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ORIGINAL ARTICLE • SHOULDER - ARTHROSCOPY

Do patients with minor shoulder instability have a different outcome from those with recurrent anteroinferior instability?

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Abstract

Purpose Minor or anterosuperior shoulder instability (MSI) is a relatively new concept with other characteristics than recurrent anteroinferior instability (TUBS). MSI includes patients without history of dislocation, with non-specific clinical symptoms and signs but with indications of laxity of (SGHL)/MGHL with isolated injury of (SGHL)/MGHL seen during arthroscopy. TUBS patients typically present with recurrent anteroinferior instability with at least labral injury of the anterior band of the IGHL. In this study, we focus on the postoperative (rehabilitation) course. Our hypothesis is that its duration is prolonged in patients with MSI when compared to those with TUBS.

Methods Thirty-five patients with isolated anterosuperior capsuloligamentous lesions identified during arthroscopic surgery (group I-MSI) and 65 with at least an anteroinferior capsuloligamentous lesion (group II-TUBS) completed a survey that included a questionnaire enquiring into relief of pain and return to activity, the Oxford Shoulder Instability Score (OSIS) and the Western Ontario Shoulder Instability index (WOSI). Final follow-up occurred at a mean of 76 months postoperatively.

Results Pain at night, at rest and during overhead activities disappeared later in group I than in group II (respectively, $p=0.03$; 0.01; 0.01). Patients with MSI returned later to professional activities ($p=0.02$) and to the same sport ($p=0.01$). In addition, they had worse outcome as measured by OSIS ($p=0.01$) and WOSI ($p=0.07$).

Conclusion Patients with MSI have poorer prospects regarding time to relief of pain, return to work and sports and outcome scores compared to patients with TUBS.

Keywords Shoulder instability · Minor shoulder instability · Return to work and sport · Outcome score

Introduction

Minor or anterosuperior shoulder instability (MSI) is a variant of shoulder instability that has been specified in the last decade [1–3]. In this variant, the pathology is situated in the anterosuperior aspect of the glenohumeral joint with attrition or even tears of the middle glenohumeral ligament (MGHL), widening of the rotator interval and possibly lesions of the superior glenohumeral ligament (SGHL). This in contrast with the classically described anterior or anteroinferior instability involving the anterior band of the inferior glenohumeral ligament (ABIGHL), usually in the form of a (bony) Bankart lesion of the anteroinferior labrum, also denominated as Traumatic Unidirectional Bankart lesion treated with Surgery (TUBS). MSI should also be differentiated from Atraumatic Multidirectional Bilateral treated with Rehabilitation and if surgery is required an Inferior capsular shift or closure of the rotator Interval (AMBRII) where the glenohumeral capsule is distended without clearly identifiable lesions. MSI should also be differentiated from other entities associated with overhead activities, such as SLAP lesions and internal impingement [2].

Patients with MSI rarely present with a clear history of instability. More often, they present with pain anteriorly or even only posterosuperiorly located. This pain may only occur during overhead activities, but may also be so severe that function is more limited [3]. In many patients, signs and

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symptoms may lead to a "diagnosis" of impingement. Some surgeons even consider MSI to be a wastebasket diagnosis of anterior shoulder pain. Physical examination may be difficult due to pain, but usually the Castagna and ER-45 tests for the MGHL are positive. Because of the many anatomic variants in the anterosuperior glenohumeral joint, identification of lesions on imaging is difficult. Therefore, the diagnosis of MSI often is one of the high suspicions on the basis of suggestive elements in the history, the clinical examination and imaging. Failing to diagnose MSI accurately may lead to persistent conservative treatment or erroneously carrying out a subacromial decompression for impingement. When MSI is highly probable, surgery can be offered after a conservative course of at least 6 months. Arthroscopy can confirm the diagnosis and allows treatment by anterosuperior labral repair or capsulorrhaphy as recognized. Clinically, we had the impression that the postoperative recovery in these patients was also prolonged, often taken 9 months or more, when compared to the typical 6-month period for patients operated on for "Bankart" lesions.

This study aims to prove this hypothesis by comparing the postoperative (rehabilitation) course regarding pain, return to work and sports and outcome scores of a group of patients with MSI with a group of patients with TUBS.

Materials and methods

We obtained approval from the local Ethical Committee (approval 2013/288) for this study.

From our database of shoulder arthroscopies, we identified 338 procedures performed for shoulder instability with documented lesions of the glenohumeral ligaments and/or labrum. These procedures were performed over a period of approximately 20 years. The selected procedures were either from patients with classic recurrent instability or patients with a suspicion of MSI. The suspicion for MSI (or rotator interval injury before 2004) was based on history (pain in the posterior–superior aspect of the shoulder, diffuse pain and difficult to pinpoint, feeling of snapping and popping [1]), clinical examination with either an exhausting Empty Can Test or a positive Castagna/ER-45 test and suggestive signs on imaging. On the basis of arthroscopic findings, we subdivided the total study group into two groups: group I with isolated anterosuperior lesions (MSI) and group II with at least anteroinferior lesions (TUBS). The arthroscopic procedure for MSI consisted of a refixation of the anterosuperior labrum in case of a labral tear, or a capsulorrhaphy of MGHL and/or SGHL (therefore closure of the rotator interval) in case of an elongation (open rotator interval). In the TUBS group, the procedure comprised of a classic Bankart-type repair. In all selected patients, electronic patient records (EPR) were screened to retrieve clinical information and the preoperative signs and symptoms and the postoperative course regarding time to recovery of maximal range of motion, time to return to activity (work and sports), time to relief of pain and duration of physiotherapy. The EPR was also used as the source of contact information to phone the patients and to send out a survey.

Since all patients were followed postoperatively until maximal recovery usually between 9 and 18 months, we felt that reevaluation of this study could be limited to a validated patient-reported outcome measure. In that purpose, the survey included the OSIS, Oxford Shoulder Instability Score (version 2 with a possible score ranging from 12 to 60), and the Western Ontario Shoulder Instability index, WOSI. This was supplemented by a custom-made questionnaire, enquiring about the type and onset of clinical symptoms, pre- and postoperative professional and sport activities, (time to) return to work and sports and time period until patients became painfree and acquired a normal range of motion. To diminish recall bias, answers to the survey were compared with the clinical information obtained from the EPR.

Means, cross-tables, the Chi-squared test for categorical variables and the independent samples *T* test for continuous variables were calculated using SPSS Statistics 22 (IBM Corp, Armonk, NY, USA, 2013) with a significance threshold set at 0.05.

Results

Because of outdated or unavailable contact details or death, only 202 patients could be contacted. Of those patients, 102 declined to participate which left us with 100 patients (CONSORT diagram in Fig. 1). On the basis of the clinical information verified with the arthroscopic operative report, 35 patients had isolated lesions of the MGHL, SGHL and/or rotator interval. Figures 2, 3 and 4 illustrate some of the lesions typically found in this MSI group (group I) [4]. The other 65 patients (group II, TUBS) had at least an anteroinferior Bankart lesion (ABIGHL), often extending superiorly or posteriorly. We started using the clinical diagnosis label of MSI in 2004. Before 2004, patients were usually labeled as having a rotator interval injury. Since 2004, 245 instability procedures were performed, 74 (34%) for MSI and 141 (66%) for TUBS. Therefore, the distribution of cases over the two groups in our study cohort (35% MSI, 65% TUBS) closely resembles that of the overall population in our hospital.

In total, 55 participants were male (55%) and 45 female (45%). Although the percentage of women in the MSI group was higher than in the TUBS group, the difference did not reach significance. The dominant arm was more frequently affected (66%), and this was similar in both groups. The mean age at time of surgery was 32.5 ± 11.0 years (range

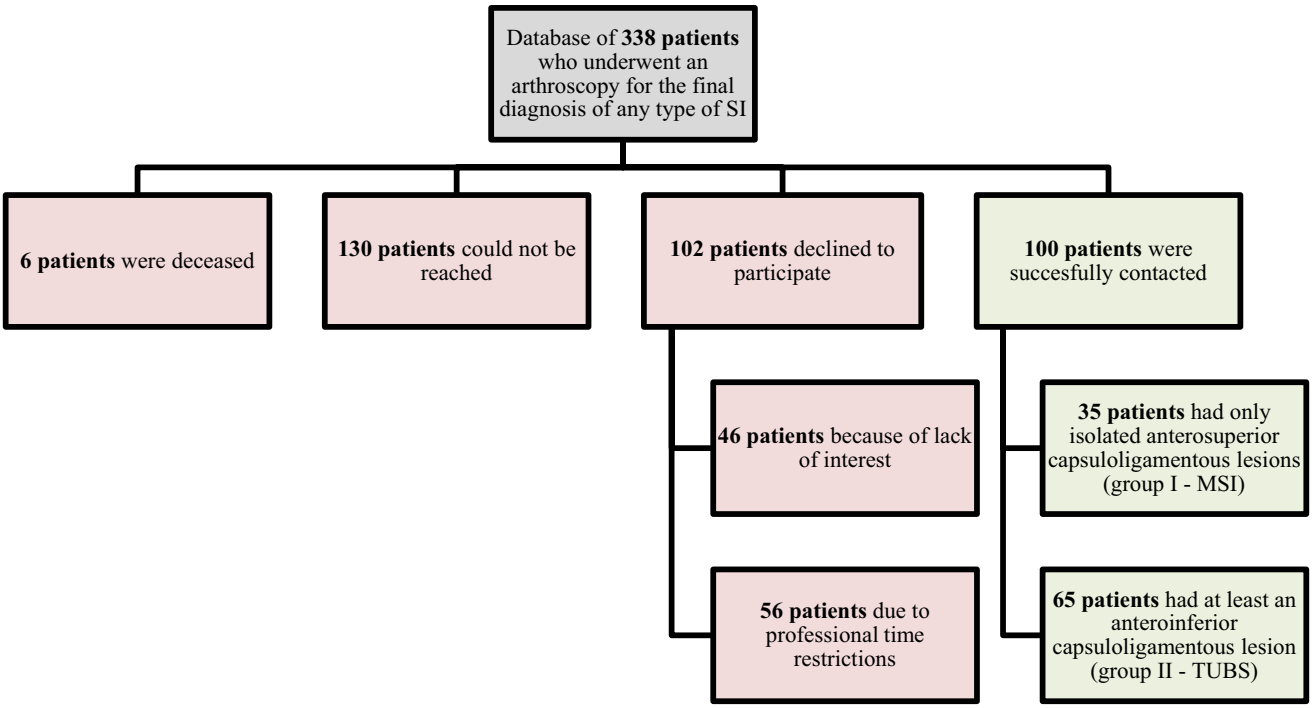

Fig. 1 CONSORT flow diagram

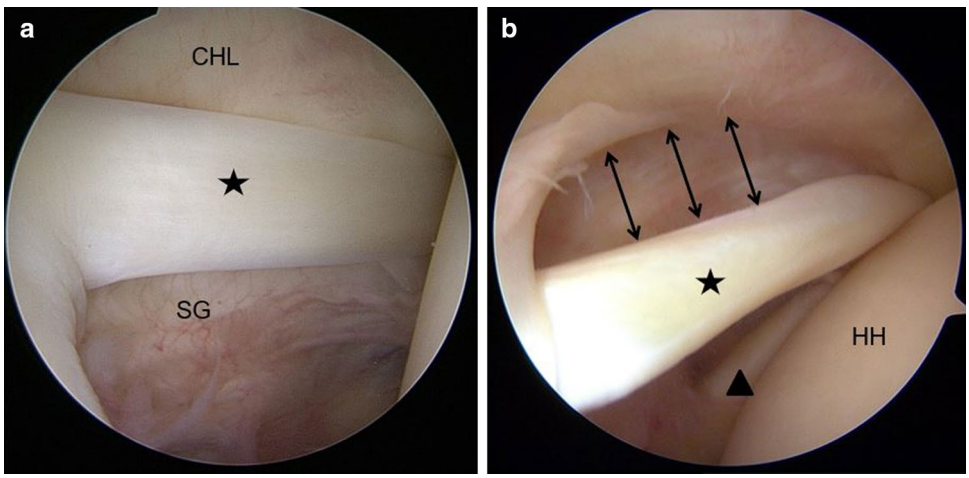

Fig. 2 In a normal joint (**a**), there is a minimal distance between the superior glenohumeral ligament (SGHL), the coracohumeral ligament (CHL) and the long head of biceps tendon (LHB; asterisk). Normally, the CHL and SGHL run parallel to the LHB, respectively, superior and anteroinferior to the tendon. Widening of the rotator interval is an indication of a lesion of the SGHL and/or middle glenohumeral ligament. Arthroscopically, a widening of the space between the LHB and the anterior limb of the SGHL complex (**b**) is observed due to fluid distension. The same effect can be depicted on computed tomography or MR arthrographic images, thanks to the articular distension by diluted contrast material. *HH* humeral head, ▲ subscapularis tendon. Reprinted with permission from Pouliart et al. [4]

16–63). The mean age at time of surgery was significantly higher in the MSI group ($p = 0.002$). (Table 1)

Surveys were returned at a mean of 76 months postoperatively (range 12–240 months). This allowed us to also differentiate final outcome on the basis of time since surgery (1–5 years, 6–10 years, 11–15 years, 16–20 years). Final outcome as measured by OSIS and WOSI was significantly worse in the MSI group than the TUBS group with higher mean *OSIS* ($p = 0.01$) and mean *WOSI* ($p = 0.07$). (Table 1) In addition, mean OSIS values were even lower in MSI patients with the longest follow-up, whereas OSIS values tended to better in TUBS patients with a longer follow-up.

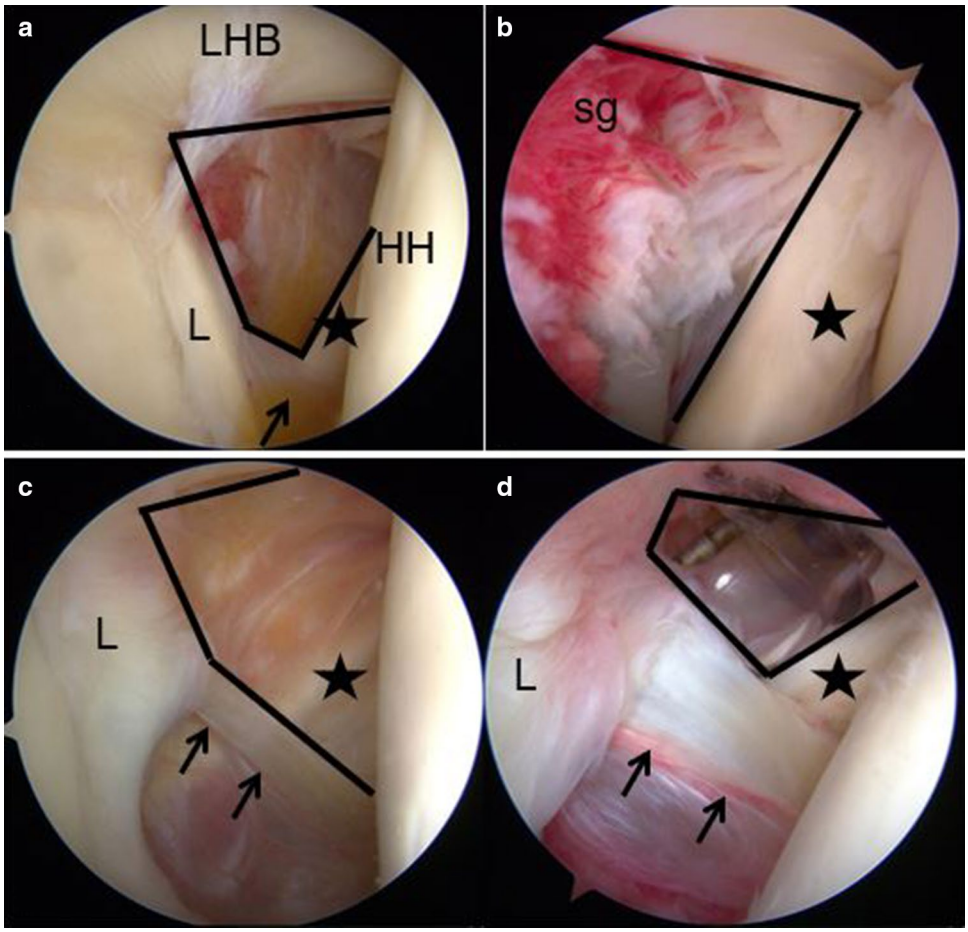

Fig. 3 Arthroscopic views of a widened or open rotator interval (RI) (area between black lines). The upper half shows an open RI due to elongation of the middle glenohumeral ligament (MGHL) (arrow) and the superior glenohumeral ligament before (**a**) and after (**b**) repair. The lower half shows a wide open RI due to elongation of a cordlike MGHL (arrows), before (**c**) and after (**d**) reduction with a probe. *HH* humeral head, *L* labrum, *LHB* long head of biceps tendon; asterisk, subscapularis tendon. Reprinted with permission from Pouliart et al. [4]

The trend for WOSI scores was similar in both groups with lowest scores in patients with 6–10 years FU compared to patients with 1–5 years FU or 11–15 years FU. When analyzing the subdomains of the WOSI, we observed that the lower scores with longer follow-up were mainly due to recurrence of pain. Ten patients (8.6% MSI, 10.8% TUBS) experienced return of pain at rest after an initial painfree period, 14 in total experienced return of pain at night, and 13 in total suffered from recurring pain during overhead activities. Although patients with MSI often do not have overt feelings of instability, they nevertheless had a lower score on this specific WOSI question than TUBS patients (median score of 12/100 versus 6/100). The OSIS value was similar in both groups.

We queried patients about the time until resolution of postoperative pain at night, pain at rest and pain during overhead activities. For almost two-thirds of the TUBS patients, *night pain* disappeared within 6 months after the surgery. In the MSI group, pain at night persisted for more than 6 months in over half of the patients, in 40% for even more than 12 months ($p=0.01$). For the majority of the patients in both groups, *pain at rest* disappeared within 6 months after the surgery. However, in almost 30% of MSI patients, pain at rest persisted for more than a year after surgery, whereas only 9% of TUBS patients suffered this long ($p=0.03$). In more than 80% of the TUBS patients, *pain during overhead activities* disappeared within 12 months, while this was the case in less than 55% of the MSI patients ($p=0.01$).

Overall, TUBS patients returned to a normal range of motion faster than MSI patients: 51.6% versus 39.4% within 6 months after surgery, respectively, and an additional 19.4% versus 24.2% within the year. 29.0% of TUBS patients needed more than a year to fully recover normal range of motion, while this was 36.4% in the MSI group.

There was no major difference in the category of professional activities between both groups, although the MSI group included a slightly higher proportion of manual workers and of professionally unemployed housewives and the TUBS group included a higher proportion of students (Table 1). The majority of patients in both groups were able to resume their professional activities as before surgery, although TUBS patients needed significantly less time to return to work than MSI patients. 76.2% of TUBS patients required less than 6 months, compared to only 57.1% in the MSI group ($p=0.020$). A minority of patients could not resume the same type of work. In the TUBS group, there

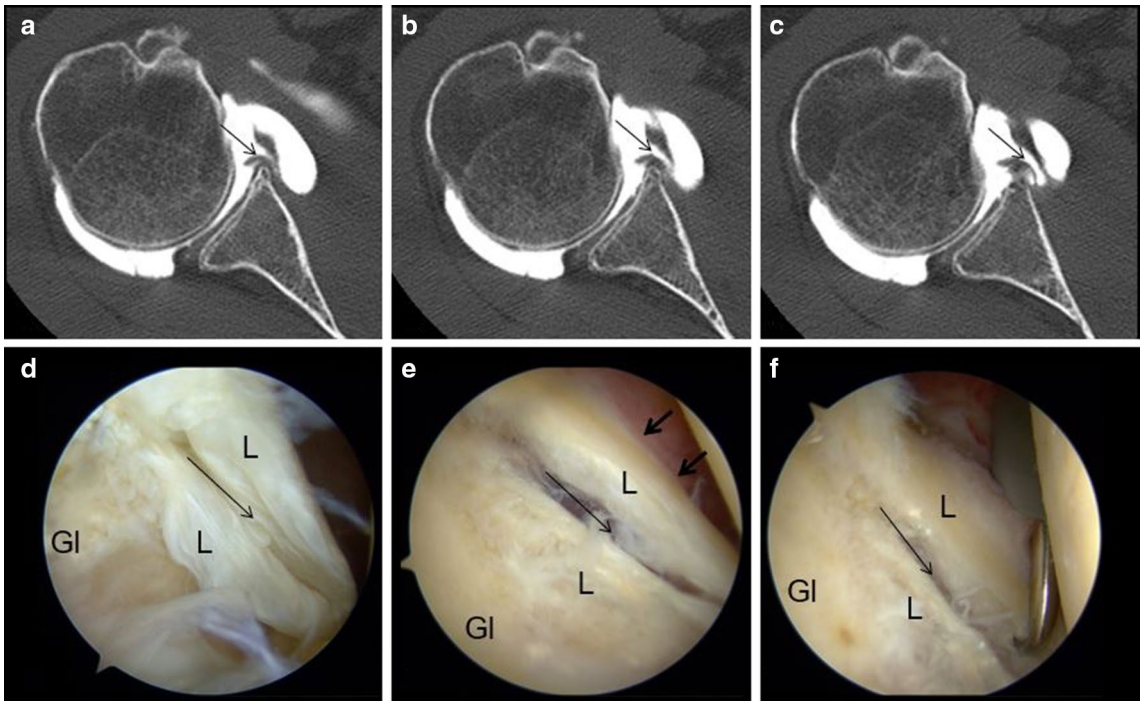

Fig. 4 Axial consecutive computed tomography arthroscopy images display an avulsion of the middle glenohumeral ligament (MGHL) including a large part of the labrum (arrow, **a**–**c**) with a small anterior ligamentous periosteal sleeve avulsion that may be mistaken for a cordlike MGHL. A remnant of the labrum attached to the glenoid rim as well as focal cartilage thinning and subchondral bone irregularities of the glenoid (Gl) can be observed. Corresponding arthroscopic views (**d**–**f**) show the frayed labral remnant (L), the cleft where labrum and MGHL have been torn (thin arrows) resulting in the appearance of a pseudo-cordlike MGHL. The true border of the labrum is indicated by thick arrows on **e**. Reprinted with permission from Pouliart et al. [4]

was a significant relationship between type of work before surgery and the ability to return to the same profession after surgery ($p = 0.001$), with only manual workers having a risk not to be able to return to the same professional activity. One of the MSI patients could not resume household activities. WOSI and OSIS values for patients unable to return to the same type of work were significantly worse than in patients able to resume work (MSI $p = 0.001$, TUBS $p < 0.001$).

Around 60% of patients in both groups practiced an overhead *sports* (swimming, volleyball, tennis, basketball, fitness) at the time of onset of symptoms. (Table 1) Sports were practiced competitively, but none of our patients were professional athletes. Over 30% of TUBS patients were involved in other types of sports activities (running, soccer, cycling), while 20% of MSI patients participated in no sports whatsoever. 75% in both groups were able to return to overhead sports at the preoperative level. About 25% of sportive MSI patients and almost 20% of sportive TUBS patients stopped with their sport after surgery, even when this sports activity did not involve the shoulder. All the other patients *returned to their primary sports*. Overall, TUBS patients appeared to be able to return sooner to the same level of sports than MSI patients ($p = 0.01$). Three times as many TUBS patients as MSI patients were able to do so in less than 6 months. Almost 40% of the patients in both groups were able to return to the same level of sport in less than 12 months. More than 70% of all patients in both groups were able to return to the same sports after more than 12 months, but more TUBS patients were unable to do so at the same level.

Discussion

The results of this study confirm our hypotheses that patients with minor shoulder instability with isolated anterosuperior capsulolabral lesions on average need longer to become painfree and to return to work and sports after surgery than do patients who have been operated for (bony) Bankart lesions.

Although only three studies have been published on minor shoulder instability, we can still make a few comparisons. In our study, the mean age at time of surgery was significantly higher in the MSI than in the TUBS group. Garofalo's patients with isolated anterosuperior labral tears had a similar age range of 38.3 ± 6.8 years (range 18–59) as our MSI patients [2]. In contrast, Nordenson's patients presenting with minor or occult instability presenting as

Table 1 Patient demographics and outcome scores related to (a) return to work, (b) return to sports

	MSI: All (35)	TUBS: All (65)	MSI: return to work (31)	TUBS: return to work (53)	MSI: no return to work (4)	TUBS: no return to work (10)
(a)						
Mean age at surgery	37.06 ± 9.68 years (range 16–56)	29.97 ± 10.98 years (range 16–63)	37.06 ± 10.04	28.85 ± 10.09	37.00 ± 7.39	29.6 ± 6.42
Gender (f/m)	20 (57.1%)/15	25 (38.5%)/40	18/13	23/30	02-févr	02-août
Dominant arm	24 (68.6%)	42 (64.6%)	22 (71.0%)	35 (66.0%)	2 (50.0%)	6 (60.0%)
Type work				2 missing data		
Manual work	17 (48.6%)	27 (41.5%)	14 (45.2%)	17 (32.1%)	3 (75.0%)	10 (100%)
Administrative work	12 (34.3%)	23 (35.4%)	12 (38.7%)	23 (43.4%)	0 (0%)	0 (0%)
Housewife	3 (8.6%)	2 (3.1%)	2 (6.5%)	2 (3.8%)	1 (25.0%)	0 (0%)
Student	3 (8.6%)	12 (18.5%)	3 (9.7%)	11 (20.8%)	0 (0%)	0 (0%)
Retired		1 (1.5%)				
OSIS Mean	30.86 ± 13.13	24.14 ± 11.77	28.45 ± 11.91	21.53 ± 9.07	49.50 ± 3.70	40.20 ± 12.51
Median	30	20	27	19	51	42
WOSI Mean	877.29 ± 566.34 (58.2%)	672.25 ± 515.74 (68.0%)	773.00 ± 510.80 (63.2%)	557.19 ± 400.23 (73.5%)	1685.50 ± 206.52 (19.7%)	1341.30 ± 567.56 (36.1%)
Median	773 (63.1% %)	593 (71.8%)	662 (68.5%)	527 (74.9%)	1688 (19.6%)	1467 (30.1%)
	MSI: All (35)	TUBS: All (65)	MSI: return to sports (21)	TUBS: return to sports (51)	MSI: no return to sports (7)	TUBS: no return to sports (11)
(b)						
Mean age at surgery			37.38 ± 10.74	29.75 ± 11.07	36.57 ± 11.75	29.18 ± 8.93
Gender (f/m)			12-sept	22/29	3/43/4	02-févr
Dominant arm			15 (71.4%)	36 (70.6%)	6 (85.7%)	4 (36.4%)
Type sport						
Overhead sports	20 (57.1%)	40 (61.5%)	16 (76.2%)	32 (62.7%)	4 (57.1%)	8 (72.7%)
Other sports	8 (22.9%)	22 (33.9%)	5 (23.8%)	19 (37.3%)	3 (42.9%)	3 (27.3%)
No sports	7 (20%)	3 (4.6%)				
Type work						
Manual work			8 (38.2%)	20 (39.2%)	5 (71.4%)	6 (54.5%)
Administrative work			9 (42.9%)	19 (37.3%)	1 (14.3%)	4 (36.4%)
Housewife			2 (9.5%)	1 (2.0%)	0	0
Student			2 (9.5%)	10 (19.6%)	1 (14.3%)	1 (9.1%)
Retired				1 (2.0%)		
OSIS Mean			26.24 ± 12.73	23.78 ± 11.67	36.43 ± 13.82	26.27 ± 12.72
Median			24	20	42	22
WOSI Mean			727.76 ± 590.81 (65.3%)	644.54 ± 518.11 (69.3%)	1019.00 ± 464.46 (51.5%)	806.55 ± 536.93 (61.6%)
Median			476 (77.3%)	593 (71.8%)	1016 (51.6%)	697 (66.8%)

an impingement syndrome during overhead activities were much younger at 22.5 ± 7.3 years (range 16–36) [3].

Castagna et al. noted that MSI generally occurs in the dominant arm [1]. The female-to-male ratio and the dominance of the affected arm in our study group were similar with that of Nordenson et al. (female/male ratio: 10/11; dominant arm: 70%) and Garofalo et al. (female/male ratio: 12/11; dominant arm: 65%) [2, 3].

We have a relatively high number of MSI patients (35) compared to the studies of Garofalo et al. (23) and Nordenson et al. (20) [2, 3]. First of all, we need to emphasize that our patient population was gathered over a period of more than 20 years. Secondly, our two experienced shoulder surgeons always had a special attention for a high suspicion of rotator interval injury and the later MSI. Finally, our patient population has a very general profile with a low prevalence

of (semi) professional and high-risk athletes. In recreational athletes and overhead workers, a higher incidence of MSI may be possible in comparison with a patient population that contains a preponderance of (semi) professional and high-risk athletes.

Patients operated for MSI had clinically significant worse OSIS and WOSI values at final evaluation than TUBS patients. For both groups, lower scores than usually reported in the literature were noted [5–10]. Our less favorable outcome may on the one hand be related to a relatively older and less athletic population than most studies on instability. One can expect an age-related decline in all shoulder scores. On the other hand, more than 50% of our patients had a final follow-up at more than 10 years postoperatively. Longer follow-up studies of instability have shown worse results with an increase in recurrence rate and degenerative changes of the glenohumeral joint with time [11]. Hovelius et al. demonstrated a moderate-to-severe instability arthropathy in 9% of the patients after a FU of 10 years and even 26% after a FU of 25 years [12, 13]. Occurrence of chondropathy was, however, not specifically studied by us.

In both groups, pain at rest tended to disappear first, followed by night pain and finally pain during overhead activities. All pain tended to disappear slower in the MSI group than in the TUBS group. However, (recurring) pain at rest and at night was reported more in the final follow-up surveys by patients in the TUBS group. Since we did not reevaluate patients clinically, we do not know whether this pain is related to the instability or to an unrelated (new) shoulder pathology.

Patients who are unable to return to the same type of work score significantly worse on both OSIS and WOSI. The relatively small number of patients that found themselves completely unable to return to work has an extremely bad outcome, which skews the overall outcome.

Although the distribution of type of work was similar in both groups, on average there was a slower return to work in MSI patients. The delay for return to work in the TUBS group is comparable to that reported in the literature. Kim et al. described a mean time to return of activity at 9–12 weeks [14], while Boileau's patients were able to return to work after an average of 5 months [15]. For MSI patients, data on return to work have not been investigated in the scant papers available. The delay in return to work is probably related to the prolonged postoperative recovery.

More patients in the TUBS group than in the MSI group were active in sports. Although 80% of MSI patients participated in sports, only 57% practiced an overhead sport. This is much less than the 75% reported by Nordenson et al. [3], but corroborates the findings of Castagna et al. [1] that MSI can occur both in athletic and non-athletic people. Time before return to sports varies according to the published literature, ranging from on average 6–9 months after Bankart repair [16–18]. Beranger et al. [5] reported a delay of 6.3 months for return to sports without indication of the level in their series of Bristow-Latarjet and Boileau et al. [15] reported 7 months after Latarjet. According to Gerometta et al. [19], their patients treated with arthroscopic Bankart stabilization for shoulder stabilization returned after an average of 9.8 months to the same level of sports. Beranger et al. [5] noted that 21.3% of patients changed sports, almost all due to their shoulder, while this was only 4.5% in Gerometta et al. [19]. No data on return to sports after MSI surgery are available, but we may compare our results with those of patients undergoing SLAP repair. Since a SLAP repair involves surgery to the superior labrum, from anterior to posterior, the repaired structures are in close proximity to those repaired in case of MSI. After SLAP repair, return to sports may be delayed for up to 12 months [17]. Beyzadeoglu and Circi [20], however, noted a return to sports at on average 6.4 months postoperatively. Sayde et al. [21] observed that 27% of patients with a SLAP lesion were unable to return to play, and this was even 37% for patients who practiced an overhead sport. Among our patients that were unable to return to their same sport, some practiced overhead sports while others practiced sports that do not involve the shoulder, which implies that the shoulder function as such does not play a decisive role. This is corroborated by the study of Alentorn-Geli et al. [22] in which 14% of patients did not return to their same sport, due to changes in personal life, other injuries or job-related factors, but not due to their shoulder. The higher mean age of the MSI group may be an additional factor. Meller et al. [23] already noted that patients after surgical treatment for recurrent anterior shoulder instability had a lower quality of life physical component summary in the SF-12 Health Survey. The present study confirms the findings of Beranger et al. and Gerometta et al. [5, 19] that patients who are able to return to sports at the same level, even when this sports activity is not shoulder related, have better outcome (WOSI and OSIS) than those patients not able to return to sports at the same level or at all.

As to why patients with anterosuperior problems (MSI as well as SLAP) need longer to recover and fare worse pre- as well as postoperatively than patients with Bankart lesions is at present a matter of speculation. One possibility is the presence of a prominent neural network of large and smaller nerve endings, neurofilaments and Pacinian corpuscles in the anterosuperior labrum and proximal part of the long tendon of the biceps close to its insertion. The anterosuperior labrum with the origin of the SGHL and MGHL is anatomically connected to the insertion of the long tendon of the biceps and the superior labrum. Therefore, the abundant sympathetic and sensory innervation that has been demonstrated by several authors as a factor in biceps tendinopathy

and prolonged pain after SLAP repair may also explain neurogenic inflammation when repairing the lesions associated with MSI [24–27].

Due to its retrospective character, our study has several obvious limitations. The main shortcoming is that less than one-third of patients operated on for shoulder instability could be reached for or were willing to participate in this study. Although MSI is deemed a relative rare pathology, a third of our patients undergoing surgery for capsulolabral injury fell into the MSI group. The first step for inclusion was a clinical suspicion for those patients with a variable clinical presentation, a history of overhead activities, complaints with overhead activities and a positive Castagna and ER-45 test. Other causes were ruled out based on imaging. Final confirmation was provided during the arthroscopic procedure. Finally, we were able to evaluate the postoperative course and final outcome of 35 patients with MSI. This is a larger group of patients with arthroscopically confirmed isolated anterosuperior lesions than in the only two other studies concerning the results of surgery for MSI, which had 20 patients each [2, 3]. Another limitation is the broad range of time since surgery, with no information on what happened to patients in the intervening years between final clinical follow-up and the present survey. On the other hand, few other studies and none of the MSI papers include long-term follow-up of instability. Strengths of this study are that all arthroscopies were performed by only two surgeons, who were already aware of anterosuperior instability before the entity of MSI was described and who diligently recorded all arthroscopic findings on a detailed shoulder arthroscopy protocol. In addition, no other study has compared the final outcome and the postoperative rehab period of surgery for MSI with those of surgery for TUBS.

This study has shown that MSI patients have a distinctively different perspective after surgery than TUBS patients. It is important to recognize MSI, to treat the pathology correctly and to inform the patients that the rehabilitation period will be longer and the outcome will be worse compared to TUBS.

Conclusions

This study confirms our empirical observation and hypothesis that resolution of pain (at night, at rest and during overhead activities) and return to full activity (work and sports) on average take longer in patients operated on for minor shoulder instability (MSI) than in patients operated on for (bony) Bankart lesions (TUBS). In addition, final outcome as measured by WOSI and OSIS is also less good for MSI than for TUBS.

When proposing surgery to patients with a suspected diagnosis of minor anterosuperior shoulder instability, patients should be counseled about this prolonged postoperative recovery regarding resolution of pain as well as return to work and sports. We suggest that these patients should not expect a full return to activity before 9–12 months. This is in contrast to patients undergoing surgery for TUBS, who can expect this around 6 months postoperatively.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

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