



The contribution of subacromial injection to the conservative treatment of impingement syndrome

Subakromiyal sıkışma sendromunun konservatif tedavisine subakromiyal steroid enjeksiyonunun katkısı

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Amaç: Lokal anestetik ve kortikosteroid enjeksiyonunun subakromiyal sıkışma sendromunun konservatif tedavisine katkısı araştırıldı.

Çalışma planı: Çalışmaya subakromiyal sıkışma sendromu tanısı konan ve rotator manşet lezyonu olmayan 56 hasta (39 kadın, 17 erkek; ort. yaş 50; dağılım 31-68) alındı. Hastalar enjeksiyon grubu ve kontrol grubu şeklinde rastgele seçimle eşit sayıda iki gruba ayrıldı. Enjeksiyon grubuna tedavinin başında subakromiyal enjeksiyonla 9 ml bupivakain ve 1 ml betametazon uygulandı. Tüm hastalara üç hafta süreli (15 seans) aynı fizik tedavi ve rehabilitasyon programı uygulandı. Değerlendirmeler tedaviden önce ve tedaviden üç ve altı hafta sonra yapıldı. Fonksiyonel durum Constant skoru, ağrı görsel analog skala ile değerlendirildi ve eklem hareket açıklığı gonyometre ile ölçüldü.

Sonuçlar: İki grupta da üçüncü ve altıncı haftalarda tedavi öncesine göre ağrı skorunda, Constant skorunda ve eklem hareket açıklığı ölçümlerinde anlamlı düzelmeler elde edildi ($p<0.05$). Enjeksiyondan 24 saat sonra ağrı skoru %37.7 oranında azaldı. Tedavi öncesi ile karşılaştırıldığında altıncı hafta Constant skoru enjeksiyon grubunda 39.9 ± 13.9 'dan 68.4 ± 7.6 'ya, kontrol grubunda 40.3 ± 13.4 'ten 64.7 ± 7.7 'ye yükseldi. Üçüncü ve altıncı haftalarda iki grup arasında ağrı skorunda anlamlı fark bulunmadı ($p>0.05$). Enjeksiyon grubunda altıncı haftada Constant skoru ($p=0.044$) ve üçüncü haftadaki dış ve iç rotasyon değerleri ($p=0.03$) kontrol grubuna göre anlamlı derecede yüksek bulundu. Altıncı haftadaki hareket açıklığı ölçümlerinde gruplar arasında anlamlı fark bulunmadı ($p>0.05$).

Çıkarımlar: Subakromiyal enjeksiyon uygulaması ağrıyı önemli derecede azaltarak, eklem hareket açıklığı ve güçlendirme egzersizlerinin daha etkili olarak yapılmasına ve fonksiyonel sonuçların daha başarılı olmasına katkıda bulunmaktadır.

Anahtar sözcükler: Egzersiz tedavisi; glukokortikoid/terapötik kullanım; enjeksiyon, eklemiçi; fizik tedavi yöntemleri; omuz sıkışma sendromu/tedavi.

Objectives: We evaluated the contribution of subacromial local anesthetic and corticosteroid injection to the conservative treatment of subacromial impingement syndrome.

Methods: The study included 56 patients (39 women, 17 men; mean age 50 years; range 31 to 68 years) with subacromial impingement syndrome without any rotator cuff lesion. The patients were randomly allocated to injection and control groups equal in number. The former group received a single subacromial injection of 9 ml bupivacaine and 1 ml betamethasone at the beginning of the treatment. The same physical therapy and rehabilitation program was administered to both groups, consisting of 15 sessions (3 weeks). Evaluations were made before, and three and six weeks after treatment. Functional results were assessed using the Constant score, pain was assessed using a visual analog scale, and range of motion was measured with a goniometer.

Results: Compared to pretreatment values, both groups exhibited significant improvements in pain score, Constant score, and range of motion measurements at three and six weeks ($p<0.05$). Pain score decreased by 37.7% in the injection group after 24 hours of injection. Pretreatment Constant scores which were 39.9 ± 13.9 and 40.3 ± 13.4 in the injection and control groups increased to 68.4 ± 7.6 and 64.7 ± 7.7 at six weeks, respectively. No significant differences were seen in pain scores between the two groups at three and six weeks ($p>0.05$). Patients receiving subacromial injection had significantly higher Constant scores at six weeks ($p=0.044$) and significantly greater external and internal rotation at three weeks ($p=0.03$). Range of motion measurements did not differ between the two groups at six weeks ($p>0.05$).

Conclusion: Subacromial injection contributes to the success of the conservative treatment through decreasing pain and enabling more effective range of motion and strengthening exercises, both of which are associated with increased functional improvement.

Key words: Exercise therapy; glucocorticoids/therapeutic use; injections, intra-articular; physical therapy modalities; shoulder impingement syndrome/therapy.

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Local anesthetics and/or steroid injections are often used^[2,3] on the subacromial space for the diagnosis^[1] and the treatment of subacromial impingement syndrome.

There are some studies^[2,3] which support that the injections are effective in the treatment of subacromial impingement but also there are some meta-analysis studies which show no accurate effect^[3] or very little effect^[4] compared to placebo. In these studies, generally, exercise programs are not used at all or exercise programs are not standardized. Although there are many researches on duration between injections, quality and dosage of medicines used, the effect of injections on success of exercise programs has not been determined yet.

In this study, we examined prudentially the effect of local anesthetic and corticosteroid injection implemented additionally before treatment on the patients under the standard physical therapy due to the subacromial impingement syndrome.

Materials and Method

The study included 56 patients (40 women, 16 men; mean age 50 years; range 31 to 68) that their first medical examination were realized by two experienced orthopedists in shoulder surgery in our clinic and their anterior- posterior radiographies and magnetic resonance were checked and they were appropriate for the following criteria: (i) age between 30-70; (ii) without sports events; (iii) complains for six months or more; (iv) determination of impingement symptom in the clinical examination (Neer impingement test, Hawkins sign, Jobe supraspinatus test), having less than 10 % stiffness compared to other side in the passive range of motion; (v) lack of deformities such as degenerative arthritis, mezoacromion under the anterior- posterior X-ray examination; (vi) no pathologic symptom other than inflammation in the subacromial bursa after the examination of magnetic resonance.

The patients who had shoulder operation or physical therapy and rehabilitation program, who had rotator cuff lesion or pathologic symptom in radiographies and who were under psychiatric treatment were not selected for this study.

All patients were given information about the study and their approvals with signature were received. The patients were randomly separated in two

groups having 28 people in each group: Injection group (21 women, 7 men; mean age 50.8 years; range 31 to 67) and control group (19 women, 9 men; mean age 49.2 years; range 31 to 68) .

At the beginning of the treatment, 9 ml bupivacaine and 1 ml betamethasone through subacromial injection were applied to the injection group. The injection was applied from the posterior of shoulder, 1cm inferior to the corner of spina scapula combining with acromion, 1cm parallel from medial to acromion (Figure 1). Standard program other than subacromial injection was implemented to all patients in the physical therapy and rehabilitation unit of our clinic. This program included wand exercises, posterior and inferior capsule stretching exercises, internal rotation exercises and rotator cuff and scapulotorasic strengthening exercises. In addition, physiotherapists applied manually articular range of motion exercises. Transcutaneous electrical stimulation for 20 minutes, intermittent ultrason for 4 minutes and ice for 15 minutes were applied to both groups at the same time. Exercises were performed once a day by physiotherapists in the clinic for three weeks. The patients were asked to practice the same exercises at home twice a day being 20 repeats each. The ice was applied for 15 minutes after the exercises. Together with these exercise programs, the patients were supported by non-steroid anti-inflammatory drugs (NSAID). The patients were implemented a treatment of 15 sessions (3 weeks) and the evaluations before and three and six weeks after treatment were made by a physiotherapist and an orthopedist who were unaware of the treat-



Figure 1. Applying subacromial injection.

Table 1. This result included before, three and six weeks after treatment of two groups.

	Injection groups	Control groups	<i>p</i>
Pain Score			
Before treatment	7.7±2.2	6.6±2.2	0.053
24 hour after injection	4.8±2.1		
After 3. weeks	2.8±2.0	3.5±1.7	0.244
After 6. weeks	1.2±1.6	1.5±1.3	0.301
Constant score			
Before treatment	39.9±13.9	40.3±13.4	0.907
After 3.weeks	60.2±8.4	56.2±9.8	0.100
After 6.weeks	68.4±7.6	64.7±7.7	0.044
Flexion (°)			
Before treatment	155.4±22.7	144.8±23.8	0.092
After 3.weeks	172.8±12.2	167.6±10.5	0.091
After 6.weeks	178.4±4.3	178.7±6.3	0.067
External rotation (°)			
Before Treatment	62.0±17.8	57.0±21.5	0.347
After 3.weeks	81.2±10.7	74.0±13.4	0.030
After 6.weeks	86.7±5.7	84.9±8.9	0.357
Internal rotation (°)			
Before treatment	57.6±22.5	57.3±24.5	0.962
After 3.weeks	78.6±13.6	70.1±16.0	0.037
After 6.weeks	86.0±7.2	82.6±10.8	0.168

ment type applied to the patients. Functional results were assessed using the Constant score, pain was assessed using a visual analog scale (VAS) and range of motion was measured with a goniometer (flexion to the front, internal and external rotation). In the injection group, pain was evaluated after 24 hours. For the evaluation between groups independent simple t- test and for pain score Mann-Whitney-U test were used.

Results

Pain score, Constant score and range of motion values before and three and six weeks after treatment of groups were summarized on Table 1.

The pain score decreased by 37.7% in the injection group after 24 hours of injection. No significant differences were seen in pain scores between the two groups at three and six weeks after the treatment ($p>0.05$). Pretreatment pain scores which were 7.7±2.2 and 6.6±2.2 in the injection and control groups decreased to 1.2±1.6 (84.4%) and 1.5±1.3 (77.3%) at six weeks, respectively.

Compared to pretreatment values, Constant scores increased significantly in both groups after the treatment. ($p<0.05$) Constant score in the injection group, was highly increased at six weeks when compared to values of the control group. ($p=0.044$) Pretreatment Constant scores which were 39.9±13.9 and 40.3±13.4 in the injection and control groups, respectively increased to 68.4±7.6 (71.4%) and 64.7±7.7 (60.6%) at six weeks, respectively.

The values of range of motion were highly improved after the treatment in both groups. ($p<0.05$) The important difference between both groups as far as range of motion was concerned was that the external and internal rotation values in injection group were higher at three weeks (Table 1). There were no significant differences in values of shoulder flexion, internal and external rotations between the two groups at six weeks.

Discussion

The conservative treatment of impingement syndrome includes ^[4,6] resting, NSAI, various methods of physical therapy, strengthening exercises for

rotator cuff and muscles surrounding scapula, activity modifications and subacromial injections. So far, we noticed successful results of exercise programs and subacromial injections, even separately, in the treatment of subacromial impingement syndrome. In this study, we examined the effectiveness of subacromial local anesthetic and steroid injection on the success of standard exercise program.

In various studies, the benefit of steroid injection, independently from exercise programs, was concentrated^[7,10] on the amount and type of steroid, number of injection, application place and timing and short term and long term effects. In a meta-analysis where the effect of corticosteroid was examined, corticosteroid compared with placebo in seven studies and corticosteroid with NSAID in three studies. Finally, in nine month follow up, it was found^[11] that corticosteroid injection was more effective than NSAID in the rotator cuff tendinitis, and also high level of volume would be more effective than the lower level. As a result of these studies, generally, a clear consensus could not be reached specifically about application amount and timing, even we did not reach any data as a proof. However, it was predicted to benefit from exercise programs at a higher level regarding positive effect on pain of subacromial injection in short period as shown before.^[2,10] Thus, in our study also, we observed much more improvement in functional results, since the pain control was better on patients who got injection before exercises.

It was stated that subacromial injection caused an increased abduction degree compared to placebo when the treatment attempts of shoulder were compiled.^[4] In a systematic study including nine random controlled studies examining the rotator cuff problems, there was a significant decrease in pain in one study, there was clinically a reasonable development in two studies as far as range of motion was concerned. It was concluded that there was no enough study about the benefit of subacromial injection.^[12] Taking this information into consideration, we thought that the exercise program would be more effective if pain was controlled.

In a random controlled study, four groups were established: the group of control, physio-therapy, subacromial injection, subacromial injection and physio-therapy and it was not found significant difference between groups.^[13] The details of exercises

were not given, the effect of injection was not searched thoroughly together with a full exercise program. In another study, subacromial injection was applied to patients twice in one-week interval, a home program was given for four weeks, it was observed 91 % improvement in pain and range of motion at the end of the four weeks period; It was found that subacromial injection was effective in pain and range of motion.^[14] In our study also, we found improvements in pain control and in functional situation in both groups through a standard exercise program. But, in the injection group, we found higher improvement in internal-external rotation range of motion and in functional results through early pain control when compared to control group.

Conclusion

The important points in the treatment of subacromial impingement syndrome are respectively to eliminate pain and to gain range motion and function. The use of subacromial injection for pain control in the subacromial space provided better result in exercise program and it was found successful results in functional score and in range of motion when compared to the control group. According to these results, we conclude that utilization of local anesthetics and corticosteroid by physical therapy 24 hours before conservative treatment provide better pain control.

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