

Comparison of Clinical Results of Pulsed Radio Frequency and Mixed Injection of Corticosteroid and Local Anesthetic in Patients with Shoulder Impingement Syndrome

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ABSTRACT

Background: Shoulder impingement syndrome is a clinical situation that presenting with shoulder pain, difficulty and weakness. Present study designed for evaluating the effect of radiofrequency and corticosteroid injection in longterm treatment follow up for pain reduction and functional evaluation of shoulder joint.

Methods: Sixty patients were analyzed equally in two treatment groups. Post-treatment follow up at one, four and twelve weeks after procedures were carried out using Visual Analog Scale (VAS) for pain relief, Shoulder Pain and Disability Index (SPADI) for shoulder function and Beck Depression Inventory (BDI).

Results: Both treatment groups showed significantly pain reduction (P -value <0.001 for both) in 4 weeks after procedures. In time point comparison between 4 to 12 weeks postoperatively, there were significantly reduced pain in R group ($P=0.03$), but not significant in C group ($P=0.1$). Total SPADI score was significantly lower in RF group in time points 1 and 4 weeks ($P<0.001$), but not significant in 12 weeks of follow up.

Conclusion: Radiofrequency could not be sufficient alone for retrieving function of the shoulder at the long periods of time after procedure, unless good and effective results for first 1 and 4 weeks of follow up.

Introduction

Shoulder impingement syndrome (SIS) is a clinical situation that presenting with shoulder pain, difficulty and weakness in daily activities with pathology in subacromial bursa and supraspinatus tendon lesions [1].

Pulsed Radiofrequency (RF) can be used for ablation of small tendon segments (Tenotomy process). RF also

could stimulate release of angiogenic growth factors that will strengthen tendon repair [2-6] previous studies demonstrated successful and good outcomes of radio frequency treatments for tendonitis and shoulder pain [7-11].

Corticosteroid injection (CI) also is a common treatment for management of shoulder pain and SIS. Although CI have anti inflammatory effects with rapid response to patient's symptoms, frequent using of CI had longterm systemic complications include osteoporosis

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and glucose control disturbance [12-14]. Some previous studies showed that CI could reduce pain and significantly improve range of motion of shoulder joint in patients who suffering from diseases affecting shoulder joint [15-16].

Present study designed for evaluating the effect of radiofrequency and corticosteroid injection in patients with SIS in longterm treatment follow up for pain reduction and functional evaluation of shoulder joint.

Methods

This study was a multi-center, randomized parallel controlled trial with no blindness in pain department hospitals of Tehran university of medical sciences. the study approved by institutional ethics committee of Tehran university of medical sciences (Decision number IR.TUMS.NI.REC.1402.020). Patients aged 18-60 years in Sina and Shariati and Imam-Khomeini hospitals between April 2023 and September 2023 were entered for treatment and follow up.

The inclusion criteria were patients with shoulder impingement syndrome without rotator cuff tearing and no plan for conservative treatment. The exclusion criteria were partial or total rotator cuff tearing, previous shoulder surgery or major trauma, malignancy, any rheumatoid or inflammatory diseases, uncontrolled hypertension and diabetes mellitus.

Total of 60 patients who admitted to pain clinics of hospitals entered the study. Patients randomly divided into two treatment groups, patients treated with pulsed Radiofrequency (RF group) and patients treated with Corticosteroid injection (C group).

All procedures were performed by the one same pain fellowship. for procedures patient was put in prone position, the fluoroscopy was adjusted toward the lateral and cephalo-caudal direction until the acromioclavicular joint was identified within sight. Local anesthesia administered to subcutaneous tissue using 3ml lidocaine 2%.

In the RF group, procedure applied with 5mm needle in 200ms and 45V in subacromial area and ACJ for 120 seconds. In C group, 5ml mixture of 10mg bupivacaine 0.25% (4ml) and 40mg methylprednisolone (1ml) was prepared, 3ml of that mixture was injected into subacromial area and ACJ and 2ml around of supraclavicular nerve.

After the procedures done, patients evaluated at time points 1, 4 and 12 weeks after that. patients did not get any other additional analgesic agents or interventions during follow up.

We used SPADI score for shoulder disability and range of motion and Beck questionnaire for depression.

SPADI includes two parts, one part is five questions for measuring patient's pain experience during past week using VAS pain score (0 no pain to 10 most severe pain), second part is eight questions for measuring disability and difficulty of shoulder using shoulder disability score (SDI) (from 0 no disability and difficulty to 10 requires help) during past week. SPADI validity was demonstrated [17]. SPADI includes 13 questions that zero refers to maximal positive effect and treating and 130 refers to maximal discomfort and sickness. We evaluated total SPADI, SDI and VAS score separately.

Beck depression inventory (BDI) questionnaire include 21 items from mild to severe disorder. Patients were asked for marking their best situation at each time point of follow up for each item. Total of 0-13 points refers to no depression, 14-19 points mild depression, 20-28 points moderate depression and 29-63 points severe depression. BDI validity was demonstrated [18].

Results

All sixty patients were available for 12 weeks follow up. There was no significant difference in age, gender, duration of symptoms, side involvement and VAS pain score between two groups.

Both treatment groups showed significantly pain reduction (P-value<0.001 for both) in 4 weeks after procedures. In time point comparison between 4 to 12 weeks postoperatively, there were significantly reduced pain in R group (P=0.03), but not significant in C group (P=0.1).

The functional evaluation disability score was significantly lower in R group after 12 weeks postoperatively (P=0.001), but not in 1 or 4 weeks. Total SPADI score was significantly lower in RF group in time points 1 and 4 weeks (P<0.001), but not significant in 12 weeks of follow up.

BDI score was significantly lower in C group after 1 week of follow up, but not significant difference in 4 and 12 weeks between both groups.

Table 1- Comparison of VAS and SPADI and BDI scores in weeks 1 and 4 and 12 of follow up.

		Week 1	Week 4	Week 12
VAS	C group	1.88 (0.78)	1.45 (0.52)	3.12 (1.21)
	RF group	4.73 (1.04)	4.03 (1.02)	2.41 (0.65)
		P<0.001	P<0.001	P=0.08
SPADI	C group	38.6 (10.6)	46.9 (9.6)	66.2 (14.7)
	RF group	84.2 (8.5)	54.5 (7.6)	49.6 (12.6)
		P<0.001	P<0.001	P=0.2
BDI	C group	16.4 (4.9)	14.8 (4.6)	14.4 (9.5)
	RF group	19.5 (6.4)	16.5 (7.2)	12.3 (5.9)
		P=0.04	P=0.3	P=0.2

Discussion

Our results of this study demonstrated the effects of RF and corticosteroid injection on impingement syndrome.

Patients had significantly pain reduction and relief within 4 weeks after both procedures according to VAS score. At time point comparison between 4 and 12 weeks postoperatively, reduction in pain was significant in RF group, but not in the C group. That showed the effect of RF could be more permanent for patients with impingement syndrome and at 12 weeks of follow up, RF group experienced more pain relief than C group.

The postoperative functional evaluation SPADI score, showed that patients who treated with RF had significantly better function at the 1 and 4 weeks follow up, but that was not significantly better function at the final follow up week 12. This finding shows that RF could not be sufficient alone for retrieving function of the shoulder at the long periods of time after procedure, unless good and effective results for first 1 and 4 weeks of follow up. In other results for disability score, RF treatment had very good and significant lower score in 4 weeks of follow up, but not much effective on final 12 weeks of follow up. same results for this two functional objects, also shows RF in not effective alone for long times.

In a previous clinical trial study, demonstrated that adding RF to treatment of shoulder impingement syndrome did not show any significant positive effects on pain relief or functional recovery from previous condition [19]. In a systematic review and meta analysis of a study on RF for shoulder pain and impingement syndrome, founded that RF provided similar pain relief and functional improvement at 12 weeks follow up as the conservative treatment did with no significantly difference [20]. These findings are similar to our results in this study.

Another evidence based systematic review of 14 clinical trial studies [21], demonstrated that using RF had good clinical efficacy on pain and range of motion of patients during longterm follow up, in contrary of our findings.

Conclusion

Radiofrequency as a sole treatment could not be sufficient for retrieving function of the shoulder at the long periods of time unless good and effective results for first 1 and 4 weeks of follow up. So it can play an effective role as a part of some combined treatments for this situation.

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