Midterm results after operatively stabilised shoulder dislocations in elderly patients

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Abstract Anterior shoulder dislocation is frequently seen in young patients. The therapeutic regime in elderly patients after shoulder dislocation is less clearly defined. The aim of this study was to compare the clinical benefit of operative stabilisation following anterior shoulder dislocation in young versus elderly patients. Seventy-two patients with anterior shoulder dislocations were allocated into two groups. Group 1 (>40 years of age) consisted of 23 patients, and group 2 (<40 years of age) consisted of 49 patients. Operative stabilisation resulted in a significant reduction in recurrence rate in both groups. However, the clinical functional results measured by the Constant score, Rowe score and disabilities of the arm, shoulder and hand (DASH) score revealed significantly better outcomes in the younger (group 2) than in the older group (group 1). These results indicate that while operative stabilisation is equally effective in reducing recurrent shoulder dislocation in the elderly functional outcomes are not as good as in younger patients.

Résumé Les luxations antérieures de l'épaule sont assez fréquentes chez les jeunes patients. Le traitement, chez les patients plus âgés, lors d'une luxation n'est pas clairement défini. Le but de cette étude est de comparer les effets bénéfiques d'une stabilisation chirurgicale après luxation antérieure de l'épaule chez les jeunes patients comparés aux patients plus âgés. 72 patients présentant une luxation antérieure de l'épaule ont été divisés en deux groupes. Le

groupe I, patients âgés de plus de 40 ans soit 23 patients et le groupe II âgés de moins de 40 ans, soit 49 patients. la stabilisation chirurgicale a permis une diminution des récides dans les deux groupes. Cependant les conséquences cliniques mesurées par le score de Constant, le score de Rowe, le score Dash et le Simple Shoulder Test, montrent que les résultats sont bien meilleurs chez les plus jeunes (groupe II) que chez les patients plus âgés. ces résultats démontrent que la stabilisation chirurgicale de la luxation de l'épaule est une technique efficace aussi bien chez les sujets âgés que chez les sujets jeunes tant sur le plan clinique que fonctionnel. Mais les résultats sont meilleurs chez les sujets plus jeunes.

Introduction

Acute or recurrent anterior glenohumeral dislocation occurs primarily in young and active individuals. However, recent changes in lifestyle have tended to extend its occurrence towards an older age group [21]. Traumatic shoulder dislocation is initiated by a considerable injury and is often associated with complex structural injuries. Related traumatic injuries causing anterior shoulder dislocation are fractures (Hill-Sachs or Bankart lesions), disruption of ligamentous structures, labral avulsion or SLAP lesions [23], neurovascular injuries as well as damage to tendinous structures such as rotator cuff tears. The resulting morphological damage from these injuries often leads to recurrent shoulder dislocation even if subsequent mechanical impact is low [23].

According to the literature recurrence rates are as high as 97%. Several studies have shown that the recurrence rate is higher in younger individuals, especially under the age of 30, than in the elderly [6]. A variety of different treatments

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have been introduced to reduce this recurrence rate [15]. After reduction, shoulder dislocation is usually treated by initial short-term immobilisation followed by either rehabilitation and/or operative intervention. Some studies exist that compare operative and conservative strategies [22]; however, which treatment is best in elderly patients remains controversial [4, 10]. Recommendations vary from author to author, some recommending conservative treatment [10], and others suggesting more aggressive surgical interventions. Due to their the less invasive nature, arthroscopic procedures have gained more acceptance [13].

Regardless of the approach, the goals of treatment for shoulder dislocation are prevention of instability, patient acceptance and restoration of full range of motion and strength of the extremity. The growing number of elderly patients that present with shoulder dislocation demand treatment strategies capable of providing good clinical results that maintain quality of life while taking into consideration morbidity and perioperative risks unique to this age group.

The purpose of this study was to compare outcomes (rate of recurrent instability, functional outcomes and range of motion) in individuals >40 years of age with individuals <40 years of age receiving operative Bankart repair for shoulder dislocation.

Materials and method

The study was approved by the Medical Faculty Ethics Review Board of the Johann Wolfgang Goethe University of Frankfurt, and written informed consent was obtained from all subjects. Between January 2001 and September 2006, 361 patients received operative treatment for post-traumatic shoulder instability. Patients were identified by reviewing the theatre coding registry. The criteria for inclusion in this study were: (1) first-time or recurrent traumatic shoulder dislocation, (2) failed conservative treatment and (3) older than 18 years of age. Exclusion criteria were (1) accompanying fractures of the humerus or scapula and (2) neurological deficit on the ipsilateral arm. Of the patients who met the inclusion criteria, ultimately 72 patients (21 women and 51 men) consented and were consequently included in the study. The mean follow-up was 22 ± 21.6 months. Demographic data on the study groups are presented in Table 1.

Operative technique

The operation was done under general anaesthesia, and in most cases with an additional interscalene nerve block. All patients received a prophylactic dose of 1.5 g cefuroxime intravenously perioperatively. The surgical procedure was

Table 1 Demographic data on the study groups. *BMI* body mass index

	Group 1	Group 2
No. of patients	23	49
Age at first dislocation (years)	59.7 ± 14.6	23.7 ± 8.6
Female:male	8:15	13:36
BMI	27.1 ± 4.3	24.2 ± 3.3
No. of dislocations before operation	1.5 ± 1.1	7.6 ± 9.9
Follow-up (months)	27.7 ± 40.4	20.6 ± 10.1

carried out using a standard approach, with the patient in the beach-chair position.

Rehabilitation

Post-operatively all patients underwent the same rehabilitation protocol. Shoulder immobilisation (arm sling) was used for 3 to 4 weeks. On the third post-operative day passive motion exercises or self-assisted active exercises for range of motion were started. Subsequently gradually increasing strengthening exercises were performed. Overhead use of the arm was not allowed before an acceptable range of motion was obtained. Full strength activities such as throwing were not allowed for the first 6 months.

Clinical evaluation

All patients were reviewed clinically, and complications during the follow-up period as well as the functional outcome were noted. At the latest follow-up patients were examined by one of the authors who had not been otherwise involved in their primary surgical care.

Functional outcome was assessed using the Constant and Murley score and the Rowe score [5, 19]. In addition, the disabilities of the arm, shoulder and hand (DASH) questionnaire was used [9]. The DASH score is a standardised 30-item self-report instrument that measures upper extremity disability from the patient's own perspective. By using the 5-response option for each item (1 "no difficulty" to 5 "unable"), the sum of all items is calculated and presented in a DASH score ranging between 0 and 100. A higher DASH score indicates increased disability. To assess the patients' overall satisfaction, individuals were requested to use a 100-point visual analogue scale (VAS), with 100 indicating "excellent" and 0 "poor" outcome.

The range of motion was measured with a goniometer. Shoulder abduction strength measurement was carried out using a dynamometer as suggested in the literature [25]. In brief, the arm was held in 90° of abduction in the scapular plane and the hand was held in fixed pronation. A belt was applied around the wrist while patients maintained a sustained pull on the dynamometer.

Measurements were performed three times, each for a period of 3 s. The mean value for all measurements was then established to define the strength in kilograms. Kilograms were used to calculate the points according to the Constant and Murley score, with a maximum of 25 points. If patients were not able to reach 90° abduction of the shoulder force measurements were rated as zero, as suggested by Bakes et al. [2]. Because strength of the normal shoulder worsens with age and may differ by gender, we adjusted the Constant and Murley score for age and gender as previously described [5, 12]. The Constant and Murley score was graded as poor (0–55 points), moderate (56–70), good (71–85) or excellent (86–100).

Data analysis

All data are expressed as mean±standard error of means (SEM). For normally distributed data, a paired *t*-test was used to examine for differences between the two groups. If data were not normally distributed, a Mann-Whitney test was used to examine for differences between the two groups. The level of significance was set at $p<0.05$. Statistical analyses were performed using SPSS for Windows, Release 11.5 (SPSS Inc., Chicago, IL, USA).

Results

Seventy-two patients with shoulder dislocation in whom operative stabilisation was performed for post-traumatic shoulder instability were included in the study. Patients were grouped according to their age when they experienced their initial shoulder dislocation. Group 1 (>40 years) comprised 23 patients, and group 2 (<40 years) had 49 patients (Table 1). Of the patients in group 1, 89% sustained a traumatic shoulder dislocation, whereas only 83% of

Fig. 1 Recurrence rate of shoulder dislocation. *** $p<0.0001$; # $p>0.05$

Table 2 Distribution of injuries between study groups

%	Group 1	Group 2	<i>p</i> value
Labral lesions	52.2	83.7	0.005
Hill-Sachs lesions	17.4	30.6	*
Rotator cuff tears	8.7	-	*
Proximal humeral fractures	18.2	4	0.015

* $p>0.05$

those in group 2 did. Eight (35%) patients in group 1 and 16 (31%) in group 2 required open shoulder stabilisation. Pre-operatively the recurrence rate in group 2 was significantly higher compared to group 1 (7.6 ± 9.9 and 1.5 ± 1.1 , respectively; $p<0.001$). The post-operative recurrence rate in group 2 did not significantly differ from group 1 (0.4 vs. 1.4; $p=0.08$) (Fig. 1).

When comparing the recurrence rate pre- and post-operatively, surgical stabilisation reduced the redislocation rate in both groups. Labral lesions were more frequently seen in group 2 than in group 1 (83.7 and 52.2%). Other injuries like Hill-Sachs lesions and glenoidal fractures were observed with similar frequencies in both groups (Table 2).

Functional outcome according to the Constant and Murley score (adjusted for age and sex as recommended [12]), the Rowe score and the DASH score showed significantly better results in group 2 as compared to group 1 (Table 3).

Discussion

After acute traumatic shoulder dislocation immediate reposition is required regardless of a patient's age. Furthermore a thorough clinical examination is mandatory to rule out accompanying vascular and nervous injuries as well as injuries of other important functional structures of the upper extremity [24]. Standard radiographic examination is necessary to ascertain if reposition was successful and to exclude injuries of the bone that might need further

Table 3 Clinical outcome

Mean±SEM	Group 1	Group 2	<i>p</i> value
Adjusted Constant score [5]	76.6±5.33	86.1±1.7	*
Adjusted Constant score [12]	69.8±5.14	87.5±1.6	0.005
Rowe score	65.5±4.4	77.7±2.6	0.019
DASH score	31.4±5.5	12.4±2.2	0.007
VAS	71.6±5	85.5±2.7	0.012

* $p>0.05$

operative therapy. Additionally magnetic resonance imaging enables the detection of common soft tissue injuries, such as Bankart and SLAP lesions, as well as relevant rotator cuff tears [17].

A number of studies have focused on young active adults who are at high risk for recurrent shoulder dislocation following an initial traumatic insult [18]. These studies report a recurrence rate of more than 90%, and subsequently operative stabilisation is recommended [11]. In recent years arthroscopic shoulder surgery has become a widely accepted procedure for reducing morbidity. Standardised methods of stabilisation have been established using different types of anchors and sutures. In young patients, at high risk for repeated shoulder dislocation, early operative intervention is recommended [16]. Though promising results have been achieved it is still difficult to predict the individual patient's risk of redislocation [20]. Although in young patients mostly good and excellent functional results are reported, post-operative external rotation is frequently restricted, probably due to operative stabilisation [7].

The recurrence rate after traumatic shoulder dislocation is lower in elderly patients probably because Bankart lesions are observed less frequently [1]. However, some accompanying lesions, e.g. rotator cuff injuries, are seen more often in elderly as compared to young adults [14]. Nevertheless, the availability of minimally invasive shoulder surgery has led to a growing number of operative stabilisation cases in elderly patients. The benefit of this development is not yet clear.

The purpose of this study was to compare the outcomes of operative stabilisation in elderly versus younger patients. The number of pre- and post-operative shoulder dislocations was significantly higher in younger (<40 years) than in elderly patients (>40 years). However, in both groups operative stabilisation of the shoulder led to a significant reduction of the redislocation rate.

Young patients showed a superior functional outcome according to the Constant score and the Rowe score as compared to elderly patients. The DASH score in the younger group was also significantly better than in the elderly group. Although it might seem obvious that younger patients have a better functional result, as the pre-operative functional status could not be measured in this study, we believe that the age-related Constant score is a reliable and objective score that is meant to diminish age-related differences. Although the DASH score is more subjective, patients tend to compare the result with their other side that has not been affected and should therefore be independent of the patient's age.

The reasons for a higher redislocation rate in young patients after traumatic dislocation of the shoulder is not yet clear. Shape and consistence of the soft tissue that stabilises

the shoulder under physiological conditions are likely to change with age, thus leading to different age-dependant injury patterns and healing processes [1]. The latter might also be responsible for the worse clinical outcome in elderly patients. Future molecular biological methods including DNA analysis might give an answer regarding the individual risk of redislocation.

The complex interplay of different muscle groups around the shoulder might recover later or lead to irreversible deficits after a traumatic insult in elderly patients compared to younger patients. In addition anatomical variations, especially concerning the glenoid architecture, must be considered to achieve a good post-operative result [3].

The indication for operative stabilisation in older patients should be restricted to selected injuries, and patient expectations should be taken into consideration. Pre-operative reduction in range of motion should suggest conservative treatment. Reduced general activity and increased risk factors associated with surgery like comorbidities should be seen as contraindications for operative treatment. On the other hand, major injuries resulting from shoulder dislocation like acute tear of the rotator cuff or dislocated fracture of the greater tuberosity in elderly patients might lead to a sudden and irreversible loss of function if operative therapy is neglected [8].

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