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Local anaesthetic injection with and without corticosteroids for subacromial impingement syndrome

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Abstract Fifty patients with impingement syndrome refractory to long-term conservative treatment were randomized to three treatment groups. All patients received an injection of 10 ml 0.5% bupivacaine, in group 1 without corticosteroid, in group 2 with crystalline corticosteroid and in group 3 with lipoid corticosteroid. Treatment in group 1 had to be stopped because of inefficacy. In groups 2 and 3 favorable results were achieved in 19 out of 40 patients.

Résumé 50 patients avec conflit sous-aeromial, qui ne montraient pas d'amélioration après un long traitement conservatif recevaient une injection dans la bourse subacromiale. Le premier groupe recevait une injection contenant un anaesthétique local pur, groupe 2 une mixture d'anaesthétique avec des corticostéroïdes cristallins et groupe 3 avec des corticostéroïdes lipoides. Le traitement du groupe 1 devait être arrêté cause d'inefficacité. 19 de 40 patients du groupe 2 et 3 montraient une amélioration après 6 mois.

Introduction

In shoulder pain due to subacromial impingement there is wide agreement that conservative measures are the first choice of treatment. Several modalities have been suggested including oral administration of nonsteroidal antiinflammatory drugs, physical therapy, programs of strengthening the rotator cuff-muscles and subacromial injections [1,4].

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This prospective randomized study was approved by the ethics committee of our hospital and designed to evaluate the efficacy of three different types of injections.

Patients and methods

Fifty consecutive patients with painful disabling impingement syndrome of at least 3 months' duration (Table 1) were randomized to three different treatments. All patients were referred to our shoulder clinic for the evaluation of surgical decompression after failed conservative treatment. Diagnosis of impingement syndrome was established on the basis of the patient's history and positive impingement signs according to Neer and Hawkins [4]. Shoulder magnetic resonance imaging scans were available from 43 patients. Exclusion criteria were: concomitant cervical radiculopathy, prior subacromial corticosteroid injection, adhesive capsulitis, full- or partial-thickness rotator-cuff tears, calcifying tendinitis, disorders of the acromioclavicular joint, shoulder instability, and involvement in workers' compensation claims.

The treatment groups received the following preparations:

Group 1: 10 ml of pure 0.5% bupivacaine

Group 2: 10 mg of triamcinolone-acetonide (crystalline corticosteroid) with 10 ml of 0.5% bupivacaine

Group 3: 4 mg of dexamethasone-21-palmitat (lipoid corticosteroid, equivalent to 2.5 mg dexamethasone) with 10 ml of 0.5% bupivacaine.

The corticosteroid preparations had an equivalent hydrocortisone potency. The position of the needle within the subacromial bursa was documented ultrasonographically in all patients. The three groups did not differ concerning age, sex, duration of symptoms and severity of the disability (Table 1). All patients received the same standardized physiotherapy program consisting of cryotherapy and active strengthening of the rotator cuff muscles.

The patients were examined clinically and ultrasonographically 15 to 30 min, 1 week, 6 weeks and 26 weeks after injection. The follow up examinations consisted of a complete clinical examination including the impingement signs and the documentation of a pain scale. Data were evaluated using the score according to Patte [5], which exclusively judges the subjective estimation of pain, function, force and overall handicap. Results were regarded as excellent when the score exceeded the 85% level. Statistical analysis was performed using nonparametric tests (U-test).

Table 1 Characteristics of patient population

	<i>n</i>	Sex (f/m)	Age (years)	Symptom duration (months)	Bursitis (sonographical)	Patte-Score pre-therapy
All patients	50	16/34	43.5 (27–63)	16.8	24	76.3
Group 1	10	4/6	43.4 (29–61)	17.3	4	75.1
Group 2	20	6/14	42.3 (29–63)	15.1	10	76.9
Group 3	20	6/14	44.8 (27–60)	18.2	10	76.4

Results

The treatment of group 1 had to be stopped after 10 patients when the code was broken for an analysis of the short-term results of the first 30 patients. No positive effect could be seen and 4 patients complained of pain aggravation.

Good pain relief lasting no longer than 1 week was reported by 3 patients of each corticosteroid group, whereas 5 patients of group 2 and 2 patients of group 3 had improvement for between 1 and 6 weeks. 8 patients of group 2 and 11 of group 3 still showed excellent results after 26 weeks. At that time 4 patients in group 2 and 4 in group 3 had been treated surgically.

The score evaluation at 26 weeks showed a mean result of 83% within group 2 ($n=16$) and 81% within group 3 ($n=16$). The 8 patients operated on had lower scores prior to the injection than the patients who were not operated at the 26 weeks follow up (61% vs 80%, $p<0.05$).

Ultrasonographical examination showed an enlargement of the subacromial bursa in 50% (20 out of 40, 10 within each of group 2 and 3) of the patients prior to the injection. At 26 weeks none of the improved patients revealed abnormal changes of the bursa, whereas half of the patients with recurrent complaints demonstrated persistent thickening.

Discussion

The small number of not more than 10 patients within group 1 may limit the conclusions of this study, but further treatment with pure local anaesthetic was ethically not acceptable. Another limitation may be seen in the treatment prior to the injections, which was not standardized, but failed to achieve the desired effect in all patients. Those with previous corticosteroid injections were excluded from the study. Whereas the injections were performed non-blinded the follow up examinations were done by physicians not informed about the patients' status within the study.

The primary therapeutic goal in patients with chronic impingement syndrome has to be a reduction of pain, which is the precondition for the success of a concomitant physical therapy regime applied to improve function. A variety of measures have been advocated to achieve this.

Blair et al. [2] presented patients with a mean symptom duration of eight months, who were followed for inconsistent time intervals of 12 to 55 weeks after injection and judged the patients according to the criteria *decreased*, *unchanged* or *worse* with a four-tailed pain rating. They reported improvement in more than 80% of the patients who received a corticosteroid injection, but also nearly 40% the patients injected with pure local anaesthetic reported decreased pain at follow up. The pain rating was significantly lower in the corticosteroid group. The patients of our study had with 16.8 months a considerably longer history of complaints and were set for operation. After a homogenous follow up period of 26 weeks we found an excellent pain relief and shoulder function in about half of the patients injected with corticosteroids. The lower success rate may reflect a more advanced stage of disease as the estimation of subjective handicap before injections was high in all patient groups. The Patte-score contains different scales allowing a detailed evaluation of shoulder function. In combination with the results of the physical and ultrasound examination we were able to evaluate the patients based on functional and anatomical criteria. Blair et al.[2] used a very high corticosteroid dose of 80 mg of triamcinolone acetonide, which lies far beyond recommended levels of 10 to 40 mg for intra- or periarticular injections [3].

In addition to the important diagnostic information [6] ultrasonography enabled us to control the position of the injection fluid. This technique allows a well-targeted anatomically guided therapy with low corticosteroid doses.

Blair's study [2] suggests a moderate efficacy of pure local anaesthetic, which cannot be confirmed by our data. However, local anaesthetic injection is considered to be a worthwhile tool to differentiate a subacromial pathology from a painful intraarticular condition or an affection of the acromioclavicular joint. In this study the efficacy of crystalline and lipoid corticosteroids did not differ significantly. Based on the relatively small number of patients, no conclusion concerning the most appropriate corticosteroid can be drawn.

In groups 2 and 3 20% of the patients had been operated at 26 weeks follow up. Compared to their corresponding group as well as to all non-operated patients the patients who had undergone surgery revealed significantly lower scores. We consider therefore patients with severe symptoms reflected in a low Patte score poor candidates for further conservative treatment. We recom-

mend surgical treatment for patients with a Patte score of less than 60%. A good prognosis can be presumed for patients with a score exceeding the 75% level, persisting reduction of bursa thickening and negative impingement signs for a longer period.

This study supports the efficacy and importance of subacromial steroid injections for patients with chronic refractory impingement syndrome. Short-term results indicate that surgery may be prevented in at least half of them. Correct needle placement should be verified and documented by simultaneous ultrasound in order to reduce the corticosteroid dose and enhance safety.

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