How Satisfied Are Patients with Arthroscopic Bankart Repair? A 2-Year Follow-up on Quality-of-Life Outcome

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Purpose: To report general life and health satisfaction after arthroscopic Bankart repair in patients with post-traumatic recurrent anterior glenohumeral instability and to investigate postoperative time lost to return to work at 2-year follow-up. **Methods:** Between 2011 and 2013 patients treated with arthroscopic Bankart repair in the beach chair position for acute shoulder instability were included in this study. Questions on Life Satisfaction Modules (FLZ^M) and the Short Form 12 (SF-12) were used as quality-of-life outcome scales. Oxford Instability Score (OIS), Quick Disabilities of the Arm, Shoulder and Hand questionnaire (QuickDASH), and self-reported American Shoulder and Elbow Surgeons (ASES) shoulder index were used as functional outcome scales. Return to work (months) was monitored and analyzed depending on physical workload. Data were assessed the day before surgery and prospectively monitored until 24 months postoperatively. Quality-of-life outcome was correlated with functional shoulder outcome and compared with normative age-adjusted data. Paired *t*-test, Wilcoxon test, Mann-Whitney *U*-Test, and Spearman's correlation coefficient were used for statistical analysis. **Results:** Fifty-three patients were prospectively included. The mean age at surgery was 29.4 years. Satisfaction with general life and satisfaction with health (FLZ^M) as well as physical component scale (SF-12) improved significantly to values above normative data within 6 to 12 months after surgery (each $P < .001$). OIS, QuickDASH, and ASES improved significantly from baseline until 24 months after surgery (each $P < .001$). For ASES, improvement above minimal clinically important difference was shown. There was a positive correlation between quality of life and functional outcome scores ($P < .05$; rho, 0.3-0.4). Mean time to return to work was 2 months (range, 0-10; standard deviation, 1.9), with significantly longer time intervals observed in patients with heavy physical workload (3.1 months; range, 0 to 10; standard deviation, 2.4; $P = .002$). **Conclusions:** Following arthroscopic Bankart repair, quality of life was impaired during early course after surgery and increased significantly above preoperative levels within 6 to 12 months after the procedure. A steady state of excellent quality-of-life and functional outcomes was noted after 12 months of follow-up. Quality-of-life outcome scales correlated significantly with the functional outcome. Heavy physical workload must be considered as a risk factor for prolonged time lost to return to work. **Level of Evidence:** Level III, prospective noncomparative therapeutic case series.

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Traumatic glenohumeral dislocation is one of the most common traumatic joint disorders in young and active individuals, commonly resulting in recurrent glenohumeral instability.[1,2] It has been shown that anterior glenohumeral instability affects perception of general health status comparable with 5 major medical

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conditions (hypertension, congestive heart failure, acute myocardial infarction, diabetes, and depression).[3] Accordingly, glenohumeral instability represents a serious public health problem in this usually young and active patient population.

Arthroscopic Bankart repair is a well-established and successful procedure to restore shoulder stability, improve shoulder function, and consequently relieve discomfort.[4,5] The high demand on shoulder function concerning occupational and recreational aspects of daily living may not be represented by standardized functional shoulder scores and/or radiographic follow-up examinations alone. Since it is the patient's perception that is important, there has been a shift towards patient-centered medicine.[6] Rossi et al. show that patient comprehension of orthopaedic procedures is low and their expectations for successful outcomes are often unrealistic. Since improvement of patient comprehension is a critical determinant of outcome, Rossi et al.[7] call it an "expectation game." A patient-reported quality-of-life outcome approach allows us to measure the effectiveness of a specific intervention by identifying individual priorities and problems, assessing progress, and developing realistic goals.

The purpose of this prospective case series was to report general life and health satisfaction after arthroscopic Bankart repair in patients with post-traumatic recurrent anterior glenohumeral instability and to investigate postoperative time lost to return to work at 2-year follow-up.

We hypothesize that arthroscopic Bankart repair for post-traumatic anterior glenohumeral instability significantly improves quality of life and that physical workload significantly prolongs time to return to work.

Methods

Between October 2011 and August 2013 patients treated with arthroscopic Bankart repair for acute post-traumatic glenohumeral instability were included in this study.

Inclusion criteria were isolated acute post-traumatic anterior glenohumeral instability and age 18 to 45 years. After an attempt to nonoperatively treat patients for initial dislocation, acute shoulder instability was defined as traumatic shoulder dislocation with consecutive apprehensiveness and a time interval from initial dislocation to surgery of <6 weeks. Exclusion criteria were chronic/habitual instability, multidirectional instability, SLAP lesion, pulley lesion, tendinitis of the long biceps tendon, glenoid bone loss >20% on magnetic resonance imaging using measurement described by Sugaya et al.,[8] engaging Hill-Sachs lesion, advanced osteoarthritis (Samilson and Prieto grade 3), glenoid dysplasia, and full-thickness or high-grade partial-thickness (>50%) rotator cuff tears. Revision stabilization and/or concomitant surgical procedures (e.g., biceps tenotomy/tenodesis, SLAP-repair, cuff repair) at the index surgery were exclusion criteria as well.

Data acquisition was conducted by 2 independent investigators and took place the day before surgery (baseline) and 6 weeks, 12 weeks, 6 months, 12 months, and 24 months (±2 months) after surgery. Patients who experienced reinstability (apprehensiveness and/or redislocation) were excluded for further follow-up (see below).

Arthroscopic Procedure and Rehabilitation

Bankart repair was performed by 3 fellowship-trained surgeons in patients who presented with at least 90° abduction and flexion prior to surgery. The patient was placed in the beach chair position. Clinical examination under general anesthesia and diagnostic glenohumeral arthroscopy through a standard posterior portal confirmed the indication for repair.

A deep anteroinferior portal (5:30 clock face position) through the lower third of the subscapularis muscle was used in all patients.[9] The number of suture anchors (BioFastak; Arthrex, Naples, FL) used varied among patients, depending on the pathologic findings. For Bankart repair, 3 anchors were placed at the 5:30, 4:30, and 3:00 o'clock positions (for right shoulders).[10]

Postoperatively, an arm sling was provided for comfort. Progressive active and assisted range-of-motion exercise was initiated on the first day after surgery. Within the first 3 weeks after surgery, range of motion was limited to 90° to 30° of internal rotation without external rotation and abduction and flexion were limited to 45°. At 4 weeks postoperatively, abduction and flexion were allowed to 90° and external rotation was limited to 0°. Free active range of motion was allowed 6 weeks after surgery. Patients were permitted to return to sport-specific training after 3 months and to overhead and high-impact activities after 6 months.

Assessment of Health-Related Quality of Life, Functional Outcome, and Return to Work

Health-related quality of life was assessed using Questions on Life Satisfaction Modules (FLZ^M, "Fragen zur Lebenszufriedenheit^{Module}")[11] and Short Form-12 Health Survey[12] as primary outcome measurement tools.

FLZ^M consists of 2 modules of 8 items: (1) general life satisfaction (GLS): "friends/acquaintances", "leisure time/hobbies", "health", "income/financial security", "occupation/work", "housing/living conditions", "family life/children", and "partner relationship/sexuality"; (2) satisfaction with health (SwH): "physical condition/fitness", "ability to relax/stay on an even keel", "energy/zest for life", "mobility (e.g., walking, driving)", "vision and hearing", "freedom from anxiety", "freedom from aches and pains", and

"independence from help/care". To deal adequately with the problem of relative importance of individual aspects of quality of life, FLZ^M evaluates individual weighting of the items. As a reference, on a 0 to 100 scale (with 100 representing maximal satisfaction), mean normative age-adjusted reference for the GLS module is 65 and 90 for SwH module.[11]

Short Form-12 (SF-12) is a multidimensional generic quality-of-life measure derived from 12 items selected from the SF-36 health survey across 8 dimensions of health: "physical functioning", "role limitations—physical", "bodily pain", "general health", "vitality", "social functioning", "role limitations—emotional", and "mental health". It produces 2 summary scores: (1) physical component scale (PCS) and mental component scale (MCS).

To evaluate longitudinally functional shoulder stability outcomes, the Oxford Instability Score (OIS)[13] was used. In addition, the short version of Disabilities of the Arm, Shoulder and Hand questionnaire (Quick-DASH)[14] and the self-reported American Shoulder and Elbow Surgeons (ASES) shoulder index[15] were evaluated at baseline and final follow-up. ASES results were compared to previously reported minimal clinically important difference (MCID) data.[16-18] Time (months) lost to return to work was evaluated. Type of occupation was assessed concerning non-/mild-physical versus heavy physical workload using the German classification system according to the REFA Association from occupational and social medicine.[19,20]

At final follow-up, patients were asked to report redislocation/instability, revision surgery, and/or other complications (e.g., neurovascular lesion, infection, surgically addressed shoulder stiffness) during the postoperative course.

The study protocol was approved by the Institutional Review Board of the Faculty of Medicine, Technische Universtiät München, Munich, Germany (IRB no. 415/15). All patients provided written informed consent to participate in this investigation.

Statistics

Statistical analysis was performed using SPSS software version 20.0 (IBM-SPSS, Armonk, NY). All data were tested for normal distribution using the Kolmogorov-Smirnov test.

Longitudinal dependent samples were computed by the paired *t*-test for parametric and the paired Wilcoxon test for nonparametric data. Characteristics between groups were compared using the Mann-Whitney *U*-Test.

Correlation was calculated using Spearman's correlation coefficient. A nominal P value $< .05$ was considered to indicate statistical significance.

A priori sample size calculation was conducted based on prior instability studies. Using differences between pre- and postsurgical ASES scores, a collective of 50 patients was calculated to be sufficient to detect a significant difference with 85% power (alpha, 0.05).[21]

Results

Demographics

Detailed demographic characteristics are provided in Table 1. Mean length of postoperative follow-up period was 24 months (range, 22 to 26 months).

Fifty-three patients fulfilled the inclusion and exclusion criteria of this study. A total of 44 questionnaires were available at final follow-up (follow-up rate, 83%). Details of patient enrollment are shown in Figure 1.

Three patients (6%) experienced reinstability (apprehensiveness) without redislocation, and 2 patients (4%) had a redislocation with adequate trauma performing contact sports >6 months after surgery. No other complications (e.g., neurovascular lesion, infection, surgically addressed shoulder stiffness) were recorded. Two patients (4%) with reinstability underwent revision surgery (one arthroscopic restabilization using suture anchors and one Latarjet procedure).

Longitudinal Changes in Health-Related Quality of Life

FLZ summary scale GLS significantly improved from 66.4 at baseline (range, -4 to 131; 95% confidence interval [CI], 57 to 76) to 78.4 (range, 8 to 160; 95% CI, 69 to 88) at 12 months after surgery ($P = .009$). SwH significantly improved from baseline 73.6 (range, -18 to 152; 95% CI, 63 to 84) to 94.5 (range, 12 to 155, 95% CI, 85 to 105; $P < .001$) 12 months after surgery. From 1-year follow-up onward, there was no significant change in GLS and SwH observed (not significant) until final follow-up. For details see Table 2.

GLS FLZ^M subitems "leisure time/hobbies", "friends/acquaintances", and "health" significantly improved from baseline until 12 months after surgery (each $P < .001$). Concerning SwH, FLZ^M subitems "physical condition/fitness", "freedom from aches and pain", and "freedom from anxiety" significantly improved until 12-month follow-up (each $P < .001$). For details see Figure 2.

The SF-12 PCS significantly improved from baseline to 12-month follow-up ($P < .001$). The outcome of

Table 1. Patient Demographic Data

Demographic Characteristic	Data
Patients/shoulders, n	44/44
Sex, male/female, n (%)	31/13 (70/30)
Shoulder, right/left, n (%)	20/24 (45/55)
Dominant side affected, n (%)	21 (48)
Mean follow-up, months (range)	24 (22-26)
Mean age at surgery, y (range)	29.4 (18-45)
Mean body mass index at surgery, kg/m^2 (range)	24.1 (17-34)

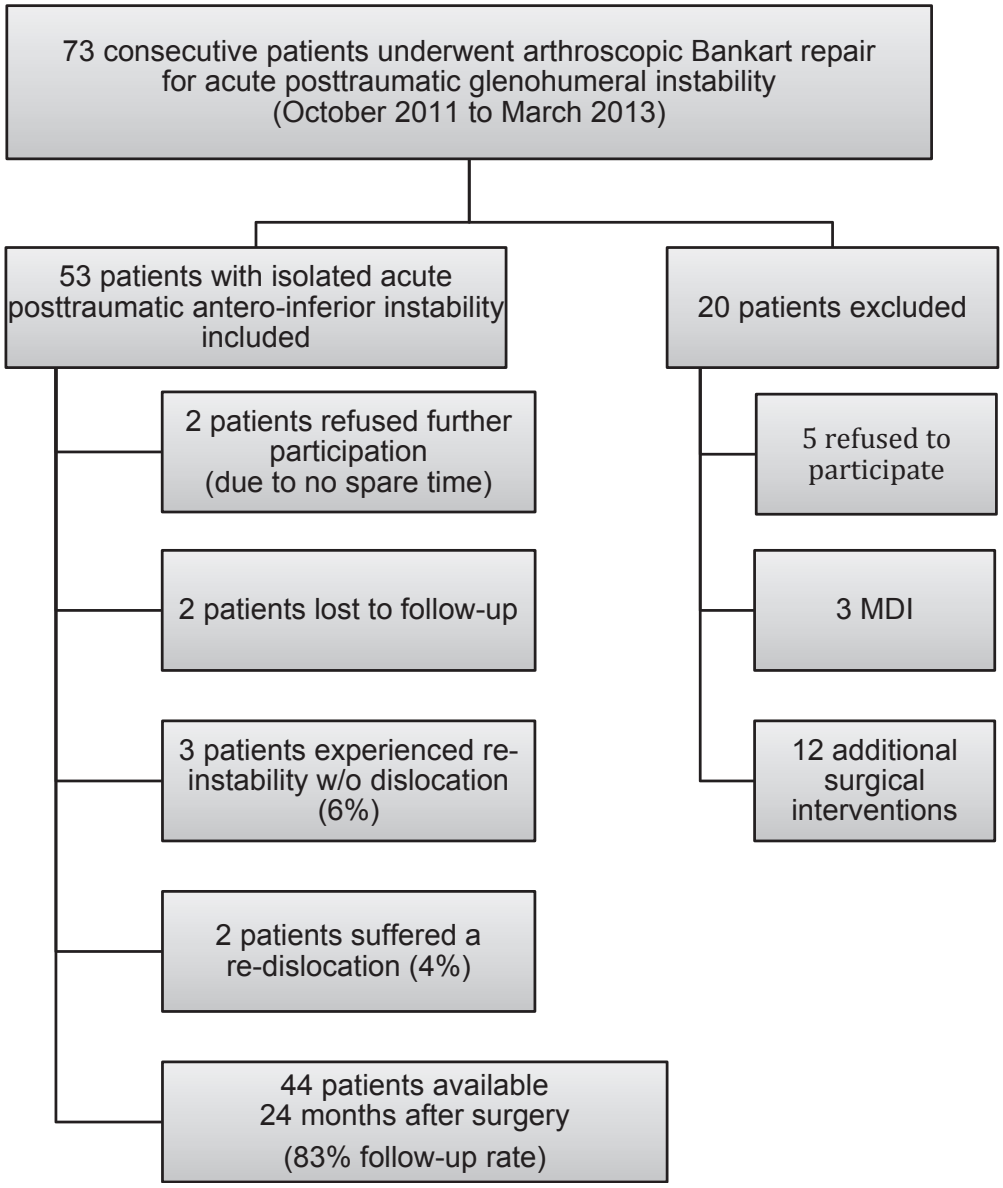

Fig 1. Flowchart of patient enrollment with isolated acute post-traumatic anteroinferior shoulder instability and arthroscopic Bankart repair ($n = 53$; MDI, multidirectional instability).

MCS was constant from baseline to final follow-up (not significant). For details, see Table 3.

Longitudinal Functional Outcome and Return to Work

Before surgery, mean OIS was 25.9 (range, 10 to 48; standard deviation [SD], 8.1). During the postoperative course, OIS significantly increased between every follow-up until 12 months after surgery (each $P < .001$). From 12-month follow-up onward, mean OIS scoring was excellent (42.4; range, 17 to 48; SD, 6.6). From the 12- to 24-month follow-up there was no significant improvement observed (not significant). For details see Table 4.

Mean outcomes of ASES (72.1 ± 18, range, 23 to 100; to 90.1 ± 14.1, range, 29 to 100) and QuickDASH (45.7 ± 17.3, range, 24 to 85; to 28.6 ± 8.2, range, 24 to 72) significantly improved between baseline and final follow-up (each $P < .001$).

At 12 and 24 months of follow-up, 82% ($n = 36$) and 84% ($n = 37$) of the patients were very satisfied with the subjective result of the procedure.

Before surgery 42 (79%) patients were regularly occupied. Mean time lost to return to work was 2 months (range, 0 to 10; SD, 1.9). Twenty-three (52%) patients had an occupation including heavy physical workload, while 21 (48%) worked in occupations required little physical work. The average time to return to work was 3.1 months (range, 0 to 10; SD, 2.4) in the heavy physical workload group versus 1.3 months (range, 0 to 4; SD, 0.9) in the group with little physical workload, which was statistically significant ($P = .002$).

Table 2. Longitudinal Satisfaction with Life and Health Outcome (FLZ^M)

Follow-up	Mean	SD	Min	Max
Preoperative				
General life	66.43	33.22	−4	131
Health	73.55	36.23	−18	152
6 Weeks				
General life	57.27	33.17	−16	135
Health	59.48	35.19	−16	118
12 Weeks				
General life	61.89	32.28	−5	152
Health	75.5	29.56	29	144
6 Months				
General life	72.48	34.98	−31	145
Health	88.2	34.66	−4	145
12 Months				
General life	78.39	32.87	8	160
Health	94.5	34.62	12	155
24 Months				
General life	75.27	30.89	3	142
Health	92.95	31.71	24	160

NOTE. Longitudinal course of general life satisfaction and satisfaction with health (FLZ^M) after arthroscopic Bankart repair ($^*P < .05$ preoperatively vs 12 months follow-up). Mean normative weighted age-adjusted reference for "general life" module is 65 and 90 for "health" module.

Correlation of Health-Related Quality-of-Life with Functional Outcome

Health-related quality-of-life outcomes (FLZ^M: GLS and SwH, SF-12: PCS) correlated moderately but significantly with functional outcomes (OIS, Quick-DASH, and ASES) at final follow-up (rho, 0.3 to 0.4; $P < .05$). MSC (SF-12) did not correlate with functional outcomes (not significant).

Discussion

The most important finding of this study was a significant increase in quality of life within the first 12 months after arthroscopic Bankart repair compared with the preoperative levels. In general, from 6 months onward, follow-up on quality-of-life outcomes (GLS, SwH, PCS) was at least equivalent to age-adjusted normative data. During the further longitudinal course, average outcomes reached excellent results. The same was true for functional outcomes. In addition, quality-of-life and functional outcomes correlated. Thus, the primary hypothesis of this study has been proved. Since time to return to work is critically dependent on heavy physical workload, the secondary hypothesis has been proved as well.

The field of orthopaedics has been devoted to assessing function. Thus, success of an orthopaedic surgical procedure is judged by relief from pain, function, activity levels, and radiographic assessments. However, since it is the patient's perception that is important, patient-based quality-of-life outcome measures have been drawing more attention over the past years.

Calman defined quality of life as measuring the gap at a particular period of time between the individual's hopes, expectations, and desires.[22] It changes over time and depends on the individual's present lifestyle, experiences, ambitions, realistic priorities, and goals. Improvement is related to the ability to identify and actively achieve those goals. "Good" quality of life can be defined as personal hopes matching and being fulfilled by experience. This is expressed by satisfaction, contentment, fulfillment, and the ability to cope.[22] In summary, quality of life is a multidimensional (at least physical, mental, and social), subjective, and relative construct. This makes it distinctive compared with the concept of patient-reported outcome (PRO) measures, since this is a patient-reported measure for only one aspect of the health condition of an individual. In contrast to quality of life that includes a broad concept of subjective well-being, PROs may be limited to singular symptoms, such as pain, for example.[23]

The SF-12 health survey is the most widely used quality-of-life measure in research to date. In the orthopaedic field, the use of the SF-12 survey is potentially limited since mental health distress might be underrepresented. More important, it may not be a good indicator of physical function of the upper extremity since it focuses on the lower extremity.[3,24] FLZ^M monitors physical and mental well-being as well. More important, FLZ^M includes weighting for the relative importance of each dimension for the individual concerned. In consequence, the rating on a dimension that is of little importance to an individual does not contribute the same amount to the overall score as the rating on a dimension that is especially important.[11]

Few studies have measured quality-of-life outcomes following Bankart repair.[25-27] We present a prospective case series that investigated standardized patient-reported quality-of-life satisfaction after Bankart repair. Further, data are provided based on a standardized and validated generic health-related quality-of-life outcome scale that incorporates individually the weighted importance of each dimension.

The present study shows a significant increase of patient SwH (FLZ^M), GLS (FLZ^M), and PCS (SF-12) within the first year after Bankart repair. Until 3 months after surgery, GLS was below, but SwH was above, the preoperative status. At 6-month follow-up, GLS was monitored above normative age-adjusted data, whereas SwH reached this level not earlier than 12 months after surgery. The longitudinal course of FLZ^M subitems "leisure time/hobbies", "health", "physical condition/fitness", "freedom from aches and pain", and "freedom from anxiety" increased significantly until 12-month follow-up. In general, there was no significant

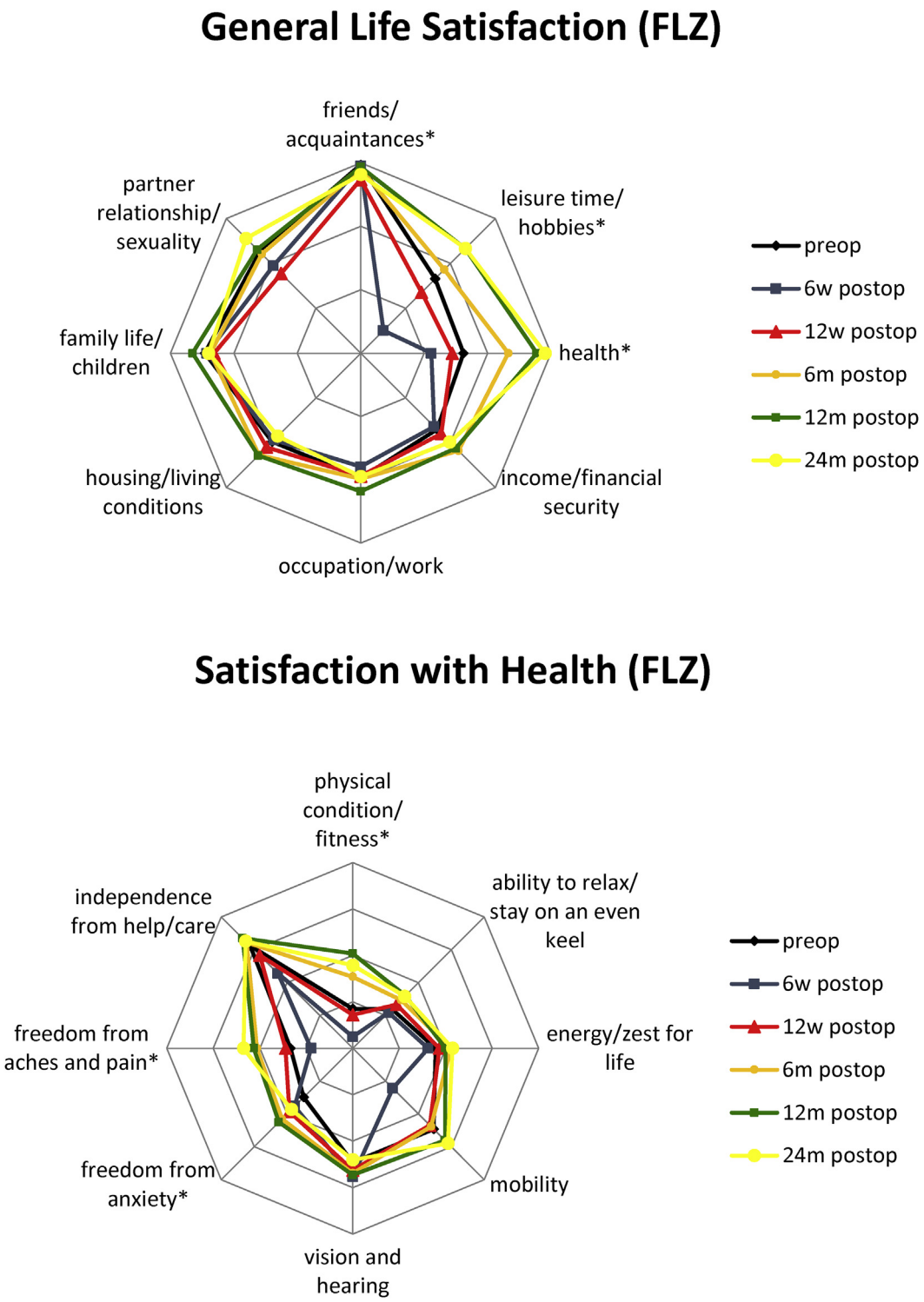

Fig 2. Longitudinal course of quality of life (general life satisfaction and satisfaction with health, FLZ^M) up to 24 months after arthroscopic Bankart repair. The area outlined by the single points of all items represents global quality of life. The distance from the center of the diagram to the single point of each axis represents the weighted importance of each item ($^*P < .001$ preoperatively vs 12 months postoperatively).

improvement observed for primary outcome measures between 12 and 24 months of follow-up. This finding differs from the data presented by Mohtadi et al.[25], where quality-of-life outcome significantly improved only between baseline and 24 months of follow-up. Our data allow us to hypothesize that a steady state outcome is achieved one year after surgery during short-term follow-up. Warth et al.[28] showed, that the

Table 3. Longitudinal Quality-of-Life Outcome (SF-12)

Follow-up	Mean	SD	Min	Max
Preoperative				
PCS	44.9	8.72	24.72	60.39
MCS	50.12	9.85	23.09	62.27
6 Weeks				
PCS	36.63	7.88	22.49	57.55
MCS	49.8	9.99	30.46	68.40
12 Weeks				
PCS	45.25	8.48	29.66	58.49
MCS	51.61	7.03	34.91	63.81
6 Months				
PCS	51.21	8.47	16.13	61.49
MCS	51.88	8.51	18.23	61.02
12 Months				
PCS	53.63*	8.02	23.12	63.96
MCS	49.85	11.31	9.4	60.76
24 Months				
PCS	51.16	8.69	23.62	59.95
MCS	51.46	7.60	33.31	63.86

NOTE. Longitudinal course of Short Form (SF-12) physical component scale (PCS) and mental component scale (MCS) after arthroscopic Bankart repair ($^{*}P < .05$ preoperatively vs 12 months follow-up).

top 3 patient expectations before shoulder stabilization were (1) participation in sports, (2) cessation of dislocating, and (3) previous level of function. The associated/corresponding FLZ^{M} subitems showed that these expectations were fulfilled. This resulted in a high satisfaction with quality of life following the procedure. In the authors' opinion, these findings are valuable to guide patients towards realistic expectations prior to arthroscopic Bankart repair.

The functional results and the recurrence rate of this study represent a significant clinical improvement. These findings are comparable to the present literature.[25,29-31] It is noteworthy that mean ASES outcome improved by 18 points between preoperative baseline and 2-year follow-up. This means an improvement above the previously described MCID.[16-18]

As mentioned above, primary and secondary outcome measures improved significantly and reached excellent results. There exists no validation for FLZ^{M} against shoulder-specific functional outcome scores (e.g., OIS). The SF-12 health survey has been validated against OIS for patients with shoulder instability.[32] In the current study, a moderate but significant correlation between quality-of-life and functional outcomes was found. Still, not all variables (e.g., MSC, SF-12) correlated with functional outcome. Limitations have been previously formulated for standardized generic quality-of-life and functional outcome measures in shoulder instability.[3] On the basis of the above-mentioned definition of quality of life, the authors of this study hypothesize that the nature of quality-of-life and functional outcome is measured and/or critically triggered by different means. It has been shown that high clinical outcomes do not necessarily correlate with quality-of-life outcome or even result in decreased quality-of-life outcome. This has been described as the "satisfaction paradox" in quality-of-life research.[33] In addition, the study by Tjong et al.[34] showed, that the PRO "return to sport" after arthroscopic Bankart repair depended critically on extrinsic and intrinsic factors (e.g., competing interests, kinesiophobia, age, and internal stressors/motivators) and was not attributable to a perceived lack of shoulder function. Further, PRO failure did not necessarily constitute a poor outcome. The authors of this study conclude that future investigations are necessary to implement more specific and sensitive outcome measures to monitor disease-specific quality of life and PRO after shoulder stabilization.

This prospective study found a mean time to return to work of 2 months. This is 0.75 months earlier than Kraus et al.[19] reported in their retrospective study. Since both studies report a significantly prolonged time to return to work for heavy physical workload, this must be considered as a risk factor for time lost to return to occupation. We conclude that physical workload should be assessed prior to surgery in order to properly inform individuals who do heavy physical work about a prolonged incapacity for work.

Limitations

For the presented prospective case series, limitations have to be named: (1) This study was performed at a

Table 4. Functional Outcome after Arthroscopic Bankart Repair

	OIS				ASES				QuickDASH			
Follow-up	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Preoperative	25.9	8.2	10	48	72.1	18	23	100	45.7	17.3	24	85
6 Weeks	18.2*	6.9	9	44								
12 Weeks	25.4*	9.2	8	46								
6 Months	38*	8	14	48								
12 Months	42.4*	6.6	17	48								
24 Months	43.5	7.4	14	48	90.1*	14.1	29	100	28.6*	8.2	24	72

NOTE. Longitudinal course of Oxford instability score (OIS), self-reported American Shoulder and Elbow Surgeons shoulder index (ASES), and Quick Disabilities of the Arm, Shoulder and Hand questionnaire (QuickDASH) after arthroscopic Bankart repair ($^{*}P < .001$ OIS preoperatively vs 6 weeks, 6 weeks vs 12 weeks, 12 weeks vs 6 months, and 6 months vs 12 months; ASES/QuickDASH preoperatively vs 24 months).

tertiary care center. Results may not reflect the characteristics of patients who present at different levels of institutions. (2) There is no control group (e.g., nonsurgical treatment) for the stabilization technique used in this study. It was outside the scope of this study to investigate a gold standard method. Nevertheless, arthroscopic Bankart repair with the presented technique remains an excellent treatment option. (3) The number of participants in this study is low. However, the results represent comparable outcomes and the minimal number of patients calculated by power analysis was achieved. (4) The potential high-risk group of individuals under the age of 18 years has been excluded due to legal reasons. (5) Individuals who had reinstability/redislocation were excluded from further follow-up. (6) This group was too small to be compared with the other patients. (7) Comparing the findings of this study with previously published normative data may be a source of bias. By presenting age-adjusted data, this source of bias was at least reduced by this variable. (8) According to the review by Plancher and Lipnick, OIS is only moderately valid for shoulder instability and not equivalent to that of the ASES subjective score.[35]

Conclusions

Following arthroscopic Bankart repair, quality of life was impaired during the early course after surgery and increased significantly above preoperative levels within 6 to 12 months after the procedure. A steady state of excellent quality-of-life and functional outcomes was noted after 12 months of follow-up. Quality-of-life outcome scales correlated significantly with the functional outcome. Heavy physical workload must be considered as a risk factor for prolonged time lost to return to work.

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