

Rehabilitative and infiltrative treatment with hyaluronic acid in elderly patients with rotator cuff tears

Cosimo Costantino, Sara Olvirri

Department of Surgical Sciences, Unit of Orthopedy, Traumatology and Fuctional Rehabilitation, University of Parma, Parma, Italy

Abstract. Rotator cuff tears are an important cause of disability. It is frequently observed in elderly people with a consequent loss of autonomy in daily life activities. The aim of this study is to evaluate the efficacy of the infiltrative treatment with hyaluronic acid, followed by a selective rehabilitative programme in elderly patients who do not present indications for surgical treatment. Twenty-two patients were selected (14 men and 8 women), ranging from 70 to 89 years, (mean age 78.1) with rotator cuff tears. They underwent to a conservative treatment consisting in a series of 3 infiltrations (once a week) with hyaluronic acid (jointex starter molecular weight: 800-1200 kdalton) followed by a specific rehabilitative treatment (passive and active assisted kinesitherapy). Each patient was evaluated for pain through a Visual Analogic Scale (V.A.S.). Costant Murley and the Shoulder Rating Questionnaire were adopted to analyze the loss of range of motion of the shoulder as well as autonomy in daily life activities. The obtained results were statistically significant ($p < 0,0005$), both for the reduction of pain and for the improvement of range of motion and autonomy in daily life activities. The encouraging results obtained with this treatment could be considered as a valid choice instead of a surgical treatment in selected cases. (www.actabiomedica.it)

Key words: Rotator cuff, tears, hyaluronic acid, rehabilitation programme

Introduction

Rotator cuff disease is a common condition in patients over seventy years old and consists in a significant loss of range of motion of the shoulder which causes a loss of autonomy in daily life activities (1, 2).

Rotator cuff is exposed during life to a range of forces, represented by stretches, compressions, and subacromial microtraumas that are responsible for the progressive weakening and degeneration of the tendinous fibres and their consequent rupture (3, 4).

Intrinsic and extrinsic causes of rotator cuff tears due to tendinous degeneration, decreased ability, spontaneous local mending and scarce vascularization of the supraspiratus tendon are observed. On the con-

trary, subacromial bursitis and bone spurs are among the external causes (5-10).

The rupture of the rotator cuff can be total or partial and in the majority of cases affects the supraspinatus muscle. The symptomatology is characterized by articular rigidity, hyposthenia, instability and pain due to the loss of the strength during flexion, abduction and extra-rotation.

The symptoms of rotator cuff tear include sharp pain when the lesser tuberosity of the homerus is touched, especially when the limb is abducted between 70° and 110° degrees (12).

The gold standard treatment is surgery; nevertheless, in selected cases the conservative treatment is recommended and several authors suggest the use of intra- articular infiltrations of hyaluronic acid (13-15).

Hyaluronic acid is a polymer that is present at the articular level in a concentration of 2-3 mg/ml (16, 17), which shows an analgesic effect on pain receptors, since it reduces the production of algogenic matter, interferes with some neuropeptides and presents mechanical functions of viscosupplementation and lubrication of the articular surfaces (18-22).

The aim of this study is to evaluate the efficacy of the infiltrative treatment with hyaluronic acid associated with a targeted rehabilitative treatment in elderly patients with rotator cuff tear, who cannot be surgically treated, because of their comorbidity or because they simply refuse the treatment.

Materials and methods

Twenty-two patients (14 men and 8 women, 70 to 89 years, mean age 78.1) affected by rotator cuff tear, observed at the Department of Functional Rehabilitation of Parma were selected.

Sixteen patients presented rupture of the right rotator cuff (dominant shoulder) and 6 pts. were affected on the left shoulder. Fourteen patients only affected by supraspinatus tendon tear, eight patients affected by supraspinatus tendons tear.

The patients arrived at the physiatric examination with symptoms including sharp pain, significant loss of range of motion of the shoulder and loss of autonomy in daily life activities.

The selected patients had a non-traumatic etiology of the rupture of the tendons, which was documented with the echographic or with the MRI imaging. All patients underwent an X-ray of the scapulo-homeral joint, and presented other crippling diseases and refused surgical treatment.

Therefore, a conservative treatment consisting in a series of 3 infiltrations (once a week) of hyaluronic acid (jointex starter molecular weight: 800-1200 kdalton) followed by a targeted rehabilitative intervention (passive and active assisted kinesitherapy) was proposed.

The infiltrative technique with anterior access was employed (Fig. 1).

At the beginning each patient was evaluated for pain through the Visual Analogic Scale (V.A.S.), Costant Murley and the Shoulder Rating Question-



Figure 1. Intra-articular infiltration of hyaluronan

naires were employed to evaluate the loss of range of motion of the shoulder and loss of autonomy in daily life activities.

The Costant Murley (top mark: 100) is divided into 4 items: the first item measures pain and patients have to score it in a range from 0 (sharp pain) to 15 (no pain). The second item is related to daily life activities and is divided into working activities, sport and free time, quality of sleeping, and range of motion of the shoulder during several activities.

The scale also evaluates the bending range (flexion, abduction, extra-intra rotation) and strength.

The aim of the Shoulder Rating Questionnaire is to evaluate the seriousness of symptoms and the range of motion of the shoulder. It consists in the evaluation of pain, daily life activities, sporting activities, free time, patient's satisfaction and recovery.

Each patient after the infiltrative treatment underwent a series of 20 passive and active assisted kinesitherapy of the shoulder. A follow-up at the first, third and sixth month was carried out.

Phase 1: weeks 0-2:

- Stretching of the anterior, posterior and inferior articular capsule
- Codman pendular exercises
- Isometric exercises
- Passive exercises to regain total R.O.M.
- Self-assisted exercises with pulley

Phase 2: weeks 2-4:

- Stretching of the articular capsule
- Exercises of passive and self-assisted movement
- Muscular strengthening of the rotator cuff: first, closed kinetic chain exercises, then open kinetic chain exercises (3 series of 10 repetitions) (Fig. 2)



Figure 2. R.O.M. before treatment (60° flexion)

- Strengthening of scapula stabilizator muscles
- Scapula retraction;
- Scapula protraction (anterior dentate muscle)
- Scapula depression (great dorsal, inferior trapezium, anterior dentate muscles).
- Scapula rotation (upper trapezium muscle)
- Proprioceptive rehabilitation.

Results

All patient underwent a Visual Analogic Scale (from 0 to 10; 0: no pain, 10: unbearable pain), Costant Murley and Shoulder Rating Questionnaire at the beginning and at the end of treatment.

The results obtained at the initial and final evaluation were submitted to statistics using the Friedman test for paired data and Wilcoxon signed-rank, considering significant a value of $p < 0,005$.

We considered a variance analysis for paired data using the Friedman test for the comprehensive estimation of the effect achieved.

At the third month the obtained results were statistically significant ($p < 0,0005$) with reference to both the reduction of pain (V.A.S. scale), and to the

Table 1. Riepilogative scores

	Friedman test
V.A.S.	$p < 0.0005$
Costant Murley	$p < 0.0005$
Shoulder Rating Questionnaire	$p < 0.0005$
Flexion	$p < 0.0005$
Abduction	$p < 0.0005$

scores achieved with the Costant Murley and Shoulder Rating Questionnaire (Tab. 1).

Thanks to the Friedman test for paired data, a variance analysis for paired data was considered in order to evaluate if any change in the range of flexion and abduction was present. The examination revealed that all patients had an increased range of motion in both flexion and abduction ($p < 0,0005$) (Tab. 1).

Regarding flexion, it is worth noting that 3 patients who had an initial range of motion of 60° reached 160° at the third month (Fig. 2, 3).



Figure 3. R.O.M. after treatment (160° flexion)

Table 2. Follow-up

	Wilcoxon test	Meaningfulness
Initial V.A.S. -1° month	Z=-3.319	p<0.0009
Initial V.A.S. -6° month	Z=-3.317	p<0.0009
Initial Costant Murley 1° month	Z=-3.306	p<0.0009
Initial Costant Murley 6° month	Z=-3.297	p<0.001
Initial SRQ 1° month	Z=-3.301	p<0.001
Initial SRQ 6° month	Z=-3.297	p<0.001

In 14 patients the increase went from 30° to 90° at the third month.

Two patients who had an initial range of motion of 90° reached 180° at the third month; 3 patient with an initial range of motion of 90° reached 120° of flexion at the third month.

The follow-up at the sixth month underlined the maintenance of the obtained results.

Finally another non-parametric method for paired data, the Wilcoxon signed-rank was employed, which made the evaluation of the immediate effect (first month) of the treatment with every scale used and, afterwards, the long-term effect (follow up at the sixth month) possible. We observed from these data that an important reduction of pain had already been reached at the first month. The scores obtained with the two scales improved, as proof of a real improvement of the clinical picture (Tab. 2).

The above-mentioned results express that the treatment produced a statistically significant improvement of the clinical picture of patients: V.A.S. is meaningfully decreased in almost every patient since the first month, maintaining or improving the result also at the follow up.

Furthermore, the results concerning the range of motion of the shoulder showed a remarkable improvement in the majority of patients. They were able to return to their daily life activities.

Conclusions

In literature there are evidences of the efficacy of a targeted rehabilitative treatment in patients with a rupture of the rotator cuff treated with a conservative

treatment of strengthening of the muscles of the rotator cuff (23-25).

In our survey, the treatment was well tolerated by all patients and no adverse events or complications were shown.

Our results were very encouraging since the statistical evaluation showed a great success (p<0,0005) and therefore an improvement of the parameters considered.

It was observed that the reduction of pain positively influenced the obtained results and are linked to the range of motion of the shoulder and the daily life activities. All the patients showed appreciation and satisfaction for the protocol.

The rehabilitative treatment performed in these selected cases had an effective result and it may be considered as a valid choice instead of a surgical treatment, which is presently the gold standard in classic cases of rotator cuff rupture.

We estimate to increase our survey by continuing following these patients. We are planning further follow-up (at 12th month) to compare this treatment with those already considered effective in literature.

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Correspondence: Cosimo Costantino MD

Department of Surgical Sciences

Unit of Orthopedy, Traumatology and Functional Rehabilitation

University of Parma, Via Gramsci 14

43100 Parma, Italy

Tel. 0039-0521-703517

Fax: 0039-0521-702147

E-mail: mailto:cosimo.costantino@unipr.it