J Orthopaed Traumatol (2007) 8:207–213
DOI 10.1007/s10195-007-0095-7

R. Padua
R. Bondì
L. Bondì
A. Campi

Surgical versus conservative treatment for acute first-time anterior shoulder dislocation: the evidence

Received: 20 October 2007
Accepted: 22 October 2007
Published online: 21 December 2007

R. Padua • R. Bondì (✉) • A. Campi
Orthopaedics Department
San Giacomo Hospital
Rome, Italy
E-mail: bondi.r@libero.it

R. Padua • R. Bondì
GLOBE Working Group for
Evidence-based Orthopaedics
Rome, Italy

L. Bondì
Orthopaedics Department
Tor Vergata University
Rome, Italy

Abstract Acute anterior dislocation of the shoulder is a common injury associated with a high rate of recurrence in young active men. Management of traumatic anterior shoulder dislocation aims to restore range of motion, to reduce the risk of recurrence and to assure an improved quality of life with a stable and painless shoulder. It includes conservative and surgical-open or arthroscopic treatment, followed by rehabilitation. No clear consensus has been reached on the best management, surgical or conservative, to adopt in first-time anterior shoulder dislocation. The aim of this review was to collect and evaluate the scientific evidence supporting the effectiveness of immediate surgical treatment versus immobilization and rehabilitation for first-time traumatic anterior shoulder dislocation. There is some evidence to support primary surgery in young active patients with an acute first traumatic shoulder dislocation, in order to reduce the risk of recurrence, but there is no evidence for the best surgical technique or best conservative approach, nor is there information regarding the best treatment in other categories of patients.

Key words Evidence-based medicine • Prospective study • Recurrence • Shoulder dislocation • Treatment • Outcome

Introduction

Acute anterior dislocation of the shoulder is a common injury that represents around 96% of all shoulder dislocations [1]. Anterior dislocation is associated with a generally high rate of recurrence [2] which varies depending on the patient's age, primary treatment and type of lesion [3].

Since the era of Hippocrates [4], traditional treatment for traumatic anterior shoulder dislocation has included immobilization of the shoulder for 3–6 weeks, with the arm held in a sling close to the trunk in adduction and internal rotation, with the aim of allowing the soft tissue to heal, followed by extensive rehabilitation program with range of motion and strengthening exercises. Conservative traditional management has a recurrence rate ranging from 17% to 96% in patients less than 30 years of age [5] with a mean redislocation rate of 67% [6]. The majority of redislocations happens in the first year after the initial episode [6]. When the shoulder redislocates, further soft tissue damage can occur and cause pain, decrease quality of life and reduce physical function.

A first-time anterior dislocation of the shoulder can commonly result in a variety of soft tissue injuries such as the Bankart lesion (an anterior labrum avulsion), the Hill Sachs lesion (humeral head compression fracture) and

subscapularis muscle disorders [7, 8]. The anterior capsulolabral complex is the most important passive anterior stabilizer of the glenohumeral joint; the high recurrence rate after conservative management correlates with failure of the labrum lesion to heal in an anatomical position [7].

Management of first-time traumatic shoulder dislocation aims to restore range of motion, to reduce the recurrence and to assure an improved quality of life with a stable and painless shoulder. Different treatments are currently used. Conservative treatment comprises immobilization of the shoulder in a sling followed by an extensive rehabilitation program. Recent studies [4, 9, 10] showed that immobilization in external rotation after first traumatic anterior shoulder dislocation is more effective in reducing the rate of recurrence than conventional immobilization in internal rotation. Magnetic resonance imaging (MRI) and studies of cadavers [4, 9] have shown how detached soft tissue from the glenoid is better coapted to the bone with the arm in external rotation than with the arm in internal rotation. Operative treatment includes arthroscopic lavage, arthroscopic surgery and open surgery, followed by a long rehabilitation program. Surgical procedures include intervention to restore pre-lesion anatomy (e.g. Bankart technique) and other surgical procedures that stabilize and reinforce the joint (e.g. Putti-Platt technique).

The choice of treatment depends on the patient's age, level of activity, occupation, general health, and ligamentous laxity. Traditionally, surgical treatments have been reserved for cases of chronic recurrent instability [8], but the high rate of recurrence observed in young active patients has opened a new controversy on the surgical management of first-time traumatic shoulder anterior dislocation in this category of patients. The cause for these controversies is if surgical stabilization can significantly reduce the rate of recurrence and give an improved quality of life.

The aim of this study was to collect and evaluate the scientific evidence reported in literature supporting the different treatments, conservative and surgical, in the management of acute primary anterior dislocation of the shoulder. A literature analysis was performed to compare different management approaches to find the best scientific evidence on this topic.

Materials and methods

A bibliographic search was conducted to identify articles comparing surgical versus non-surgical treatment for first-time traumatic anterior shoulder dislocation. We searched for meta-analyses, systematic reviews, guidelines, quasi-randomized and randomized controlled trials (RCTs) using the following databases: the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, the Cochrane Central Register of Controlled Trials, Health technology assessment (HTA), PEDro, MEDLINE (1966 to September 2007), EMBASE (1980 to September 2007), CINAHL (1982 to September 2007), DARE, TRIPdatabase, and the UK National Research Register. The search was completed in October 2007. All RCTs and quasi-RCTs included in the study regard patients affected by acute anterior shoulder dislocation evaluated through physical examination and radiography, with or without MRI. We searched for any surgical treatment: open, minimally invasive open, or arthroscopic. The main outcome measures included pain, recurrence, return to pre-injury level of sports and work, subjective evaluation of instability and quality of life, assessed through a validated shoulder questionnaire or on rating scales such as the Short Form-36 (SF-36) and the disability of the arm, shoulder and hand (DASH) questionnaire. Range of movement, stiffness, objective instability, muscle strength, complications and patient's satisfaction were also assessed.

The following search terms were selected from the US National Library of Medicine's medical subject heading (MESH) database: Adolescent; Adult; Arthroscopy; Follow-up studies; Humans; Prospective Studies; Shoulder Dislocation/surgery; Shoulder Dislocation/therapy; and Treatment outcome. Publication types were searched as follows: Comparative Study, Multicenter Study, Randomized Controlled Trial, Review, Meta-analysis, and Practice Guideline.

Results

Our research identified only 1 quasi-RCT and 5 RCTs (Table 1), 1 Systematic Review, no Meta-analysis and no Guideline.

Randomized controlled trials

Bottoni et al. [5] did a prospective quasi-RCT of 24 male active duty military personnel, aged 18–26 years, with primary traumatic shoulder dislocation. Exclusion criteria were previous shoulder injuries, tuberosity fracture or other fracture of the shoulder, and neurological impairment. MRI was used to evaluate eventual capsulolabral injury after dislocation reduction. The patients were randomized to 2 groups: 14 to the non-operative group and 10 to the operative group. Non-operative treatment consisted of shoulder immobilization for 4 weeks with a sling followed by a supervised rehabilitation program. Operative treatment was arthroscopic Bankart repair with bioabsorbable tacks followed by the same rehabilitation program. The average follow-up was 36 months (range, 16–56). The patients were assessed in terms of return to active military duty, recurrence, subjective instability,

Table 1 Randomized controlled trials that compared surgical to non-surgical treatment for primary traumatic anterior shoulder dislocation

Reference	Patients and FU	Surgical treatment	Outcome measures	Results
Bottoni et al. [5]	24 (18–26 years) Mean FU, 36 months (range, 16–56)	Arthroscopic stabilization	Return to active military duty, recurrence, subjective instability, subsequent surgery, ROM, complications, patient satisfaction, SANE and L'Insalata shoulder evaluation	Significantly lower recurrence rate in arthroscopic stabilization group in young athletic patients
Jacobsen et al. [11]	76 (15–39 years) FU, 2 and 10 years	Open Bankart repair	Recurrence, subjective and objective instability, patient satisfaction, Constant score, Oxford self-assessment score	Significantly lower recurrence rate in open Bankart repair in patients between 15 and 39 years
Kirkley et al. [13]	40 (<30 years of age) FU, 24 and 32 months	Arthroscopic stabilization	Recurrence, WOSI, ROM, complications	Significantly lower recurrence rate in arthroscopic stabilization in patients <30 years. Significantly better results in disease-specific quality of life measured with WOSI
Kirkley et al. [7]	40 (<30 years of age) FU, 79 months	Arthroscopic stabilization	Recurrence, WOSI, ASES, DASH, ROM, complications	Significantly lower recurrence rate in arthroscopic stabilization in patients <30 years. No significant difference in disease-specific quality of life measured with WOSI
Wintzell et al. [14]	60 (16–30 years) FU, 1 year	Arthroscopic lavage	Reduction in sports level, change in occupation, recurrence, apprehension test, Rowe shoulder score, ROM, complications	Significantly lower recurrence rate in arthroscopic lavage in patients aged 16–30 years. Rowe shoulder score and apprehension test showed significantly better functional outcome in arthroscopic lavage
Wintzell et al. [15]	30 (18–30 years) FU, 2 years	Arthroscopic lavage	Clinical evaluation (apprehension test, crank test, relocation test), return to work and sport activities, Rowe shoulder score and Constant and Murley score	Significantly lower recurrence rate in arthroscopic lavage. Functional outcome, assessed on Constant and Rowe scores, was not significantly different between the two groups

FU, follow-up; *ROM*, range of motion; *SANE*, Single Assessment Numeric Evaluation; *WOSI*, Western Ontario shoulder instability; *ASES*, American Shoulder and Elbow Surgeons; *DASH*, disabilities of the arm, shoulder and hand

subsequent surgery, range of movement, complications, satisfaction and through a Single Assessment Numeric Evaluation (SANE) and L'Insalata Shoulder evaluation. The results showed that arthroscopic stabilization was associated with a significantly lower recurrence rate compared with non-surgical treatment. No significant difference was noted in range of movement between the groups. In the non-operative group, the average loss of external rotation was 3° (range, 0°–16°); in the operative group it was 4° (range, 0°–15°).

Jacobsen et al. [11] reported the long-term results of a study that had been previously reported only as a conference paper [12]. This was a prospective, randomized multicenter trial of 76 men and women, aged 15–39 years, with first-time traumatic anterior shoulder dislocation, confirmed radiographically, with a Bankart lesion confirmed arthroscopically within the first week. Exclusion criteria were a greater tuberosity fracture and previous shoulder injuries. The patients were randomized to 2 groups: 39 patients to the nonoperative treatment group and 37 to the operative group. Nonoperative treatment consisted of immobilization with a fixed sling for 2 days and a non-fixed sling for 1 week, followed by rehabilitation. Operative treatment was open anatomical repair using anchors, with a similar immobilization and rehabilitation program as used in the first group.

At the 2-year follow-up, the patients were evaluated objectively for instability and apprehension and were assessed on the Constant evaluation system. At the 10-year follow-up, the patients were contacted by phone for

an interview and for determining the Oxford self-assessment score. At the 2-year follow-up, 21 of 39 patients (53.8%) of the non-surgical group and 1 of 37 (2.7%) who underwent the open Bankart repair had a recurrence (p=0.001). The recurrence happened within 11 months after the first dislocation in 64% of cases. In the conservative group, 66% of the youngest patients (15 to 24 years) had a recurrence. Patients in the 2 groups who did not have dislocation were compared on the Constant score: no significant difference was found at 2 years. At the 10-year follow-up, 24 patients (62%) of the non-surgical group and 2 (9%) who had open Bankart repair had a recurrence. According to the Oxford shoulder score, among patients without redislocation, results were excellent and good in 53% and 17% of patients, respectively, in the surgical group while they were unsatisfactory in 74% of those treated conservatively after 10 years. The authors showed that the recurrence rate after open Bankart repair for first-time anterior dislocation of the shoulder is significantly lower than that after non-surgical treatment in patients aged 15–39 years. The risk of recurrence is highest in the younger age groups.

Kirkley and colleagues compared immediate arthroscopic stabilization to nonsurgical treatment, in an RCT of 40 patients, younger than 30 years, with first traumatic anterior dislocation of the shoulder. Results at 32 and 79 months of follow-up were reported separately [7, 13]. Diagnosis of dislocation was confirmed by clinical and radiological examination. Exclusion criteria were associated fractures such as greater tuberosity fracture, history of multidirectional instability and neurological injury. The patients were randomized as follow: 21 to the non-surgical treatment group and 19 to the surgical group. Non-surgical treatment consisted of immobilization of the shoulder for 3 weeks (the patients could remove the sling only for bathing) and mobilizing the elbow and the wrist, followed by rehabilitation. Surgical treatment was arthroscopic stabilization with K-wires followed by the same immobilization and rehabilitation protocol of the first group. The patients were evaluated on the Western Ontario Shoulder Instability (WOSI) index at an average follow-up of 32 months, and on WOSI, the American Shoulder and Elbow Surgeons (ASES) and the Disabilities of the Arm, Shoulder and Hand (DASH) Scales at an average follow-up of 39 months.

At 24 and 32 months of follow-up (38 patients were available), a significant difference in rate of recurrence between the two groups was reported: 3 of the 19 patients (15.8%) treated surgically and 9 of 19 (47%) of the conservative treatment group had a redislocation. At a mean follow-up of 33 months, the authors showed a significantly better result in disease-specific quality of life measured on the WOSI index in the surgical group. No significant differences were found in ROM between the two groups even if there was a trend for limitation in external rotation in the surgical group. The comparison of each of the 4 WOSI domains revealed a significant difference between the two groups, with better results in the surgical one. At an average follow-up of 79 months, no additional cases of recurrence were observed. The WOSI scores did not change in the surgical group from 32 to 79 months and improved in the conservative treatment group. At 79 months, the difference in WOSI index between the two groups did not reach statistical significance. Moreover no significant difference was detected in shoulder function assessed on ASES and DASH scales.

Finally, the results showed that the rate of recurrence was significantly lower after arthroscopic stabilization than after non-surgical treatment, at 32 and 79 months of follow-up in patients younger than 30 years of age. At an average follow-up of 32 months, there was a significantly better result in disease-specific quality of life (physical symptoms and pain; sport, recreation and work function; lifestyle and social functioning; emotional well being) measured using the WOSI index, but this difference did not reach significance at 79 months.

Wintzell and coworkers did a multicenter RCT to compare primary arthroscopic lavage to non-surgical treatment for first traumatic anterior dislocation of the shoulder in 60 patients, aged 16–30 years [14]. Diagnosis was confirmed by clinical and radiological examination. Exclusion criteria were previous shoulder injuries, greater tuberosity fractures, generalized joint laxity and drug addiction. The patients were randomized into two groups: 30 to the non-surgical treatment group and 30 to the surgical group. Non-surgical treatment consisted in optional use of a sling for 1 week, followed by mobilization with no restrictions. Operative treatment was arthroscopic lavage within 10 days of injury. Rehabilitation was the same for both groups. The patients were evaluated for sports level, occupation, recurrence, apprehension, Rowe shoulder score, ROM and complications. At an average follow-up of 1 year, 4 of the 30 patients (13%) in the lavage group and 13 of 30 (43%) in the conservative treatment group had a redislocation (p=0.01). In the conservative treatment group, the recurrence rate was higher in patients less than 25 years of age. The results showed that the recurrence rate was significantly lower after arthroscopic lavage than after non-surgical treatment in patients aged 16–30 years. Moreover, the Rowe shoulder score and the apprehension test showed significantly better functional outcome in arthroscopic lavage-treated patients (respectively, p=0.003 and p=0.008).

In the same year, Wintzell and colleagues published the results of another RCT that also compared arthroscopic lavage to non-operative treatment for traumatic primary

anterior shoulder dislocation [15]. This study involved 30 patients treated at a single institution and followed for 2 years; the 1-year results were published earlier [16]. The patients were randomly assigned to two groups of 15 patients each: one surgical group underwent arthroscopic lavage at an average of 7 days (range, 4–10) after the trauma; the non-surgical group was managed with an optional sling for 1 week, followed by mobilization with no restrictions. Rehabilitation was the same for the two groups. The patients were evaluated by clinical evaluation (apprehension test, crank test, relocation test) and according to the time to return to work and sport activities, the Rowe shoulder score and the Constant and Murley scores. The study showed that the risk of a redislocation after a primary anterior shoulder dislocation was significantly lower after arthroscopic lavage than after nonoperative treatment. The functional outcome, assessed through the Constant and Rowe scores, was not significantly different between the two groups.

Systematic reviews

In 2004, Handoll and Almaiyah published an updated version to their Cochrane systematic review [8] which aimed to identify and evaluate the most appropriate treatment for first-time anterior dislocation of the shoulder. The authors identified 11 randomized and quasi-randomized trials; of these 5 were included and 6 were excluded. Three of the included studies [5, 13, 14] were published as papers in medical journals. The other two [12, 17] were only presented as conference papers. When this review was written, the study of Jacobsen et al. [11] had not been published. The objective of this systematic review was to compare surgical to non-surgical treatment for first-time anterior shoulder dislocation. The five included studies regarded 239 active young adults with a primary traumatic anterior shoulder dislocation. The overall results showed a significantly less frequent redislocation or subluxation in patients treated surgically. Functional results were also significantly better in surgically treated patients. The only complication observed among surgically treated patients was a septic joint. The authors concluded that there is limited evidence to support the hypothesis that surgical treatment is superior to non-surgical treatment for highly active young adults with first-time acute traumatic anterior dislocation of the shoulder. There is no evidence for the best treatment for other types of patients, in particular for patients who are at a lower risk of recurrence. The comparison between different surgical techniques was not performed. Well designed and good quality studies are necessary to support which is the best treatment for this injury.

Discussion

Anterior shoulder dislocation occurs above all in physically active young men. Jacobsen et al. [11] found a peak of dislocation in males of 15–24 years of age, in agreement with an earlier study [3]. The rate of recurrence after a first-time anterior shoulder dislocation varies widely from 17% to 96% depending on the age at time of first dislocation and on the level of activity to which patients return after the initial injury [5]. An episode of recurrence is not the only failure with performance impairment in young active patients: subluxation can also lead to variable inability [13]. It should be clear if surgical stabilization reduces the risk of redislocation and how recurrent episodes lead to articular cartilage damage with consequent shoulder osteoarthritis.

The possibility of recurrence in particular in young active patients is unacceptable [11]. The Cochrane systematic review [8] underlined that there are more favorable results among surgically treated patients, with a significantly lower risk of subsequent instability. The functional outcome among surgically treated patients was better than after conservative treatment for active young patients with acute shoulder dislocation, even if different functional assessment measures were used.

Nevertheless, the study populations were similar in all investigations: young active patients, usually male, in the highest risk category for recurrence [3]. Thus, the overall findings and any conclusions cannot be applied to the whole population or to person who differ in age, sex and physical activity level. The authors underlined that blinding, only done in one trial [13], and the small numbers of subjects enrolled in the studies could lead to methodological bias.

Our research identified a few RCTs that reported similar data. All the quasi-RCTs and RCTs discussed in this paper reported significantly lower rates of recurrence in patients surgically treated after a first traumatic shoulder dislocation. There are many surgical techniques to treat patients with first-time anterior shoulder dislocation. All clinical trials assessed in this review compared surgical to non-surgical treatment: the surgical technique was different in each trial (arthroscopic lavage, arthroscopic repair, open stabilization) and no different grades or types of injuries were considered. Moreover, the durations of sling immobilization and rehabilitation were different. In all studies, conservative treatment referred to one type of immobilization: with the arm close to the trunk in adduction and internal rotation. In 2001 and 2003, Itoi et al. [4, 9] showed, using in vivo MRI and cadaver studies, that immobilization of the arm in external rotation better approximates the Bankart lesion with greater coaption than that achieved with the conventional position of inter-

nal rotation. In a Cochrane systematic review first published in 2006 and republished in 2007 [18] on conservative management following closed reduction of traumatic anterior dislocation of the shoulder, no significant difference was found between immobilization in internal and external rotation, underlining a lack of evidence and a need for powered, good quality RCTs with long-term follow-up. At time of the review, only one clinical trial was included: the preliminary study of Itoi et al. on 40 patients [4]. A recent paper by Itoi et al. [10] reported the overall results of 198 patients treated conservatively after a first-time shoulder dislocation. The patients were randomly assigned to be treated with immobilization in either external rotation (104 shoulders) or conventional method of internal rotation (94 shoulders) for 3 weeks. With a minimum follow-up of 2 years, the authors showed a significantly lower recurrence rate in the external rotation group than in the internal rotation group (p=0.033) with a relative risk reduction of 38.2% increasing to 46.1% in the subgroup of patients 30 years of age or younger. No study identified in our search considered the position in external rotation in its conservative treatment group. Long-term complications, such as osteoarthritis, were not reported in the studied trials. The short follow-up did not permit us to collect data on joint degeneration in the two studied groups. The recent study of Jacobsen et al. [11] provided 10-year follow-up data, but the evaluation was based on a telephone interview without the possibility of obtaining objective data on ROM and osteoarthritis. We conclude that the small number of patients included in these trials permit us only to suggest preliminary findings.

In summary, limited evidence supports surgical treatment for young highly active patients, usually males, to reduce the risk of recurrence after a primary traumatic anterior shoulder dislocation. No indication to the best surgical or conservative treatment can be provided by our review. No clinical trials compared conservative treatment in external rotation with surgical treatment. No evidence is available for the best treatment to adopt after a first anterior dislocation of the shoulder for other categories of patients, in particular those who have a much lower risk of recurrence.

Methodologically corrected clinical trials, sufficiently powered, are necessary to compare good surgical intervention with good conservative treatment for first anterior shoulder dislocation, in particular for those patients with lower risk of recurrence for age and physical activities. Moreover, there is a need to consider well defined shoulder injuries. Long-term follow-up trials are useful to study the long-term degenerative effects on joints, late complications and late instability. There is a real need for well designed studies to obtain strong evidence for the management of these injuries, to define timing, selection and role of different surgical techniques.

References

1. Goss TP (1988) Anterior glenohumeral instability. Orthopedics 11(1):87–95
2. Hovelius L (1999) The natural history of primary anterior dislocation of the shoulder in the young. J Orthop Sci 4: 307–317
3. Hovelius L, Augustini BG, Fredin H, Johansson O, Norlin R, Thorling J (1996) Primary anterior dislocation of the shoulder in young patients. A ten-year prospective study. J Bone Joint Surg Am 78:1677–1684
4. Itoi E, Hatakeyama Y, Kido T, Sato T, Minagawa H, Wakabayashi I, Kobayashi M (2003) A new method of immobilization after traumatic anterior dislocation of the shoulder: a preliminary study. J Shoulder Elbow Surg 12:413–415
5. Bottoni CR, Wilckens JH, DeBerardino TM, D'Alleyrand JCG, Rooney RC, Harpstrite JK, Arciero RA (2002) A prospective, randomized evaluation of arthroscopic stabilization versus nonoperative treatment in patients with acute, traumatic, first-time shoulder dislocations. Am J Sports Med 30(4):576–580
6. Edmonds G, Kirkley A, Birmingham TB, Fowler PJ (2003) The effect of early arthroscopic stabilization compared to nonsurgical treatment on proprioception after primary traumatic anterior dislocation of the shoulder. Knee Surg Sports Traumatol Arthrosc 11:116–121
7. Kirkley A, Werstine R, Ratjek A, Griffin S (2005) Prospective randomized clinical trial comparing the effectiveness of immediate arthroscopic stabilization versus immobilization and rehabilitation in first traumatic anterior dislocations of the shoulder: long term evaluation. Arthroscopy 21(1):55–63
8. Handoll HHG, Almaiyah MA (2004) Surgical versus non-surgical treatment for acute anterior shoulder dislocation. Cochrane Database Syst Rev (1):CD004325
9. Itoi E, Sashi R, Minagawa H, Shimizu T, Wakabayashi I, Sato K (2001) Position of immobilization after dislocation of the gleno-humeral joint: a study with use of magnetic resonance imaging. J Bone Joint Surg Am 83(5):661–667
10. Itoi E, Hatakeyama Y, Sato T, Kido T, Minagawa H, Yamamoto N, Wakabayashi I, Nozaka K (2007) Immobilization in external rotation after shoulder dislocation reduces the risk of recurrence. A randomized controlled trial. J Bone Joint Surg Am 89(10):2124–2131

11. Jacobsen BW, Johannsen HV, Suder P, Sojbjerg JO (2007) Primary repair versus conservative treatment of first time traumatic anterior dislocation of the shoulder: a randomized study with 10-year follow up. Arthroscopy 23(2):118–123
12. Jacobsen BW, Sojbjerg JO (1996) Primary repair after traumatic anterior dislocation of the shoulder joint. Acta Orthop Scand Suppl 272:13 (abstract)
13. Kirkley A, Griffin S, Richards C, Miniaci C, Mohtadi N (1999) Prospective randomized clinical trial comparing the effectiveness of immediate arthroscopic stabilization versus immobilization and rehabilitation in first traumatic anterior dislocations of the shoulder. Arthroscopy 15(5):507–514
14. Wintzell G, Haglund-Akerlind Y, Ekelund A, Sandstrom B, Hovelius L, Larsson S (1999) Arthroscopic lavage reduced the recurrence rate following primary anterior shoulder dislocation. A randomised multicentre study with 1-year follow-up. Knee Surg Sports Traumatol Arthrosc 7(3):192–196
15. Wintzell G, Haglund-Akerlind Y, Nowak J, Larsson S (1999) Arthroscopic lavage compared with nonoperative treatment for traumatic primary anterior shoulder dislocation: a 2-year follow-up of a prospective randomized study. J Shoulder Elbow Surg 8(5):399–402
16. Wintzell G, Haglund-Akerlind Y, Tidermark J, Wredmark T, Eriksson E (1996) A prospective controlled randomized study of arthroscopic lavage in acute primary anterior dislocation of the shoulder: one-year follow-up. Knee Surg Sports Traumatol Arthrosc 4:43–47
17. Sandow MJ, Liu SH (1996) Acute arthroscopic Bankart repair for initial anterior shoulder dislocation: a prospective clinical trial. J Shoulder Elbow Surg 5(2):581 (abstract)
18. Handoll HHG, Hanchard NCA, Goodchild L, Feary J (2006) Conservative management following closed reduction of traumatic anterior dislocation of the shoulder. Cochrane Database Syst Rev (1):CD004962