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SHOULDER

Patients' expectations of shoulder instability repair

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Abstract
Purpose To analyze and compare patient expectations of primary and revision shoulder stabilization and to assess the factors associated with patients' expectations.
Methods Pre-operative patient expectations after shoulder instability repair were prospectively assessed using a self-designed questionnaire. The survey included questions on the expected level and type of return to sports, instability, pain, risk of osteoarthritis, and overall shoulder condition.
Results One-hundred and forty-five patients (99 primary; 46 revision repair) were included. A return to sport at the same level with slight to no restrictions was expected in 95%, a return to high-risk activities in 34%, to moderate in 58%, and to low-risk activities in 9%. No pain [instability] independent of the activity level was expected by 71% [79%] and occasional pain [instability] during contact and overhead activities by 25% [19%]. 61% expected to have no risk of glenohumeral osteoarthritis, 37% a slight, and 2% a significant risk. The overall expectation for the post-operative shoulder was indicated to be normal or nearly normal in 99% of patients. The revision group did not differ from the primary repair group in any variable. High pre-operative sport performance was positively correlated with post-operative sport expectations. The number of dislocations, the duration of instability, and the subjective instability level were negatively correlated with return to sport expectations.
Conclusion Patient expectations for primary and revision shoulder instability repair are high. Realistic patient expectations regarding the surgical procedure are necessary to avoid low patient satisfaction, especially in pre-operatively highly active and demanding athletes. The surgeon must not solely base the treatment on the pathology and possible risk factors for failure but should also take the individual expectation of the patient into account.
Level of evidence III.

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Introduction

From the surgeon's point of view, shoulder instability is a condition that can be treated effectively and safely and multiple studies have reported high stability and functional scores for recent repair techniques [5, 17, 29, 35, 38, 45].

Nevertheless, patient satisfaction remains the main goal of all orthopedic procedures and studies have shown that patient satisfaction may not be associated with objective outcomes [12, 23, 32].

Numerous studies have demonstrated that when pre-operative patient expectations are in line with post-operative results, patient satisfaction with the surgical procedure significantly improves [3, 8, 13, 18, 24, 32, 41, 42]. Thus,

patients may be satisfied when they achieve their expected outcome despite possible objective limitations and/or decreased outcome score. This understanding has led to a recent increase in interest among surgeons to understand patients' pre-operative expectations in an attempt to align them with outcomes [46].

Extensive data exist on hip and knee joint replacement, but few studies address patient expectation in the field of orthopedic shoulder surgery, and to date, no specific data exist regarding patient expectation and glenohumeral instability [3, 8, 13, 14, 24, 26–28, 32, 41, 46]. It is imperative that the surgeon understand their patients' perspectives about what constitutes a successful treatment and the factors that influence those expectations to have an appropriate discussion about what to expect from a specific surgery and improve shared decision making [40].

Unrealistic patient expectations may lead to dissatisfaction despite a successful operation from the surgeon's point of view, which in the end makes no one happy.

The aim of this study was to analyze patient expectations before primary and revision shoulder stabilization procedures and to assess factors associated with these pre-operative expectations.

It was hypothesized that: (1) patient expectations of shoulder instability repair are overall high; (2) patients undergoing revision repair have inferior expectations; and (3) young male patients with a high pre-injury sports level have the highest expectations status-post shoulder instability repair.

Materials and methods

Patients undergoing primary and revision shoulder instability repair from May 2013 to November 2015 at the Department of Orthopedic Sports Medicine, Munich, Germany (tertiary care facility) were enrolled

Exclusion criteria were voluntary shoulder instability, fracture dislocation (excluding bony Bankart lesions), rotator cuff tears that needed repair, and advanced symptomatic glenohumeral osteoarthritis.

Data collection

Surveys were collected by a study nurse that was not involved in the medical care of the patients. All surveys were administered on the day before surgery.

The questionnaire assessed specific data on pre-operative expectation, demographic data, detailed shoulder instability history, the pre-trauma sports level (professional, competitive, recreational, and none) as well as a Visual Analog Scale (VAS) for instability. The pre-operative sports level was classified as high-, moderate-, and low risk or no sports [9].

The six-item section on patient expectation was based on a recently published survey on pre-operative patient expectation [9]. Patients were asked to report the minimum result at 1 year post-operative with which they would be satisfied. The survey included questions on the return to sports level and type of sport, instability, risk of joint degeneration, pain, and overall condition of the shoulder. The detailed questionnaire is shown in Table 1.

The study protocol was approved by the Institutional Review Board of the Technical University Munich, Germany (IRB# 418/13) and all patients provided written informed consent to participate in this investigation.

Statistical analysis

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

Pre-operative patient characteristics between both groups were compared using the unpaired Student´s t test if data were normally distributed or the Mann–Whitney U test if data were nonparametric.

Dichotomous data were computed by the Chi-square test. A correlation analysis between pre-operative patient characteristics and patient expectation was calculated using Spearman's correlation coefficient. A P value of less than 0.05 was considered to indicate statistical significance.

Power analysis for group comparison on the basis of a previous study [9] determined a minimum sample size of 141 patients (94 primary and 47 revision group), assuming an enrollment ratio of 2:1 (primary versus revision), an α of 0.05, and a power of 0.80.

Results

Patient characteristics

One-hundred-and-forty-five patients underwent shoulder stabilization between May 2013 and November 2015 at the Department of Orthopedic Sports Medicine, Munich, Germany. All patients met the study inclusion criteria and could be included in the study. The average age at surgery was 27.6 ± 8.2 years (range, 14–63). One-hundred-sixteen patients (80%) were male. The dominant shoulder was affected in 82 patients (57%).

One-hundred-twenty-eight patients (88%) reported a traumatic onset of shoulder instability. Of the 128 patients, 97 patients (76%) had sports related injuries, while 14

Table 1 Six-item shoulder instability patient expectation questionnaire, based on [9]

Return to the sports performance level:	(A) Same level, no restrictions
	(B) Same level, slight restrictions
	(C) Slightly reduced level
	(D) Significantly reduced level / no sport
Return to the risk level for recurrent dislocation (examples given according to [43])	(A) High-risk activities
	(B) Moderate risk activities
	(C) Low risk activities
	(D) No sport possible
Sensation of instability	(A) No sensation of instability, independent of activity level
	(B) Sensation of instability during contact- and overhead activities
	(C) Sensation of Instability during low-demanding activities
	(D) Sensation of instability during activities of daily living
Risk for osteoarthritis (at 20 years post-operatively compared to a healthy shoulder)	(A) No increased risk
	(B) Slightly increased risk
	(C) Significantly increased risk
	(D) Shoulder surgery cannot reduce the risk for early joint degeneration
Pain	(A) No pain, independent of activity level
	(B) Pain during contact- and overhead activities
	(C) Pain during low-demanding activities
	(D) Pain during activities of daily living
Overall condition of the shoulder (compared to a healthy shoulder)	(A) Normal
	(B) Nearly normal
	(C) Abnormal
	(D) Severely abnormal

patients (10%) indicated no initial trauma. Three patients (2%) had a seizure-related primary dislocation.

Ninety-nine patients (68%) underwent primary shoulder stabilization, while 46 patients (32%) had a history of one or multiple previous shoulder stabilization procedures. Thirty-one patients (67%) reported a single previous surgery, 12 patients (26%) had two prior surgeries, two patients (4%) three, and one patient (2%) 5.

Detailed patient characteristics, including subdivisions of primary and revision stabilization, are provided in Table 2.

Patient expectations

Ninety-two percent of patients expected a return to sports at the same level without or with only slight restrictions, while 7% expected a slight and 1% a significant decrease of sports level (Fig. 1). 34% of patients expected to be able to return to high-risk activities, 58% to moderate-risk activities, and 9% to low-risk activities post-operatively without risk for recurrent dislocation (Fig. 2).

No instability independent of the activity level was expected by 79%, occasional instability during contact and overhead activities by 19%, occasional instability during low-demanding activities by 1%, and occasional instability during activities of daily living by 1% (Fig. 3).

Sixty-one percent of patients expected no increased risk of development of glenohumeral osteoarthritis, while 37% indicated a slight and 2% a significant increased risk. No patient expected that the surgical procedure would not reduce the risk for development of glenohumeral degeneration (Fig. 4).

No pain independent of the activity level was expected by 71%, occasional pain during contact and overhead activities by 25%, occasional pain during low-demanding activities by 3%, and occasional pain during activities of daily living by 1% (Fig. 5).

The overall expectation of the post-operative shoulder was indicated to be normal or nearly normal in 99% of patients. One percent expected an abnormal result and no patients expected a severely abnormal shoulder post-operatively (Fig. 6).

Revision surgery group analysis

Compared to the primary surgery group, the revision group showed a significantly higher grade of subjective pre-operative instability ($P = 0.009$), a higher number of pre-operative dislocations ($P < 0.001$), and a longer

Table 2 Pre-operative patient characteristics for the whole patient population as well as for primary and revision repair

Demographics		Overall	Primary repair	Revision repair	*P* value
No. of patients (%)		145	99 (68)	46 (32)	–
Male/female ratio (%)		116/29 (80/20)	81/18 (82/18)	35/11 (76/24)	n.s
Right/left ratio (%)		82/63 (57/43)	56 / 43 (57/43)	26/20 (57/43)	n.s
Dominant side affected ratio (%)		82/63 (57/43)	54/45 (56/46)	28/18 (61/39)	n.s
Mean age at surgery ± SD (range), y		27.6 ± 8.2 (14–63)	26.9 ± 8.6 (14–63)	29.2 ± 7.3 (15–51)	n.s
Visual Analog Scale (instability)		6.0 ± 2.4 (0–10)	5.6 ± 2.4 (0–10)	6.7 ± 2.3 (0–10)	0.009
Number of pre-operative dislocations (%)	>50	12 (8)	8 (8)	4 (9)	<0.001
	11–49	24 (17)	12 (12)	12 (26)	
	6–10	21 (15)	9 (9)	12 (26)	
	2–5	50 (35)	33 (33)	17 (37)	
	1	35 (24)	34 (34)	1 (2)	
	subluxation	3 (2)	3 (3)	0 (0)	
Mean duration of instability ± SD (range), m		51.2 ± 63.9 (0.3–338)	37.2 ± 52.5 (0.3–338)	81.2 ± 75.6 (4–305)	<0.001
Pre-trauma sports level	Professional	10 (7)	6 (6)	4 (9)	n.s
	Competition	39 (27)	27 (27)	12 (26)	
	Recreational	83 (57)	55 (56)	28 (61)	
	None	13 (9)	11 (11)	2 (4)	
Pre-trauma risk level	High	50 (34)	34 (34)	16 (35)	n.s
	Moderate	73 (50)	50 (51)	23 (50)	
	Low	11 (8)	6 (6)	5 (11)	
	None	11 (8)	9 (9)	2 (4)	
Surgical procedure	Arthrosc. Bankart	93 (64)	82 (83)	11 (24)	–
	Arthrosc. bony Bankart	9 (6)	6 (6)	3 (7)	–
	Open Latarjet	37 (26)	8 (8)	29 (63)	–
	Open bone graft	1 (1)	0 (0)	1 (2)	–
	Plicature only	3 (2)	1 (1)	2 (4)	–
	Glenoid osteotomy	2 (1)	2 (2)	0 (0)	–

No numbers; *SD* standard deviation; *y* years; *m* month

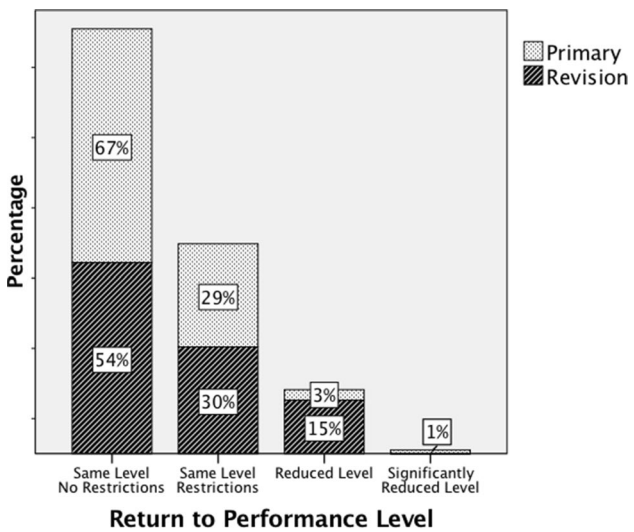

Fig. 1 Patient expectations for return to performance level. Minimum result at 1 year post-operative with which they would be satisfied

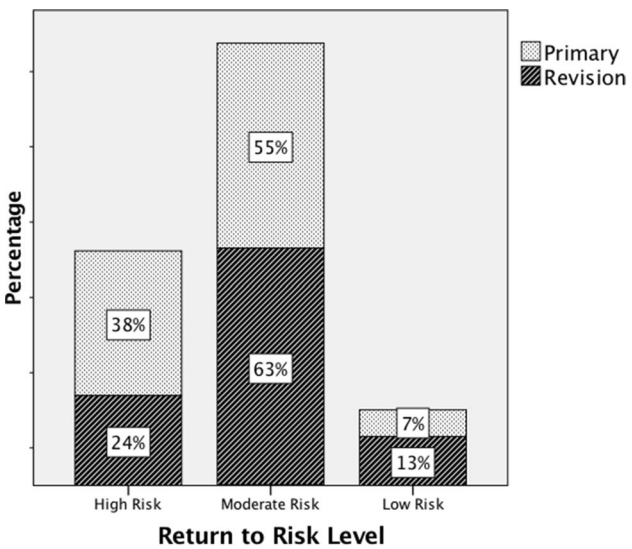

Fig. 2 Patient expectations for return to risk level. Minimum result at 1 year post-operative with which they would be satisfied

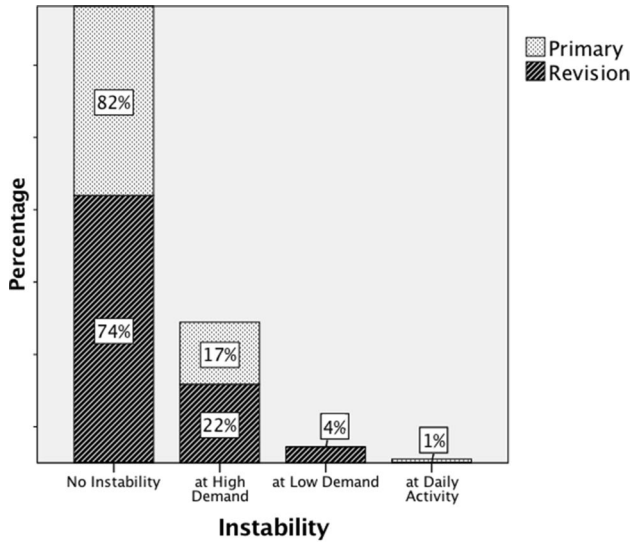

Fig. 3 Patient expectations for instability. Minimum result at 1 year post-operative with which they would be satisfied

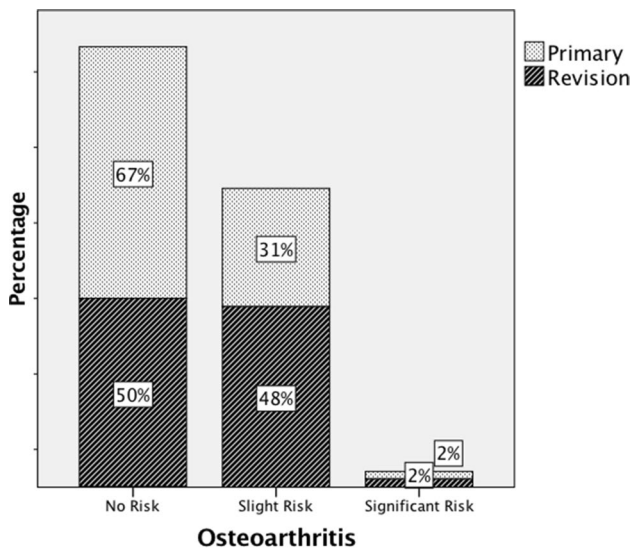

Fig. 4 Patient expectations for osteoarthritis at 20 years post-operatively compared to a healthy shoulder. Minimum result with which they would be satisfied

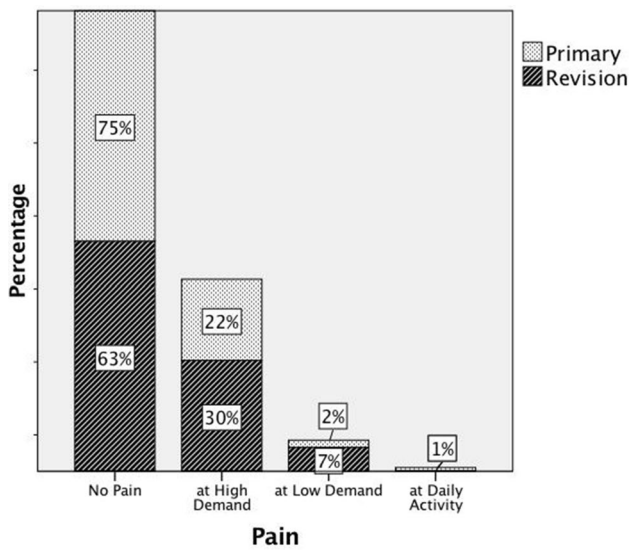

Fig. 5 Patient expectations for pain. Minimum result at 1 year post-operative with which they would be satisfied

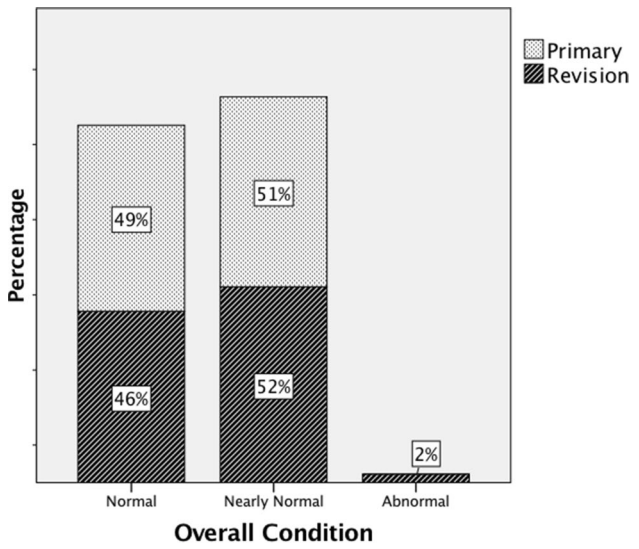

Fig. 6 Patient expectations for overall condition compared to a healthy shoulder. Minimum result at 1 year post-operative with which they would be satisfied

duration of shoulder instability ($P < 0.001$). In all the remaining pre-operative variables both groups were statistically homogenous (Table 2).

Upon analysing the pre-operative patient expectations, the revision group did not significantly differ from the primary repair group concerning the level of post-operative sports level (n.s.), risk level (n.s.), instability (n.s.), glenohumeral joint degeneration (n.s.), pain (n.s.), or overall shoulder condition (n.s.).

Factors associated with pre-operative expectation

The sex of the patient did not influence pre-operative patient expectations for any variable (n.s.).

The correlation analysis showed that a higher age at surgery was correlated with a higher expected risk for long-term glenohumeral osteoarthritis, while all other variables showed no significant correlation with age.

Patients who performed high-risk sports before trauma also expected to be able to return to high-risk activities at a

high level of performance post-operatively. The pre-trauma sports level was also positively correlated with a return to post-operative risk level.

A large number of previous dislocations, a long duration of shoulder instability, and a high level of pre-operative subjective instability (VAS) were significantly correlated with a reduced expectation regarding return to sports level and persistent pain after shoulder stabilization. A long duration of shoulder instability was also associated with a worse expected outcome of the shoulder.

Results of the correlation analysis and *P* values are shown in Table 3.

Discussion

The main finding of the present study was that patients have high expectations regarding shoulder instability surgery, which confirms our first hypothesis. Contrary to our second hypothesis, revision repair did not reduce the expectation of the patients in any perspective. Lower expectations were instead found among patients with a long history of instability, numerous dislocations, and a high grade of subjective instability. We also found that an athlete's expectations were affected by which sport they wanted to get back to playing. Our hypothesis that young and male patients have generally higher expectations is not supported by our data. In conclusion, it appears that revision surgery alone does not influence patients to change their expectations, but instead, a long and distressing history of instability may.

In the current study, the majority of patients indicated that they would only be satisfied with the surgical result if a full return to sport without restriction could be achieved. One-third of patients with a primary repair and one-quarter of patients with a revision repair expected to return to high-risk activities, while the majority of patients indicated to be satisfied with a return to a moderate-risk-level post-operatively.

Mancuso et al. [27] asked a group of 409 patients with various shoulder diagnoses about their expectations of shoulder surgery. Within the subgroup of shoulder instability, "return to sport" was the most frequently given answer (80%), followed by "stop dislocation" (53%). The authors used the given information to develop a 17-item shoulder surgery expectation questionnaire which was termed the "Hospital for Special Surgery Shoulder Surgery Expectations Survey" (HSSSSES).

Warth et al. [27] applied this survey to 313 of their patients presenting with a wide range of diagnoses. They confirmed within their instability patients that participation in sports was the most and cessation of dislocation was the second most important expectation for patients. However, they critically mentioned that the questionnaire may have limited use in patients with shoulder instability.

Definite clinical outcomes on the return to sport following shoulder instability repair are difficult to quote as this depends on the extent of the lesion, the performed surgical procedure, and the previous level and kind of activity of the patient [2, 7, 16, 17, 36, 38]. Nevertheless, the overall post-operative expectations after instability surgery seem to be realistic and achievable with the current surgical techniques. Furthermore, the reduced expectations on sport specific outcome in patients with a high number of dislocations and a long duration of instability are supported by the literature [21, 22, 43].

However, one should keep in mind that the highest patient expectations in regard to risk and performance level were found in patients with a high pre-trauma risk and performance level. Previous outcome studies on Bankart repair showed a limited return to full activity [7, 16, 20]. Surgeons should take this into account when informing a high-demanding athlete about the expected post-operative sporting ability and when selecting the correct surgical procedure. For instance, the Latarjet procedure has gained more popularity in recent years and surgeons are becoming more aggressive with the use of this procedure in contact athletes, even in cases with minor or no bone loss and in revision situations [2, 10, 11, 19, 31].

Of all variables, shoulder stability following the surgical procedure was the most important expectation in primary as well as in revision repair. Eighty-two percent of patients with a primary and 74% with a revision repair

Table 3 Correlation analysis between pre-operative patient characteristics and patient expectation

	Sport Level *P* value	Risk Level *P* value	Pain *P* value	Instability *P* value	Osteoarthritis *P* value	Overall *P* value
Age at time of surgery	n.s	n.s	n.s	n.s	0.006	n.s
Pre-trauma sports level	n.s	0.005	n.s	n.s	n.s	n.s
Pre-trauma risk level	0.031	0.000	n.s	n.s	n.s	n.s
Number of pre-operative dislocations	0.000	n.s	0.011	n.s	n.s	n.s
Duration of pre-operative instability	0.000	n.s	0.001	n.s	n.s	0.002
Visual Analog Scale (instability)	0.000	n.s	0.009	n.s	n.s	n.s

indicated that they would not tolerate any instability, even in high-demanding shoulder activities. This was independent from age, sex, previous sporting activity, or history of shoulder instability. Those results are in accordance with the findings of Mancuso et al. [27] and Warth et al. [44], where shoulder stability was the second most frequently given answer in the instability subgroup.

In a current systematic review, Longo et al. [25] found an average recurrence rate after Latarjet and Bankart repair of 5.9 and 23.2%, respectively, while the overall failure rate in the open Latarjet procedures was 7.5%.

Consequently, the patient expectations regarding post-operative stability in the current study are likely to exceed the findings in the literature.

Ninety-eight percent of our patients expected no or only a slightly increased risk for the development of osteoarthritis compared to a healthy shoulder at 20 years post-operatively. This stands in sharp contrast to the high prevalence of dislocation arthropathy in long-term outcome studies following surgical shoulder stabilization and the current scientific opinion that the surgical procedure may not influence the long-term degeneration but rather the extent of pre-operative trauma [4, 6, 15, 34, 37].

Interestingly, older patients expected more frequently to face long-term joint degeneration. This may be explained by the fact that patients in a higher age group may generally be more commonly confronted with this topic.

Concerning pain, patient expectations in primary, and revision repair are low and appear to be realistic and supported by clinical data [1, 7, 30, 39, 43].

The overall shoulder expectations in our study with a (nearly) normal shoulder in 100% of patients in primary surgery and 98% in revision cases emphasize once more the high expectations of this specific group of patients.

To our knowledge, the present study is the first to specifically focus on patient expectation following shoulder instability repair.

A comprehensive knowledge of pre-operative patient expectations and influencing factors is important to properly and individually counsel the patient before surgery. This is not only to identify possible expectation mismatches between physician and patient but also to find the adequate surgical treatment option. Furthermore, the desired "shared decision making process" may only work if patient and surgeon have the same understanding of what defines a successful operation [33, 40].

The results of this study can provide a framework and may help in pre-operative patient counseling.

The study has several limitations: First, the reproducibility and validity of the utilized questionnaire are unknown. However, as mentioned earlier, the HSSSSES has been reported to have limited use in shoulder instability and we are not aware of any appropriate survey for patients with shoulder instability [44, 46].

Second, patients were seen by different surgeon during consultation prior to surgery and may also have independently informed themselves about treatment options and outcome. The extent of individual pre-information was not assessed.

Third, the study group was heterogeneous regarding history of instability, pre-trauma activity level, underlying cause of instability, and scheduled surgery. The aim of this study, however, was to assess the pre-operative expectations in the general group of patients that suffer from shoulder instability.

Fourth, based on the results of this study, no conclusion can be drawn about the influence of pre-operative patient expectations on post-operative fulfillment of patient satisfaction.

Finally, the study was performed at a tertiary care center. Results may not reflect the characteristics of patients that present at different levels of care.

Conclusions

Patient expectations for primary and revision shoulder instability repair are high.

Realistic patient expectations regarding the surgical procedure are necessary to avoid subjective failure of the patient, especially in pre-operatively highly active and demanding athletes.

The treatment of shoulder instability must not solely depend on the pathology and possible risk factors for failure but should also take the individual expectation of the patient into account.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest with regard to the present study.

Funding There is no funding source.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent All patients provided written informed consent to participate in this investigation.

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