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Original Research Paper

Sports Science

EXTRACORPOREAL SHOCK WAVE THERAPY VERSUS ULTRASOUND THERAPY IN TENNIS ELBOW

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ABSTRACT

INTRODUCTION: Extracorporeal shock wave therapy (ESWT) and Ultrasound therapy (UST) is being used widely to reduce pain and disability in tennis elbow.

AIM: To compare the therapeutic efficacy of ESWT and UST in management of tennis elbow.

DESIGN: Prospective, randomised, single blind, clinical trial.

METHODS: 60 patients with tennis elbow were randomised to receive ESWT and UST with 30 patients in each group. ESWT group received 6 sessions, 2 times in a week and UST group received 10 sessions, 3 times a week. Patients were assessed clinically before treatment, 1, 2 and 3 months following completion of treatment using Visual Analogue Scale(VAS), Disability of Arm Shoulder and Hand(DASH) and MAYO elbow performance score.

RESULTS: Reduction in pain and improvement in functional outcomes were observed in both the groups, as assessed by VAS, DASH and MAYO elbow scores. The mean VAS scores were significantly better in patients treated with ESWT as compared to UST at 1 and 2 months ($p<0.05$) months follow up. Mean DASH scores in ESWT group were significantly better at every follow up ($p<0.05$) as compared to patient treated with UST. Mean MAYO elbow scores became statistically significant at 3 months ($p=0.002$) following completion of treatment with ESWT as compared to UST.

CONCLUSION: 1. Both ESWT and UST causes reduction in pain and disability. 2. ESWT is more effective than UST.

KEYWORDS : Tennis elbow, extracorporeal shockwave therapy, ultrasound therapy.

INTRODUCTION

Tennis elbow or lateral epicondylitis is the degenerative pathology of the common extensor tendon originating of the lateral epicondyle of humerus due to repetitive microtraumas.(1,2) It was first indentified by a German Doctor Runge in 1873 as 'writer's cramp'.(3) It is degenerative or failed healing response characterised by the increased presence of fibroblast, proteoglycans and glycosaminoglycans, vascular hyperplasia and disorganised collagen at extensors origin, especially at extensor carpi radialis brevis tendon.(4)

It often presents in individuals who perform repetitive, resistance based, wrist movements especially in eccentric contractions and gripping activities.Common symptoms include pain and tenderness over lateral epicondyle, pain on resisted dorsiflexion of wrist, middle finger or both.(5,6,7) Conservative therapeutic options include non steroidal anti-inflammatory drugs, cryotherapy , orthotics, taping, stretching, strengthening exercises, US therapy, ESWT, laser, manipulation- mobilisation.(8)

ESWT aims to reduce pain and promote healing. Although the underlying mechanism is not clear, it likely works by hyperstimulation analgesia; reduces pain as a result of moderate - intense sensory input that is applied at the common extensor origin. It promotes healing by stimulating poorly vascularised tissue and cell growth.(9,10,11) US therapy is assumed to both thermal and mechanical effect on the target tissues resulting in increased local metabolism, circulation, extensibility of connective tissue and tissue regeneration.(12)

There are few studies with contradictory results addressing the treatment of tennis elbow using ESWT and US therapy.(13,14,15) The aim of the study was to compare the effectiveness of two different therapeutic modalities and to determine which one is superior in management of tennis elbow.

MATERIAL AND METHODS

This study is a prospective randomised single blind control trial conducted from 2016-2017 at Sports Injury Centre, VMMC and Safdarjung hospital, New Delhi.

Patients with lateral epicondylitis, more than 18years of age and not responding to physical therapy including ice packs , non-steroidal anti-inflammatory drugs, orthotics, stretching and strengthening exercises were included in the study. Patients with local soft tissue infection, malignant diseases, diabetes mellitus, skin ulceration, reduced range of motion at the elbow, previous surgery or local steroid injection were excluded from the study.

After fulfilment of inclusion and exclusion criteria 60 patients were enrolled in the study. Randomisation was done by taking every even number patients into group A and odd number patient into group B, 30 participants in each group. Patients of group A were treated with ESWT and group B with US therapy. All the participants signed informed consent form prior to participation.

Group A patients received ESWT 6 treatments 2 times per week at a dose of 1000 shock, 1mJ/mm^2. While group B patients received continuous wave US therapy at intensity of 0.08W/cm^2 , 100%, 1MHz carrier frequency, 10 treatments 3 times per week. In both the cases ultrasound gel was applied between apparatus head and skin and was performed at the area of intense pain. Each treatment session in both the cases did not exceeded 10mins.

Outcomes measures

Patients were assessed for level of pain and functional status immediately, 1, 2 and 3 months following completion of treatment.

Pain evaluation: Pain was assessed using Visual analogue scale(VAS), which is a subjective scale whose left and right side corresponds to no pain (0) and unbearable pain (10). Patient marked the scale to indicate their current level of pain.

Functional status evaluation: Using the Disability of arm, shoulder, and hand (DASH) score and MAYO elbow score. DASH is a 30-item disability scale concerning the patient's health status during preceding week, scored 0 (no disability) to 100(most severe disability). Mayo score or Mayo elbow performance score (MEPS) used to test the limitations of the elbow during activities of daily living using 4 subscales.

STATISTICAL ANALYSIS

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Normality of data was tested by Kolmogorov-Smirnov test. Data was found to be normally distributed. Quantitative variables were compared using unpaired T test between the two group. A p value of <0.05 was considered statistically significant. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 25.0.

RESULTS

Sixty patients of Tennis elbow not responding to physical therapy were included in the study with thirty patients in each group. Mean age in ESWT group is 42.33+/- 5.8 years and UST group is 33.43+/-13.5years. There were 65%(39) males and 35%(21) females in the study.

Table 1:Discriptive statistics

			ESWT(n=30)	UST(n=30)
1.	Age	Mean+/- SD (years)	42.33+/-5.8	33.43+/-13.5
2.	Gender	Male	16 (53.3%)	23 (76.6%)
		Female	14 (46.7%)	7 (23.3%)
3.	Affected side	Dominant	18 (60%)	21 (70%)
		Non dominant	12 (40%)	9 (30%)
4.	Symptom duration	Mean+/-SD (weeks)	5.9+/-1.27	5.4+/-1.5

Pain Evaluation

Pain was evaluated using VAS scores at every follow up in both the groups. There was no difference in VAS scores in both groups at the start of this study ($p=0.569$). But there was statistically significant reduction in pain at 1and 2months ($p<0.05$) following treatment. VAS scores did improved with time in both the groups but the difference is not statistically significant($p=0.73$).

Functional Status Evaluation

Functional status was evaluated using DASH and MAYO score at each follow up in both groups. There was no difference in both groups in DASH scores at the start of study. Mean DASH scores in ESWT group were significantly better at every follow up ($p<0.05$) as compared to patient treated with UST. Mayo elbow score did improved following treatment at every subsequent follow up. But the mean MAYO scores became statistically significant at 3 months ($p=0.002$) following completion of treatment with ESWT as compared to UST.

Table 2: Independent t test.

	f	t	df	p	Mean difference	S.E difference	Confidence interval	
VAS BL	5.19	-0.572	58	0.569	-0.16	0.29	-0.75	0.41
VAS 1M	0.51	-4.29	58	<0.05	-1.5	0.35	-2.19	-0.8
VAS 2M	5.69	-4.45	58	<0.05	-1.36	0.31	-1.98	-0.75
VAS 3M	0.13	-0.35	58	0.73	-0.13	0.38	-0.89	0.63
DASH BL	12.01	-1.91	58	0.061	-4.58	2.39	-9.38	0.22
DASH 1M	0.53	-4.45	58	<0.05	-8.74	1.96	-12.67	-4.8
DASH 2M	12.20	-5.03	58	<0.05	-8.83	1.75	-12.33	-5.31
DASH 3M	0.38	-4.23	58	<0.05	-5.64	1.33	-8.29	-2.97
MAYO BL	4.55	2.46	58	0.029	3.83	1.71	0.41	7.25
MAYO 1M	0.51	0.76	58	0.45	1.0	1.31	-1.61	3.61
MAYO 2M	6.53	0.74	58	0.459	1.16	1.56	-1.96	4.3
MAYO 3M	0.33	3.18	58	0.002	4.0	1.26	1.48	6.52

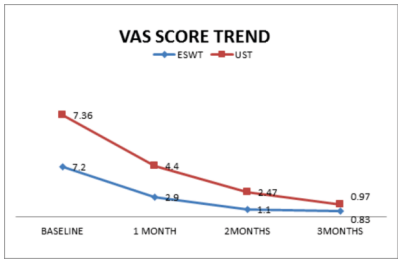

Figure 1: Visual analogue scale trend in both groups

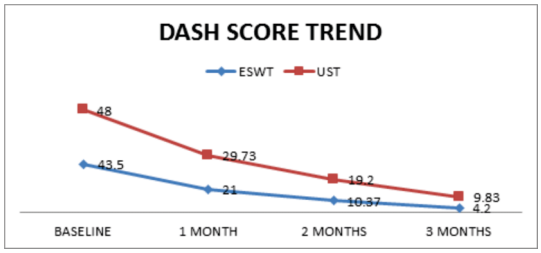

Figure 2: DASH score trend in both the groups

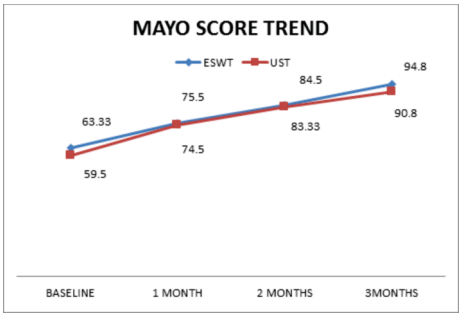

Figure 3: MAYO elbow score trend in both the groups

DISCUSSION

Tennis elbow is usually simple to diagnose but the management is often difficult and time taking. Various treatment modalities are being used for its manage ment.(16,17,18,19,20) There are many studies available in literature determining the role of ESWT and UST in tennis elbow individually.(21,22,23) But there are only few studies available those documented the role of ESWT and UST in pain relief and functional improvement.(13,14,15)

Lizis P.(14) in a prospective randomised control trial compared the analgesic effects of ESWT versus UST in chronic tennis elbow on 50 patients. 25 pateints in ESWT group received 5 treatments once per week at 1000, 1500, 2000 pulses during first, second and third through fifth treatments. While rest 25 patients in UST group received 10 treatment 3times per week at continuous mode,1mHz freq, 0.8W/cm^2. They found ESWT decreases pain levels significantly than UST.

Another study by Kubot A. Et al. (13) compared both the therapies by assessing reduction in pain levels and need for pain medication and restoration of mobility in 60 patients. ESWT group received 3 sessions at weekly intervals and UST group received 10 treatments daily. They concluded that EWST is more effective than UST.

In our study ESWT group received 6 treatments, 2 times a week

at 1000 pulse, 1mJ/mm^2. While UST group received continuous mode US therapy at 1MHz freq, 0.08W/cm^2, 10 treatments 3 times per week. In our study, significant improvements was indentified in pain levels in ESWT group after 1and 2 months following treatment.

Yalac B. et al.(15) compared the efficacy of ESWT and UST in treatment of lateral epicondylosis with 50 patients in a randomised control trial. ESWT patients received 2000 pulses once a week for 3 sessions, while UST patients received continuous mode, 1MHz frequency at 1.5w/cm^2, 5 days a week for total 10 sessions. They found that there were no significant difference between 2 groups and both the therapies are equally effective.

In our study both EWST and UST group have shown improvement in pain and function. But ESWT group showed significant in pain and functional scores at each follow up compared to UST. Our study has a advantage that it has taken long term follow up. Additional studies are required to assess further long term effectiveness of ESWT and UST and also in preventing recurrence in chronic cases.

CONCLUSION

ESWT and UST both are amongst the effective treatment of Tennis elbow. Both the modalities can be used individually in patients of tennis elbow for better response in terms of pain and functional outcomes. But ESWT provides a better response in treatment of tennis elbow that persisted for 3months following treatment. Therefore ESWT should be used as a primary treatment modality due to better response, shorter sessions and application time. These findings may can be beneficial for physicians, physiotherapist and patients for selection of most appropriate treatment for individual patient.

REFERENCES

1. Fornalski S, Gupta R, Lee TQ. Anatomy and biomechanics of the elbow joint. Tech Hand Up Extrem Surg. 2003;7(4):168-178.
2. Celli Andrea. Anatomy and biomechanics of the elbow. In: Celli Andrea, Celli Luigi, Morrey Bernard F, eds. Treatment of Elbow Lesions New Aspects in Diagnosis and Surgical Techniques. Springer; 2008:1-11.
3. Hong QN, Durand MJ, Loisel P. Treatment of lateral epicondylitis: where is the evidence? Joint Bone Spine. 2004;71(5):369-373.
4. Alfredson H, Ljung B, Thorsen K, et al. In vivo investigation of ECRB tendons with microdialysis technique: no signs of inflammation but high amounts of glutamate in tennis elbow. Acta Orthop Scand 2000;71:475-9.
5. Ahmad Z, Siddiqui N, Malik SS, et al.: Lateral epicondylitis: a review of pathology and management. Bone Jt J, 2013, 95-B: 1158–1164.
6. Luk JK, Tsang RC, Leung HB: Lateral epicondylalgia: midlife crisis of a tendon. Hong Kong Med J, 2014, 20: 145–151.
7. Lee S, Ko Y, Lee W: Changes in pain, dysfunction, and grip strength of patients with acute lateral epicondylitis caused by frequency of physical therapy: a randomized controlled trial. J Phys Ther Sci, 2014, 26: 1037– 1040.
8. Trudel D, Duley J, Zastrow I, Kerr EW, Davidson R, MacDermid JC. Rehabilitation for patients with lateral epicondylitis-A systematic review. J Hand Ther. 2004;17(2):243-266.
9. Spacca G, Necozione S, Cacchio A: Radial shock wave therapy for lateral epicondylitis: a prospective randomised controlled single-blind study. Eura Medicophys, 2005, 41: 17–25.
10. Lebrun CM: Low-dose extracorporeal shock wave therapy for previously untreated lateral epicondylitis. Clin J Sport Med, 2005, 15: 401–402.
11. Buchbinder R, Green SE, Youd JM, et al.: Shock wave therapy for lateral elbow pain. Cochrane Database Syst Rev, 2005, 4: CD003524.
12. Cambier D, D'Herde K, Witvrouw E, et al.: Therapeutic ultrasound: temperature increase at different depths by different modes in human cadaver. J Rehab Med 2001; 33: 212-215.
13 Kubot A, Grzegorzewski A, Synder M, et al.: Radial extracorporeal shockwave therapy and ultrasound therapy in treatment of Tennis elbow syndrome. Ortop Traumatol Rehabil. 2017 Oct 31;19(5):415-426.
14 Paweł L: Analgesic effect of extracorporeal shock wave therapy versus ultrasound therapy in chronic tennis elbow. J. Phys. Ther. Sci. 2015 Aug; 27(8): 2563-2567.
15. Yalvac B, Mesci N, Geler Kulu D, et al.: Comparison of ultrasound and extracorporeal shock wave therapy in lateral epicondylosis. Acta Orthop Traumatol Turc. 2018 Sep;52(5): 357-362.
16. Morimoto Y, Saito A, Tokuhashi Y: Low level laser therapy for sports injuries. Laser Ther, 2013, 22: 17–20.
17) Johnson GW, Cadwallader K, Scheffel SB, et al.: Treatment of lateral epicondylitis. Am Fam Physician, 2007, 76: 843–848.
18) Smidt N, Assendelft WJ, van der Windt DA, et al.: Corticosteroid injections for lateral epicondylitis: a systematic review. Pain, 2002, 96: 23–40.
19) Trinh KV, Phillips SD, Ho E, et al.: Acupuncture for the alleviation of lateral epicondyle pain: a systematic review. Rheumatology (Oxford), 2004, 43: 1085–1090.
20) Struijs PA, Smidt N, Arola H, et al.: Orthotic devices for the treatment of tennis elbow. Cochrane Database Syst Rev, 2002, 1: CD001821.
21. D Stasinopoulos, M I Johnson: Effectiveness of extracorporeal shock wave therapy for tennis elbow (lateral epicondylitis). Br J Sports Med 2005;39: 132-136.
22. Bayram K, Yesil H, Dogan E: Efficacy of extracorporeal shock wave therapy in the treatment of lateral epicondylitis. 2014; 1(1): 33-38.
23. Akin C, Oken O, Koseoglu BF. Short-term effectiveness of ultrasound treatment in patients with lateral epicondylitis: randomized, single-blind, placebo controlled, prospective study. Arch Rheumatol. 2010;25(2):050-055.