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Research Article

Role of extracorporeal shockwave therapy and injectable corticosteroids in the treatment of lateral epicondylitis: a comparative study of 100 patients

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ABSTRACT

Background: Even though considered to be self-limiting, lateral epicondylitis (tennis elbow) can cause significant impediment in professional and activities of daily living. A safe and minimally invasive procedure that will enable patients to return to their daily activities as soon as possible should be advocated in the management of this condition. The aim of the present study was to investigate the role of extracorporeal shock wave therapy (ESWT) and injectable corticosteroids in the treatment of lateral epicondylitis with the secondary objective of comparing the difference in pain relief and functional improvement in patients treated with both modalities.
Methods: A cross sectional analytical study was conducted over an 18 month period.100 patients were randomized into two groups, A (51 patients) who received three sessions of ESWT on weekly intervals and B (49 patients) who received two intra-lesional injections of 1ml of methylprednisolone and 2% lignocaine on weekly intervals. The patients were followed up at 3 weeks, 6 weeks and 6 months after the interventions. Subjective and objective improvements were measured using visual analogue score (VAS) and Patient Rated Tennis Elbow Evaluation Score (PRTEE).
Results: The mean VAS in both groups reduced from 8.47 and 8.53 to 2.51 and 1.67 respectively at the end of the follow up ($p < 0.001$) .The mean PRTEE score in Group A reduced from 80.59 to 26.53 ($p<0.001$) and Group B from 82.76 to 13.59 ($p<0.05$). In Group A (ESWT), the average reduction In PRTEE Score at the end of follow up was 54.06 and Group B (steroids) was 69.16. The difference was found to be statistically significant ($p<0.001$) favouring steroid injections.
Conclusions: Both ESWT and steroid injections were found to be effective in producing symptomatic pain relief and improving the functional disability in the management of lateral epicondylitis. The comparison of both modalities showed a statistically significant improvement in pain and functional disability in favour of steroids at a short duration of follow up i.e., 03 weeks, 06 weeks and 06 months.

Keywords: ESWT, Epicondylitis, Steroids, Tennis elbow, VAS, PRTEE

INTRODUCTION

Lateral epicondylitis (LE) of the humerus or Tennis Elbow is a common soft tissue ailment that is encountered in general orthopaedic practice. The management of this disabling ailment which includes both non operative and invasive measures has been controversial over the years with non-operative treatment claiming a success rate of 95% of patients.[1] Even though considered to be a self-limiting condition, it can cause significant impediment in professional and activities of daily living. The management with conservative and surgical methods aims in providing symptomatic pain relief and improving the functionality of the affected limb, thereby reducing the disability related pain and the

loss of work hours. The patients if left untreated will have a relief in symptoms in around twelve months, which is quite long not only in terms of pain and disability, but also in terms of loss of economic productivity. So, a safe and minimally invasive procedure that will enable the patients to return to their daily activities as soon as possible should be advocated in the management of this condition. Several studies investigated the effect of ESWT in patients with lateral epicondylitis of the elbow, and the success rate ranged from 68% to 91%.[2-4]

A recent meta-analysis of RCTs on the efficacy and safety of steroid injections for lateral epicondylitis showed that steroid injections are well tolerated and effective than other treatments.[5] Many researchers have investigated the effects of ESWT vis-à-vis intra-lesional steroid injections in the treatment of LE. A recent study concluded that both steroid injection and ESWT both have a role in decreasing pain of LE but injection of steroid was more effective in treatment of LE.[6]

Therefore, it was planned to undertake the current study with the primary aim to investigate the efficacy of intra-lesional steroids and ESWT in the treatment of tennis elbow and secondary objective of comparing the difference in pain relief and functional improvement in patients treated with both the modalities, viz ESWT and steroid injections.

METHODS

The sample size for the current study was calculated using the results of Crowther et al study:[7] "A prospective, randomised study to compare extracorporeal shock-wave therapy and injection of steroid for the treatment of tennis elbow." The following statistical values were used in the sample size estimation: α = 5%, confidence interval= 90%, power = 80%. The sample size required to show a statistically significant result in the degree of pain relief using Visual Analogue Score was calculated to be 42 in each group i. e., the ESWT and intra-lesional steroid group. But 100 subjects were included in the present study. The present study was a prospective, analytical study involving patients suffering from lateral epicondylitis attending the orthopaedic OPD at a tertiary care centre.

Out of 128 patients who were diagnosed with lateral epicondylitis, 100 patients who satisfied the inclusion criteria for the study were included by the orthopaedic surgeons at the tertiary centre after obtaining a written informed consent. The inclusion criteria for the present study was individuals of more than 18 years of age with pain in the lateral epicondyle for more than 01 month and had received unsuccessful conservative therapy in the form of NSAIDS, rest local heat or ice.[7] In addition, the pain had to be induced by eliciting tenderness over the lateral epicondyle approximately 5 mm distal and anterior to the midpoint of the condyle and patients with a positive resisted wrist extension test (Cozen's test).[8] Patients excluded from the study were those with generalized shoulder or neck dysfunction, elbow arthritis, generalized polyarthritis, nerve entrapment syndromes, pregnancy, local infection, malignancy and those who previously received ESWT or steroid injections for lateral epicondylitis of the same elbow and patients already on systemic corticosteroids.[7]

The orthopaedic surgeons treated 51 patients (Group A) with ESWT and 49 with steroid injections(Group B). A proforma containing the demographic details of the patient, visual analogue scale and Patient Rated Tennis Elbow Evaluation Score (PRTEE) was filled before the intervention by the investigator. The ESWT treatment was given using the Elettronica Pagani Roland Serie E-SWT machine by the treating team. The machine was turned into the pre-set protocol for lateral epicondylitis. The large ESWT shock wave probe was used to give a total of 800 shock waves of 5 Hz frequency, pressure of 2.8 bars on the marked area over a period of 5 minutes. 1 ml of Methyl prednisolone acetate (40 mg/ml) mixed with 1 ml of 2% lignocaine using an insulin syringe at the marked area under strict aseptic precautions was administered by the orthopaedic surgeons in patients who received steroid injections. ESWT treatment was given on three sessions, one week apart and two steroid injections were given two weeks apart. The outcome measures analyzed were pain relief using the Visual Analogue Scale and functional improvement with the functional arm of patient rated tennis elbow evaluation score.[9-10]

The patients were followed up at 03 weeks, 06 weeks and 06 months from the initial date of intervention. At each follow up visit, the VAS and Patient Rated Tennis Elbow Evaluation Score (PRTEE) were recorded. Paired sample t-test was used to analyze the effects of both modalities, viz ESWT and steroid injections in the degree of pain relief and functional improvement in both groups A and B. Independent sample t-test was used to compare the efficacy of both treatment modalities in the test subjects. The statistical analysis was done using SPSS 20 software.

RESULTS

A total of hundred patients were included in the study. 51 patients were administered ESWT and 49 were given corticosteroid injection. There was no loss to follow up. The demographic features and pre-treatment functional scores of both groups were of both the groups were similar as shown in Table 1.

On follow up, the patients who were treated with ESWT (Group A) showed a marked improvement in pain denoted by the reduction in Visual Analogue Score at 03 weeks, 06 weeks and 06 months after treatment (p value <0.001). The patients who were treated with injectable corticosteroids (Group B) also showed a marked improvement in pain denoted by the gradual drop in Visual Analogue Score at all follow up visits. The

improvement in both groups was statistically significant by using the paired t-test with p value of <0.001. The results are tabulated in Table 2.

Table 1: Demography and pre-intervention scores.

Parameter	Group A	Group B	p value
Mean age (Years)	44.22	44.47	0.944 *
Gender	M=26;F=25	M=27; F=22	0.694 +
Hand dominance	D=41;N=10	D=31; N=18	0.092 +
Initial VAS (Median)	8.47	8.53	0.958 +
Initial PRTEE	80.59	82.76	0.097 #

M=male, F=female, D=dominant, N=non-dominant, VAS=Visual analogue score, PRTEE= Patient Rated Tennis Elbow Evaluation Score, *- Fisher's exact test,+ - chi square test#-Mann-WhitneyU-Test.

On comparing the Visual Analogue Score in patients treated with both modalities, the results showed a significant difference in VAS at every follow up visit favouring patients treated with injectable steroids (Group B) with a p value less than 0.001 using the independent sample t-test. The results are depicted in Table 3.

The functional disability as quantified by the PRTEE Score in patients treated with ESWT (Group A) and steroid injections (Group B) showed a gradual improvement in at all follow up visits which was found to be statistically significant using the paired sample t-test (p value <0.001) as depicted in Table 4.

On comparing the PRTEE Score in patients treated with both modalities, the results showed a statistically significant difference in improvement at every follow up visit favouring patients in Group B (steroids) with a p value less than <0.05 by using 2 independent sample t-test (Table 5).

In Group A, the average reduction In PRTEE Score at the end of follow up was 54.06 and Group B was 69.16. The difference was found to be statistically significant using the independent sample t- test with a p value less than 0.001, favouring steroid injections. The mean fall in PRTEE Score in both groups is pictorially depicted in Figure 1.

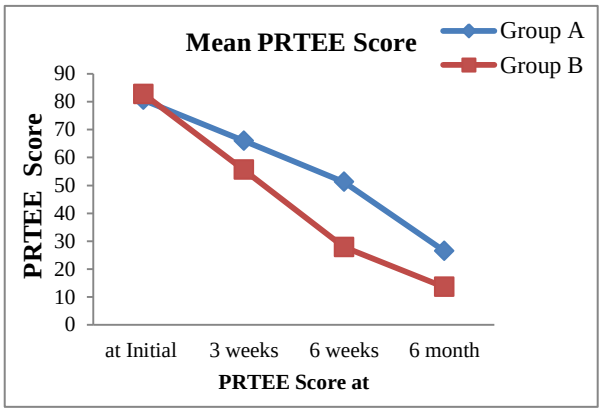

Figure 1: Mean fall of PRTEE scores (pictorial representation).

Table 2: VAS at follow up.

Follow up	ESWT (Group A)				Steroids (Group B)			
	Mean VAS	Mean difference (from initial)	SD	p-value*	Mean VAS	Mean difference (from initial)	SD	p-value*
3 weeks	6.82	1.647	0.770	0.001	5.27	3.224	1.343	0.001
06 weeks	5.33	3.137	1.077	0.001	2.57	5.918	1.288	0.001
06 months	2.51	5.961	1.166	0.001	1.67	6.816	1.286	0.001

Table 3: Comparison of VAS between Group A and Group B.

VAS at		Number of patients	VAS			p-value
			Mean	SD	Mean Difference	
At initial	Group A	51	8.47	1.102	-0.019	0.926
	Group B	49	8.49	0.960		
3rd week	Group A	51	6.82	1.072	1.558	0.001
	Group B	49	5.27	1.271		
3rd month	Group A	51	5.33	0.952	2.762	0.001
	Group B	49	2.57	1.080		
6th month	Group A	51	2.51	1.189	0.836	0.001
	Group B	49	1.67	0.851		

Table 4: PRTEE score at follow up.

	ESWT (Group A)				Steroids (Group B)			
	Mean PRTEE	Mean difference (from initial)	SD	p-value*	Mean PRTEE	Mean difference (from initial)	SD	p-value*
03 weeks	66.00	14.58	4.99	0.001	55.59	27.16	8.59	0.001
06 weeks	51.25	29.33	5.77	0.001	27.86	54.89	12.16	0.001
06 months	26.53	54.06	10.89	0.001	13.59	69.16	8.87	0.001

Table 5: Comparison of PRTEE score between Group A and Group B.

PRTEE at		Number of patients	PRTEE			p-value*
			Mean	SD	Mean difference	
At initial	Group A	51	80.59	6.171	-2.167	0.126
	Group B	49	82.76	7.804		
3rd week	Group A	51	66.00	8.035	10.408	0.001
	Group B	49	55.59	8.401		
3rd month	Group A	51	51.25	6.669	23.398	0.001
	Group B	49	27.86	9.823		
6th month	Group A	51	26.53	12.207	12.938	0.001
	Group B	49	13.59	6.667		

DISCUSSION

In the present study, the demographic distribution and pretreatment functional scores of patients in both groups was similar to that in the available literature.[2,6,11] Wang et al, Rompe et al, Pettrone et al in their respective placebo controlled prospective trials showed favourable results of ESWT in the form of symptomatic pain relief and improvement in functional scores in the management of tennis elbow.[2,12,13] The overall success rate of ESWT in the management of lateral epicondylitis in the available literature ranges from 68% to 91 %.[2-4]

In the current study 51 patients received three sessions of ESWT at weekly intervals. The patients who were treated with ESWT showed a statistically significant improvement in pain denoted by the reduction in Visual Analogue Score at 03 weeks, 06 weeks and 06 months after treatment by using the paired t- test (p value <0.001). Rompe et al treated patients with ESWT and study showed a statistically significant improvement in the functional disability as indicated by the difference in mean fall of Roles-Maudsley Score (p=0.009) and Upper extremity Functional Scale at three month follow up visit.[2]

In the present study the functional disability as quantified by the PRTEE Score in patients treated with ESWT also showed a gradual improvement at all follow up visits which was found to be statistically significant by using the paired t-test (p value <0.05). Smidt et al and Tonks et al suggested that steroid injections are the best short term option for pain and functional disability in patients with lateral epicondylitis when compared with observation and physiotherapy.[14,15]

A meta analysis of 20 RCTs studying the safety and efficacy of steroid injections in the management of tennis elbow concluded that they are well tolerated and more effective for tendinitis in the short-term than pooled other treatments, though with no long term benefits.[5] Review of previous literature shows that injectable corticosteroids have a success rate ranging from 80% to 90.9%.[16]

In the current study, the patients who were treated with injectable corticosteroids also showed a statistically significant improvement in pain denoted by the gradual drop in Visual Analogue Score at all follow up visits (p value of <0.001). Harun Mutlu showed a mean improvement in the DASH score in patients treated with steroid injections at an average follow up of 03 months.[17] In the present study PRTEE Score in patients treated with steroid injection showed a statistically significant improvement at all three follow up visits using paired t-test with a p value of less than 0.001 (paired t-test). In recent years many researchers have investigated the effects of ESWT vis-à-vis intralesional steroid injections in the treatment of LE. Crowther et al noted that both injectable steroids and ESWT are effective in its management with a success rate of 84% and 60% respectively.[7]

The results were statistically significant in favour of steroid injections. Similarly Sharma et al also studied the efficacy of both modalities in the treatment of tennis elbow. They showed that both steroid injections and

ESWT both have a role in decreasing pain of tennis elbow, but observed that patients receiving steroid injection had significantly better results compared to those receiving ESWT at all periods of follow up.[18] But a recent prospective investigation on the efficacy of steroids, ESWT and physiotherapy in the management of tennis elbow showed that all three modalities have similar and favourable effects on pain and grip strength in the early period of LE treatment. Grip strength improvement was noted to last longer in the ESWT group than the other two methods.[19] In the current study the results showed a statistically significant difference in VAS at every follow up visit favouring patients treated with injectable steroids (Group B), with a p value less than 0.05. Many studies carried out in the past comparing the efficacy of ESWT and injectable steroids have also analyzed the difference in the functional improvement between both groups. On analyzing the difference in DASH Scores between ESWT and steroid group, Mutlu et al showed that the mean improvement in the ESWT group was 20.55 and 23.77 in the steroid group (p value = 0.05) favouring steroid group.[17]

In the present study, patients who received steroid injections showed a statistically significant improvement in the degree of functional improvement compared to those who received ESWT (p value less than 0.05).

In the current study, only three patients were noted to have local skin atrophy after steroid injections at the final follow up visit and two patients had initial flare up of pain after the initial treatment session, which were managed successfully with oral anti inflammatory agents and ice packs. Both the patients underwent the subsequent sessions without further complications. There was no statistically significant difference in the rate of complications between both groups by using the chi-square test with a p value more than 0.05.

CONCLUSION

Lateral epicondylitis poses a significant healthcare burden in adult population causing significant impairment in professional and activities of daily living. The natural history is that of a benign self-limiting condition which improves with or without treatment within 12 months in 70% to 80% of patients.

One year is a longtime for a patient to wait not only in terms of pain and disability, but also loss of economic productivity. So, a safe minimally invasive procedure that will enable them to return to their daily activities as soon as possible should be advocated in the management of the same. The current study investigated the role of ESWT and steroid injections in the management of lateral epicondylitis.

Both the treatment modalities were found to be effective in producing symptomatic pain relief and improving the functional disability. The comparison of both modalities showed a statistically significant improvement in pain and functional disability in favour of steroids at a short duration of follow up i.e., 03 weeks, 06 weeks and 06 months. The current study followed up the patients for a relatively short duration of 06 months. The long term effect of both modalities in tennis elbow is questionable and further investigations with longer follow up is required to elucidate the same.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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