

ORIGINAL ARTICLE

Frequency of Local Treatment in Carpal Tunnel Syndrome during Pregnancy

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ABSTRACT

Background and Aim: The most common entrapment neuropathy is carpal tunnel syndrome (CTS). Carpal tunnel syndrome is caused by median nerve compression at the wrist joint. Idiopathic carpal tunnel syndrome is the most common cause. Among the other physiologic causes of carpal tunnel syndrome (wrist trauma, diabetes, hypothyroidism, rheumatoid arthritis, occupation, contraception, and pregnancy), pregnancy is the most common. The objective of the present study was to determine the frequency of local treatment in carpal tunnel syndrome during pregnancy.

Materials and Methods: This cross-sectional study was carried out on 45 pregnant women with carpal tunnel syndrome in the departments of Neurology and Gynaecology, Ayub Teaching Hospital, Abbottabad from May 2020 to April 2021. Individuals who met the inclusion criteria were enrolled in this study. Ethical approval and consent forms were taken from the participants. All the patients were treated with local treatment (dexamethasone acetate 4 mg and lidocaine 0.5 ml) under the carpal tunnel syndrome. Before and after 3 weeks of local injection, median nerve electro physiologic parameters through sensory nerve conduction velocity (SNCV), sensory latency (DSL), pain intensity (visual analog scale or VAS) and distal motor latency (DML) were all noted.

Results: The mean age of the patients was 29 ± 5.3 years while mean weight gain was 13.2 ± 4.9 kg. The third trimester was the most frequent pregnancy trimester with carpal tunnel syndrome. Before and after 3 weeks, the average pain score of injected dexamethasone acetate was 8.65 ± 0.89 and 4.29 ± 0.74 respectively (p -value < 0.005). Additionally, the median nerve SNCV transcarpal was 32.9 ± 7.1 and 25.1 ± 7.2 m/s (p -value = 0.001); while DSL median nerve was 4.87 ± 0.81 ms and 4.1 ± 0.62 . Lastly, the DML of the median nerve before and after 3 weeks of local treatment was 5.2 ± 1.03 and 4.69 ± 0.54 ms respectively.

Conclusion: Pain intensity and electrophysiological factors were considerably improved after local treatment dexamethasone acetate injection. Encouraging results have been offered for carpal tunnel syndrome with minimum invasive treatment in pregnant women.

Keywords: Carpal tunnel syndrome, Pain intensity, local treatment

INTRODUCTION

The carpal tunnel syndrome (CTS) was initially defined as a nocturnal paresthesia, median nerve sensory disturbance, and atrophy [1]. Retrograde pain, weakness, and hypoesthesia were the subsequent symptoms of CTS. A median neuropathy at wrist by electrophysiological evidence is a clinical CTS. The CTS abnormalities on electrodiagnostic testing and proposed cause for transverse carpal ligament are the median nerve compression reasons which account for 96% of cases [2, 3]. The median nerve fibers are responsible for early nerve-conduction testing diagnosed abnormalities and sensory symptoms [4,5]. There is no significant association found between median nerve compression degree and electrophysiological changes degree. But severe compression could be because by the motor response and absent sensory.

The prevalence of CTS reported was 62% in pregnant women. Carpal tunnel syndrome usually occurs in the third trimester but sometimes occurs in the first trimester as well. Tingling and numbness at the middle finger, ring finger radial half, index finger, and thumb are the most common symptoms of CTS. Electrophysiological assessment, physical examination, and history could be the pre-requisite parameters for CTS diagnosis [6]. The CTS

treatment involves corticosteroid local injection, analgesics, extremity involvement and wrist support. Surgical intervention is preferred in case the median nerve velocity impaired conduction and progressive symptoms such as thenar muscles severe atrophy and patients do not respond well. The CTS symptoms may be reduced by dexamethasone acetate injection applied to the wrist joint.

Previous research has shown that dexamethasone acetate injection can help treat lateral refractory epicondylitis and joint dislocation of recurrent temporomandibular. Another study investigated injected dexamethasone acetate for carpal tunnel syndrome symptom treatment in pregnancy, and their findings revealed the effectiveness of carpal tunnel syndrome treatment was in controlling [7].

Boston symptom severity scale and CTS physical symptoms were assessed for outcomes [8]. The present study will not consider electro diagnosis for CTS diagnosis. But will assess the steroids injection effectiveness of CTS with pregnancy.

METHODS

This cross-sectional study was carried out on 45 pregnant women with carpal tunnel syndrome in the departments of Neurology and Gynaecology, Ayub Teaching Hospital,

Abbottabad from May 2020 to April 2021. Individuals who met the inclusion criteria were enrolled in this study. Ethical approval and consent forms were taken from the participants. All the patients were treated with local treatment (dexamethasone acetate 4 mg and lidocaine 0.5 ml) under the carpal tunnel syndrome. Before and after 3 weeks of local injection, median nerve electro physiologic parameters through sensory nerve conduction velocity (SNCV), sensory latency (DSL), pain intensity (visual analog scale or VAS) and distal motor latency (DML) were all noted. Carpal tunnel syndrome was diagnosed based on its symptoms and signs verified by electrophysiological evidence. An individual had the following findings (at least one) of electrophysiology; a. Excessive distal latency recorded from the abductor pollicis brevis muscle (> 4.2 ms) of the motor median nerve, b. Extended peak latency of antidromic median sensory nerve action potential recorded from the third digit (> 3.6 ms) c. Prolonged peak latency of median compound nerve action potential with an 8 cm distance (> 2.2 ms) at palm wrist section, and d. Reduction in median nerve conduction velocity as measured from the wrist (41 m/s). Proximal sensory latency > 5.5 m/s, the velocity of conduction transcarpal median nerve < 25 m/s, distal motor latency > 6.5 m/s, and potential action median nerve compound > 4 m/s were the severe disease cases.

Carpal tunnel was injected with a needle (4cm long) containing 0.5 ml lidocaine mixed with dexamethasone (4mg) at 30° angle relative to Palmaris longus tendon medial side to the skin. In case patients upon injection to median nerve root felt paresthesia, little changes to the angle and needle position are made by dragging back the inserted needle. Individual patient's pain severity (VAS based) before and after 3 weeks injection was recorded. SPSS software version 20 was used for data analysis such as age, gender, and pain severity.

RESULTS

The mean age of the patients was 29 ± 5.3 years while mean weight gain was 13.2 ± 4.9 kg. The third trimester was the most frequent pregnancy trimester with carpal tunnel syndrome. Before and after 3 weeks, the average pain score of injected dexamethasone acetate was 8.65 ± 0.89 and 4.29 ± 0.74 respectively (p -value < 0.005).

Additionally, the median nerve SNCV transcarpal was 32.9 ± 7.1 and 25.1 ± 7.2 m/s (p -value = 0.001); while the median nerve of DSL was 4.87 ± 0.81 ms and 4.1 ± 0.62 . Lastly, the DML of the median nerve before and after 3 weeks of local treatment was 5.2 ± 1.03 and 4.69 ± 0.54 ms respectively as shown in Table/Figure-1. Based on electrophysiological and clinical findings, an insignificant association was found between local treatment (dexamethasone or steroids) with another group. But a statistically significant association was found between electrophysiological findings and signs (p -value < 0.01). Similarly, no significant correlation was found between electrophysiological data and symptoms. Table-2 compared the placebo and treated group in terms of antidromic SAP latencies, all symptoms, nocturnal acroparaesthesia and MAP latencies. The weakness symptom reached a significance level which decreased but all other signs shown insignificant improvement as shown in Table-2.

Table-1 Comparison of CTS signs and symptoms before and after 3 weeks of injection.

CTS Parameters	Before 3 weeks	After 3 weeks	p-value
Average Pain Score of dexamethasone injection	8.65 \pm 0.89	4.29 \pm 0.74	< 0.005
SNCV median nerve	32.9 \pm 7.1	25.1 \pm 7.2	0.001
DSL median nerve	4.87 \pm 0.81	4.1 \pm 0.62	0.001
DML median nerve	5.2 \pm 1.03	4.69 \pm 0.54	0.001

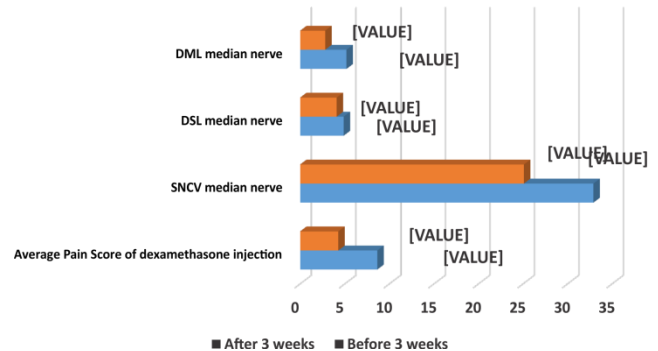


Figure-1 comparisons of CTS signs and symptoms

Table-2 Comparison of CTS baseline signs and symptoms at different time period using Wilcoxon signed rank test and symbols represent (P), Placebo; (S), steroid treatment; NS, not significant.

CTS symptoms	Group	1 week	2 weeks	one month	two months
Paresthesia	Steroid	$P < 0.0001$	$P < 0.0001$	$P < 0.0001$	$P < 0.0001$
	Placebo	$P < 0.01$	$P < 0.05$	NS	NS
Severe Pain	Steroid	$P < 0.0001$	$P < 0.0001$	$P < 0.0001$	$P < 0.0001$
	Placebo	$P < 0.01$	NS	NS	NS
Hypoesthesia	Steroid	$P < 0.05$	NS	NS	NS
	Placebo	NS	NS	NS	NS
Weakness	Steroid	$P < 0.05$	$P < 0.05$	$P < 0.05$	NS
	Placebo	NS	NS	NS	NS
MAP latency	Steroid	$P < 0.01$	$P < 0.01$	$P < 0.01$	$P < 0.01$
	Placebo	$P < 0.01$	$P < 0.01$	$P < 0.05$	$P < 0.05$
Atrophy	Steroid	NS	NS	NS	NS
	Placebo	NS	NS	NS	NS

DISCUSSION

The current study found that significant relief in the severity of pain was noted with dexamethasone injections. Other

electrophysiological factors such as motor median nerve and nerve conduction velocity are shown improvement as well. In any individual, no specific complication occurred.

The inflammatory-reparative process commenced by regenerative process improvement caused by dexamethasone acetate injection [9]. Some studies suggested the wrist injected corticosteroid caused an improvement which was thruvia injection side bleeding [10], but no historical evidence justified their claims. According to their studies, mitogenic agents and specific mediators were activated through blood injection insertion in the connective tissue. Fibroblast for angiogenesis induced by platelet-derived growth factors and chemotactic polypeptides were also mentioned among them [11]. Additionally, ligament repairing cascade inflammation might be activated by the mediators [12].

The inflammatory response caused by blood stimulation in local metabolites or dexamethasone acetate or blood cell mediating factors is still unknown and needs to be clear. A researcher injected platelet-driven growth factors in 122 rabbits to their ruptured medial collateral ligaments [13]. Comparisons were made between control and test group. The test group showed faster and stable improvement. Hence, vascular hypothesis formation and fibroblastic hypothesis need to be taken into account [14].

Previous studies reported sleep interference is a symptom of CTS [15]. The current study showed no association between sleeping patterns and CTS. A troublesome delivery could be caused by sleep disturbance as a risk in the last trimester, exhaust women, and interferes with life quality. CTS could be treated conservatively but pregnancy problems need to be recognized. A wrist splint wearing stabilizes the neutral position of the wrist, maximizes the carpal tunnel volume, and reducing nerve pressure [16.]. Moreover, temporary symptoms relief can be gained through steroids injection [17]. Pregnant women do not accept these steroids injection readily as serious side effects have been reported. Many women experience relief after delivery in terms of symptoms [18]. An alternate non-invasive treatment of CTS was developed using a mechanical traction device to rotate and track the wrist. In case the alternate treatment is proven effective would be used for CTS treatment in pregnant women [19].

The pain severity significantly reduced by 80% in the current study. About 60% VAS reduction was recorded in those patients who took the plasma rich platelet buffered injection in the study group equated to the control group (6%). Theoretically, fibrosis caused damages to soft tissue but no extensive damages were noted since the injection was used. Therefore, fibrosis chances were lower and no complication was reported. On comparing dexamethasone with other corticosteroids injections, the former results fewer complications. In General, the dexamethasone acetate injection could be an alternate treatment for carpal tunnel syndrome with fewer complications.

CONCLUSION

Pain intensity and electrophysiological factors were considerably improved after local treatment dexamethasone acetate injection. Encouraging results have been offered for carpal tunnel syndrome with minimum invasive treatment in pregnant women.

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