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EFFICACY OF INJECTION WITH TRIAMCENOLONE ACETONIDE PROXIMAL TO THE CARPAL TUNNEL IN RELIEVING SYMPTOMS OF CARPAL TUNNEL SYNDROME : A RANDOMISED CONTROL TRIAL

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Abstract

This was a randomized control trial done in the Physical Medicine Department , National Institute of Traumatology and Othopaedic Rehabiliotation (NITOR) , Dhaka with the aim to assess the effect of a 40 mg triamcenolone acetonide injection proximal to the carpal tunnel in patients with the carpal tunnel syndrome. Patients with symptoms of the carpal tunnel syndrome for more than 3 months, confirmed by electrophysiological tests and aged over 18 years were included in the study.Patients were divided into two goups.Intervention groups were injected with 40 mg triamcinolone acetonide along with 10 mg lignocaine and the control group received only lignocaine at the same dose.A 12 months follow up schedule was arranged for outcome measurement and were scored as having improved or not improved. Improved was defined as no symptoms or minor symptoms requiring no further treatment. 7 (21%) of 33 patients in the control group had improved at 1 month compared with 28 (78%) of 35 patients of the intervention group. After 1 year, 2 of 7 improved patients in the control group needed no further treatment, compared with 19 of 28 improved patients in the intervention group . Of the 26 non-responders in the control group, 22 (85%) improved after injecting triamcenolone acetonide.

Introduction

The carpal tunnel syndrome (CTS) is a common condition causes pain and paresthesia in the arm. It is an entrapment mono-neuropathy of median nerve at wrist. In Bangladesh, like many other countries, it is also a common cause of pain and paresthesia in the upper limbs, particularly in women. Injection with corticosteroids is one of the many recommended treatments[1,2,3].

One of the techniques for injection is to introduce just proximal to , not into the carpal tunnel. The rationale for this injection site is that there is often a swelling at the volar side of the forearm, close to the carpal tunnel, which might contribute to compression of the median nerve [4]. Moreover, the risk of damaging the median nerve by injection at this site is lower than by injection into the narrow carpal tunnel.

This study was attempt to investigate , firstly, whether symptoms disappeared after injection with corticosteroids proximal to the carpal tunnel and, secondly, how many patients remained free of symptoms at follow up after this treatment.

Fig 1 : Injection technique at carpal tunnel

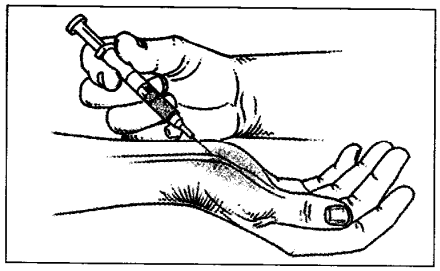
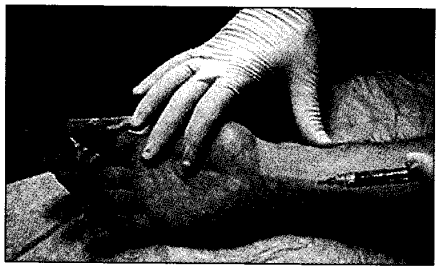


Fig 2 : Site of injection



Methods

Participants

The participants were patients attending in and referred to the Physical Medicine OPD of NITOR with signs and symptoms of the carpal tunnel syndrome of more than 3 months' duration confirmed by electrophysiological tests. In those with bilateral symptoms, the arm with the most severe symptoms was chosen and the treatment of this arm was randomised. We excluded patients aged under 18 years or patients who had already been

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treated for symptoms of the carpal tunnel syndrome. Informed written consent was taken from all participants.

Intervention

Injections were given by a physiatrist experienced in administration of intra-lesional injections . They contained 10 mg lignocaine and 40 mg triamcenolone acetonide. The site of injection was at the volar side of the forearm 4 cm proximal to the wrist crease between the tendons of the radial flexor muscle and the long palmar muscle. Injections were given with a 2.5 cm (23 gauge needle fig 2).The angle of introduction of the needle depended on the size of the wrist. In participants with a thin wrist the median nerve is close to the skin. In these participants the angle was 10°. The angle was larger, about 20°, in those with a thick wrist. In participants with well developed muscles, the pronator quadratus muscle may push up the median nerve, so in a thick muscular arm the angle of introduction was also flat, between 10° and 20°. The needle was introduced slowly, and the participant was instructed to say stop if he or she felt pins and needles or pain in the fingers. If a resistance was felt the needle was withdrawn a few millimeters then repositioned. The injection was given without much pressure. After injection, the 1 ml fluid bolus was gently massaged towards the carpal tunnel.

Outcome measurment

One month after injection the randomized participants visited the outpatient department and were asked by another physician whether they had no symptoms or only minor symptoms that they considered so much improved that they felt no further treatment was necessary. Further visits were planned for 3, 6, 9, and 12 months after the injection or earlier if the participant felt this was necessary. At these visits, participants were asked the same question. If treatment was necessary the decision to treat was taken first, and then the trial code was broken. This treatment was offered to the patients who had not been treated with local steroid before.

Sample size

The sample size calculation was based on the assumption that after 1 month 80% of the participants in the intervention group would respond to treatment versus 50% in the control group. With a power of 80% and a significance level of 5% two sided, this meant that at least 80 participants needed to be included.

Analysis

We used 3 and Fisher's exact tests to compare differences between the groups. We calculated the 95% confidence intervals of the differences of the proportion of participants who responded to treatment.

Results

Total 77 participants had been recruited in the study. The final analysis of the results is on 68 randomised patients. Nine of the participants did not participated at follow up. Table I shows the baseline characteristics. No significant differences existed between the groups. After 1 month 28 of the 35 participants in the intervention group had no or only minor symptoms versus 7 of the 33 participants in the control group (P<0.001).

Table I : Baseline characteristics of 68 participants in trial

Variable	Intervention	Control
Number of Participants	35	33
Mean Age (years)	48	47
Number of Females	31	30
Number of participants with pain in arm at night	32	30
Number of participants with swelling near carpal tunnel	23	20
Average duration of symptoms (months)	33	29
Number of participants with absence of sensory action potential of median nerve	24	22

Table II : Treatment response at follow up

Period after treatment	No (%) of participants not needing second treatment		Percentage of observed difference (95% confidence interval of difference)
	Intervention group (n=35)	Control group (n=33)	
1 month	28(80)	07(21.2)	58.8
3 months	25(71.4)	03(9.1)	62.3
6 months	22(62.9)	03(9.1)	51.8
9 months	20(57.1)	02(6.1)	51
12 months	19(54.3)	02(6.1)	48.2

Table II shows the proportion of participants not needing a second treatment. At all time intervals the number of participants not requiring treatment was significantly higher in the intervention group.

After 1 year, 2 of 7 improved patients in the control group did not need a second treatment, compared with 19 of 28 improved patients in the intervention group [difference 40% (28% to 68%)]. Of the 26

non-responders in the control group, 22 (85%) improved after injecting triamcenolone acetonide.

Discussion

This study confirmed a beneficial effect of injection with triamcenolone acetonide near the carpal tunnel. Ahmed et al reviewed the role of steroid injection in CTS and noted good response[5] In many centres through out the world, physicians have been injecting local steroid close to, but not in, the carpal tunnel for last 20 years[1]. They claimed not only excellent results in the short term but also long lasting improvements. The duration of improvement shown in this controlled study seemed to be longer than has been reported in other studies[4-10]. Two studies were clinical trials [9,10]. In the first trial, injections with steroids into the carpal tunnel were compared with intramuscular injections. At the end of one month significant improvement was seen in the group of 18 patients who had been given injections into the carpal tunnel, but this beneficial effect had disappeared after 10-12 months. In the second trial local steroid (methylprednisolone) was injected, and again the effect of treatment was of short duration.

Our rationale for positioning injections close to the carpal tunnel was that injections at this site are less likely to damage the nerve and are easier to carry out than injections into the carpal tunnel. Another reason that this site was chosen was the common occurrence of a swelling close to the carpal tunnel in this study in three quarters of the participants. Such a swelling probably consists of fat tissue and hypertrophy of the pronator quadratus muscle. A locally applied injection may reduce the swelling by the lipolytic action of local steroid, which would explain the long term beneficial effect. Whether this is true, this treatment is safe and is easier to carry out than surgical decompression or 20 sessions of ultrasound treatment which has been shown beneficial in significant number of patients in a few studies[11].

Most of the studies that assessed the effect of local steroid in CTS used methyl-prednisolone and hydrocortisone[1,8] but in the present study we used triamcenolone acetonide which has got a longer half life than the cortisone preparations mentioned above and shorter half life than triamcenolone hexacetonide[11]. But no significant difference was found in the results with injection of methyl-prednisolone[1].

Conclusion

Injection with steroids close to the carpal tunnel may result in long term improvement and can minimize the need of surgical decompression. This single injection is still effective at one year in half of the patients Injections proximal to the carpal tunnel have no side effects and are easier to carry out than injections into the carpal tunnel because corticosteroid injections into the carpal tunnel may damage the nerve.

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