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Non-operative treatment of multidirectional shoulder instability

Abstract At an average follow-up of 3.7 years we assessed the results of non-operative treatment of 84 symptomatic shoulders in 59 patients with a diagnosis of multidirectional shoulder instability. Sixty-two shoulders had received no previous surgical treatment (group A) while 22 had failed to respond to surgical treatment before the rehabilitation programme (group B).

Subjectively 11 of the non-operated shoulders (group A) were cured and 27 improved, 23 of the shoulders remained the same and one was worse at follow-up. According to the age and gender adjusted Constant score, 38 of the non-operated shoulders had either no disability or only mild disability, nine had moderate disability, while the remaining 15 had severe or total disability. These figures were far worse in group B. In group A only four shoulders required operation, while in group B seven required operation following rehabilitation.

Patients who had had previous shoulder surgery, those with a work related injury and those with psychological problems were less likely to benefit from the rehabilitation programme.

Résumé Nous avons suivi pendant 3.7 ans 84 épaules chez 59 patients avec une instabilité multidirectionnelle traitée par un programme de rééducation. Soixante-deux épaules (groupe A) ne recevaient aucun traitement chirurgical, et 22 épaules (groupe B) ont eu un traitement chirurgical inefficace avant la rééducation. Dans le groupe A, 11 sont sans symptôme, 27 sont améliorés, 23 restent sans changement, et une est aggravé. Selon le score de Constant, 38 épaules n'avaient aucune insuffisance ou avaient des signes cliniques très modérés, neuf avaient des signes modérés et 15 avaient une instabilité sérieuse. Les résultats dans le groupe B ont été beaucoup plus mauvais. Dans groupe A quatre épaules et dans le groupe B sept épaules ont été opérées après la rééducation. Les patientes qui étaient traités chirurgicalement á cause d'un accident du travail ont fait leur programme de rééducation avec moins de succès.

Introduction

While traumatic anterior dislocation is the most common form of shoulder instability, there is a subgroup of patients in which instability can occur in more than one direction with minimal or no causative trauma. Neer and Foster [13] were the first to describe this condition in 1980 and they named it multidirectional instability of the shoulder (MDI).

Since Neer and Foster's initial publication several authors have discussed the treatment of these patients and have used different classifications to help understand the condition. Since the pathology of MDI is usually very complex, it is difficult to develop a treatment suitable for all cases. Most authors agree that patients with MDI should be initially treated with rehabilitation and only patients who fail to respond to this conservative treatment should be treated surgically. However, there is very limited data on the effectiveness of conservative treatment and on the proportion of patients that finally need surgery [4, 6, 15, 16].

Several operative procedures have been developed for treating MDI but most of these have a much higher failure rate than operations designed for the treatment of unidirectional post-traumatic instability. Whatever treatment is used, the results seem to deteriorate with time [1, 3, 6, 7, 10, 17].

This study was carried out to assess the results of the non-operative treatment of patients referred to a tertiary referral unit, with a diagnosis of multidirectional instability and who were treated with a rehabilitation programme with no planned surgical intervention.

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Materials and methods

One-hundred and sixteen patients were diagnosed as having symptomatic glenohumeral instability in at least two directions at the Nottingham Shoulder and Elbow Unit during a 7-year period (from 1988 to 1995).

Fifty-nine patients (37 female, 24 male) with 84 previously symptomatic shoulders with an average follow-up of 3.7 (1–10) years were assessed by a doctor who had not been involved in their treatment with an average follow-up of 3.7 (1–10) years. At follow-up a clinical examination and two different functional assessments (Constant score and Rowe score [5, 14]) were performed. In addition the patients completed a questionnaire based on 100 points (Subjective Shoulder Rating System) and they were also asked about their satisfaction with the results of their treatment [8].

Twenty-six patients could not attend the clinic and they completed only the questionnaire but this data was not included in the final assessment. Nine patients were lost to follow-up (one died, eight moved to an unknown address). Twenty-two patients, who had less than 1-year follow-up or who were younger than 14 years at the start of treatment, were not included in the study.

Rehabilitation commenced with a careful explanation of the condition to the patient. The programme then concentrated on proprioceptive input to improve joint position sense, and re-learning correct movement patterns with development of strength and endurance in the scapulothoracic and glenohumeral muscles. Mirrors, closed circuit television, proprioceptive neuromuscular facilitation, and biofeedback were used for the correction and retraining of the scapulothoracic and glenohumeral movement patterns. Stability was increased with an improvement of muscle balance and proprioception using strengthening exercises, closed chain exercises, and stamina training. The patients were instructed on how often the exercises had to be performed each day. Occupational therapy and a home exercise programme were also used to promote and to maintain the functional capacity of the shoulder.

The average age of the 59 patients reviewed was 24.7 (15–46.7) years at the beginning of the rehabilitation programme and 28.4 (16.7–48) years at the time of follow-up. Twenty-five patients out of the 59 had bilateral symptoms. The dominant and non-dominant sides were often equally involved in patients with unilateral symptoms. Twenty-three patients showed signs of generalised joint laxity (five or more out of nine on the Beighton scale [2]), 15 patients were able to reproduce the symptoms voluntarily, and six patients had a major psychological problem.

The 59 patients had 84 symptomatic shoulders. Only eight shoulders had suffered major trauma and 22 shoulders minor trauma. The leading symptoms were pain, dislocation, subluxation, 'dead arm feeling' or a combination of these. Twenty-six shoulders had predominantly antero-inferior instability, 47 shoulders postero-inferior instability, and 11 shoulders antero-postero-inferior instability.

As each shoulder was individually assessed the 84 shoulders could be divided into two groups for the final assessment. Group A contained 62 shoulders that were not surgically treated before the rehabilitation programme while group B contained 22 shoulders that were operated on (one to five times) before being referred to our unit. Nine off the 25 patients with bilateral symptoms had one shoulder operated and one shoulder not operated and one patient had operations on both sides. The age, gender and length of follow-up did not differ significantly in the two groups.

The data was assessed using descriptive statistics, Kruskal-Wallis one-way ANOVA, and linear regression.

Results

A higher proportion of persisting signs of instability was observed among the previously operated shoulders (group B; Table 1). Considerable weakness (grade 2 or 3

Table 1 Physical assessment of 84 previously symptomatic shoulders in 59 patients at follow-up

Clinical examination at follow-up	Group A (n=62) (n)	Group B (n=22) (n)
Positive anterior apprehension	24	12
Positive posterior apprehension	17	10
2+ or 3+ anterior draw	14	7
2+ or 3+ posterior draw	32	15
2+ or 3+ sulcus sign	23	14*
Pseudo-winging of the scapula	27	16*
Dislocation or subluxation on active elevation	10	9*

*$P<0.05$ Kruskal-Wallis one-way ANOVA

Table 2 Functional assessment of 84 previously symptomatic shoulders of 59 patients at follow-up

Functional assessment at follow-up	Group A (n=62) values (SD)	Group B (n=22) values (SD)
Constant score	76 (16)	59 (22)**
Age and gender adjusted constant score (%)	80 (17)	63 (24)**
Rowe score	50 (29)	27 (24)**
Subjective Shoulder Rating System	79 (14)	58 (23)**
Satisfaction (1=cured, 2=better, 3=same, 4=worse)	2.23 (0.76)	2.72 (0.79)*

*$P<0.05$, **$P<0.001$ Kruskal-Wallis one-way ANOVA

on the Medical Research Council scale), especially of the external and internal rotator muscles, was also more commonly found in group B ($P<0.05$–0.001).

According to the patients' self-assessment 38 shoulders out of the 62 in group A were cured or improved while 23 shoulders remained the same. Only one shoulder was worse after rehabilitation. In group B, ten shoulders out of the 22 were cured or improved, ten remained the same and two were worse.

According to the age and gender adjusted Constant score 38 of the non-operated shoulders (group A) had either no disability or only mild disability, nine had moderate disability, while the remaining 15 had severe or total disability. Only six shoulders had no or minimal disability, four had moderate disability, and 12 had severe or total disability in group B.

According to the Rowe score the proportion of shoulders with fair or poor function was considerably higher amongst the shoulders that had been treated surgically before rehabilitation. The differences in objective scores, subjective scores and satisfaction between the two subgroups were statistically significant (Table 2).

Linear regression analysis based on gender, age, follow-up time, dominant or non-dominant symptomatic side, generalised joint laxity, a history of surgery, a psychological problem and direction of instability revealed that the sex and age of the patient, previous surgery, psychological problem, and the direction of instability did have significant effects on the final objective or subjec-

tive out-come (adjusted r^2: 0.16–0.65; $P<0.01$–0.0001). Younger patients and males did slightly better. Shoulders with instability in all three directions did best, while shoulders with postero-inferior instability did worse.

Thirty-three patients stated at follow-up that they were still carrying out their home exercises. Eleven patients were off work (many of them unemployed) at the time of follow-up, 26 patients did office work, 22 patients light manual work, and none was able to undertake heavy physical work. Eleven patients were able to take part in regular recreational sport.

Only four shoulders in group A but seven shoulders in group B needed further surgical treatment ($P<0.001$) after rehabilitation failed to cure their symptoms.

Discussion

The aetiology of multidirectional instability is probably multifactorial but there are four major aetiological categories that can lead to instability either on their own or in combination [10]. These are bone and labral abnormalities, ligamentous abnormalities, impaired muscular control, and collagen abnormalities. In addition, a number of authors, including ourselves, have found that psychological elements also play a significant role in the development of MDI.

Most authors have found that multidirectional shoulder instability was equally common in males and females and that it was often bilateral with a high recurrence rate [1, 3, 4, 6, 13, 15]. In our series there was a moderate female predominance. Also, 42% of the patients had bilateral symptoms. A high proportion (39%) of our patients had signs of generalised joint laxity but this had no significant effects on the results.

Different studies have shown that patients with multidirectional shoulder instability have poor co-ordination and strength of their rotator cuff muscles and of the scapulothoracic muscles, and we confirmed this in our series [9, 10, 11, 12, 15]. Our EMG investigations also confirmed other authors' findings that hyperactivity of some muscles combined with reduced activity of other muscles or muscle groups can be demonstrated in many patients [9, 15].

Most authors agree that the first line of treatment of multidirectional shoulder instability is non-operative [4, 10, 11, 13, 15, 18]. The basic principles of every rehabilitation programme are to improve the muscle strength and co-ordination in conjunction with encouraging a change in lifestyle and additional psychological treatment when necessary. There have been several rehabilitation protocols published but there is no evidence that any one is better than another. A direct comparison of the results published in different papers is difficult since patient selection and methods of assessment are usually different. Burkhead and Rockwood [4] reported the results of 3–4 months of conservative treatment of 115 shoulders presenting with traumatic and atraumatic subluxations. They used the Rowe score to assess the results and showed that 80% of the 66 shoulders presenting with atraumatic subluxation achieved good or excellent function. These results are superior to those we obtained but in our series most of the shoulders showed more severe instability and only 33% of the shoulders were subluxing while the majority were dislocating. Tibone and Bradley [16] reported on 70% satisfactory results following a 6-month course of conservative treatment of athletes presenting with posterior subluxation. Rowe et al. [15] reported on the conservative and operative treatment of 26 patients with unilateral or bilateral voluntary shoulder dislocations. The results of non-operative treatment were poor when the patients had a major psychological problem but very good when there was no social or psychological disorder. We have also found that the results of conservative treatment of patients who presented with a major psychological element were less favourable. Six of our patients had such a psychological problem but most of them or their parents refused to accept psychological treatment when it was offered. The ability of the patient to reproduce their symptoms voluntarily did not have a significant effect on the outcome in our series.

Authors who report on surgical treatment of MDI patients usually emphasise the priority of the conservative treatment but they seldom quantify the proportion of patients who were managed successfully without an operation. Cooper and Brems [6] reported on the results of the inferior capsular shift operation performed on MDI patients who did not respond to conservative treatment. These patients represented 15% of their 251 MDI cases. Many of the surgically treated patients, as in our series, often had undergone several operations in other institutions before non-operative treatment was started. In our series, four shoulders (6%) in group A and seven (32%) in group B needed surgical treatment after an unsuccessful rehabilitation programme. In addition, physical examination and functional and subjective assessment showed significantly better results among shoulders that were not operated on before the initiation of rehabilitation (Tables 1, 2).

From our results we conclude that patients with multidirectional shoulder instability should be treated conservatively initially. In spite of persisting clinical signs of laxity and occasional episodes of instability after treatment, the patients developed more confidence in everyday activities and had a better understanding of their shoulder condition. Patients who had had previous shoulder surgery, those with a work-related injury and those with psychological problems were unlikely to benefit from the rehabilitation programme.

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