient in the traditional open procedure group had a wound infection that couldn't be treated with oral antibiotics and required further treatment, including removal of damaged tissue and intravenous antibiotics. Multiple studies have reported a higher frequency of wound complications (infections, hematomas, or wound separation) in patients undergoing the open procedure compared to those undergoing the endoscopic procedure.[28]

This study has some limitations such as a limited sample size and brief post-operative follow-up. The comparison of the impact of the two surgical techniques on hand grip strength could not be performed. Nevertheless, the study provides a useful comparison of the clinical outcomes, patient satisfaction, complications, and daily life recovery between the two techniques.

Conclusion

The study concluded that endoscopic release procedure is superior to open procedure as it showed comparable results in alleviating symptoms, reducing severity, improving function, reducing pain and similar complications.

Additionally, endoscopic procedure has benefits such as quicker return to daily activities, earlier return to work and smaller incision.

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