Szyluk K., Jasiński A., Mielnik M., Widuchowski W., Koczy B. Recurrence of instability after Bankart repair. Issue Rehabil. Orthop. Neurophysiol. Sport Promot. 2016; 15: 67–75.

RECURRENCE OF INSTABILITY AFTER BANKART REPAIR

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SUMMARY

Introduction

Nowadays it is generally agreed that patients with diagnosed shoulder instability should be treated surgically. However, even now, the surgery for shoulder instability is associated with a high recurrence rate.

Aim

The aim of this study was to analyze the incidence of recurrent shoulder joint dislocation following state-of-the-art surgical treatment of Bankart lesions.

Material and methods

To present and review the state-of-the-art knowledge about the shoulder dislocation recurrence rate following open or arthroscopic surgical treatment of Bankart lesions, the Pubmed/Medline database were queried.

Results

Comparison of arthroscopic procedures collectively vs. open Bankart repair did not

NAWRÓT NIESTABILNOŚCI STAWU RAMIENNEGO PO LECZENIU OPERACYJNYM USZKODZENIA TYPU BANKARTA

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STRESZCZENIE

Wstęp

Obecnie na łamach literatury panuje zgodność, że pacjenci z rozpoznaną niestabilnością stawu ramiennego powinni być leczeni chirurgicznie. Jednak nawet teraz, operacja niestabilności stawu ramiennego jest związana z wysokim odsetkiem nawrotów.

Cel

Celem obecnej pracy była analiza częstości występowania nawracających zwichnięć stawu ramiennego po leczeniu chirurgicznym uszkodzenia Bankarta.

Materiał i metody

W celu zaprezentowania i analizy obecnego stanu wiedzy na temat częstości występowania nawrotów po operacyjnym leczeniu uszkodzenia Bankarta zarówno metodą otwartą jak i artroskopową, posłużono się medyczną bazą danych Pubmed/Medline.

Wyniki

Porównując wszystkie metody artroskopowe z metodami otwartymi, nie wykazano

reveal a significant difference between the recurrence rates (p = 0.4).

Conclusions
A statistical analysis of literature data failed to reveal significant differences in the post-operative recurrence rates following open vs. arthroscopic Bankart lesion repair. Assessment of the risk factors for recurrence, including the presence of additional lesions and possibilities for treating them is useful during the planning of surgery and choosing the surgical technique.

Keywords: Bankart lesion, shoulder, instability

Date received: January 21, 2016
Date accepted: February 24, 2016

istotnej statystycznie różnicy pomiędzy odsetkiem nawrotów po leczeniu z wykorzystaniem technik artroskopowych i otwartych (p = 0,4).

Wnioski
Bazując na danych z literatury poddanych w pracy analizie statystycznej, nie stwierdzono istotnych różnic statystycznych pomiędzy „open and arthroscopic Bankart lesion repair" w zakresie częstości występowania nawrotów pooperacyjnych. Podczas wyboru i planowania leczenia operacyjnego, przydatna jest ocena czynników ryzyka wystąpienia nawrotów pooperacyjnych, w tym ocena występowania i możliwość leczenia uszkodzeń dodatkowych.

Słowa kluczowe: uszkodzenie Bankarta, staw ramienny, niestabilność

Data otrzymania: 21 styczeń, 2016
Data zaakceptowania: 24 luty, 2016

Introduction

Despite our ever-increasing knowledge about the anatomy of the shoulder joint and the biomechanical basis of shoulder dislocation, and the dynamic development of operative techniques, the shoulder joint continues to be the most prone to dislocation of all human joints. The incidence of shoulder dislocations is 11.2/100.000/year, affecting approximately 2% of the general population. It has been estimated that 85% of dislocations are secondary to injury. Forced abduction with simultaneous external rotation in the shoulder joint and direct injury are the most common immediate causes. The complex anatomy of the area plays a role in shoulder joint dislocation and instability. The shoulder joint is a free ball-and-socket joint with a size ratio of 3:1 between the humeral head and the glenoid cavity (Rowe *et al.* 1978; Simonet *et al.* 1984; Hovelius 1999; Chant *et al.* 2007; Bergin 2009; Zachalli and Owens 2010). Such anatomical relations ensure a very wide range of mobility, but they also predispose to dislocation. The shoulder joint stabilizers are responsible for congruence of the shoulder joint while ensuring a wide range of mobility and resistance to strain. They are divided into static stabilizers, i.e. the morphology of articular surfaces, labrum, joint capsule, glenohumeral ligaments, coracohumeral ligament, coracoid process and acromion, and dynamic stabilizers: the rotator muscles, tendon of the long head of the biceps, proprioception and the normal position and mobility of the scapula (Finnoff *et al.* 2004). A dislocation is associated with damage to the glenohumeral stabilisers, which may result in imbalance of the entire complex system of dynamic and static stabilizers, leading, in turn, to recurrent dislocations, a condition known as shoulder instability. The most common type of injury associated with shoulder joint dislocation is detachment of the anteroinferior part of the glenoid labrum together with some

periosteum (Bankart 1938; Wen 1999; Itoi *et al.* 2007). Such an injury leads to laxness of the joint capsule and functional impairment of a major static stabiliser, the inferior glenohumeral ligament (IGHL), increasing the likelihood of future dislocations (Bankart 1938; Wen 1999; Itoi *et al.* 2007). This pattern of injury was first described by Arthur Bankart, who also presented the first report on outcomes of surgical treatment of shoulder instability (Bankart 1938). He did not have many followers initially, but nowadays it is generally agreed that patients with diagnosed shoulder instability should be treated surgically. However, even now, the surgery for shoulder instability is associated with a high recurrence rate. Despite the dynamic development of surgical techniques and continuous improvements in surgical equipment, recurrent dislocation is the most important cause of failure of surgical treatment, whether open or arthroscopic of Bankart lesions. The recurrence rate has been estimated at 0–25% (Jorgensen *et al.* 1999; Rhee *et al.* 2006; Kim *et al.* 2009). There is thus a need for on-going analysis of causes of recurrences and updates on surgical techniques for the treatment of shoulder joint instability. Apparently, a fundamental challenge for the operator is to limit the risk of recurrence even before the first surgery: recurrence prevention involves a careful evaluation of risk factors, a thorough analysis of the indications and contraindications for using an open vs. arthroscopic approach, and careful planning of the operative procedure on the basis of the patient's history, physical examination, imaging results and current knowledge.

Aims

To analyze the incidence of recurrent shoulder joint dislocation following state-of-the-art surgical treatment of Bankart lesions. To review the current opinion on possible risk factors for recurrence following operative treatment of Bankart lesions.

Material and methods

To present and review state-of-the-art knowledge about the shoulder dislocation recurrence rate following open or arthroscopic surgical treatment of Bankart lesions, the PubMed and Medline databases were queried using the following search keywords: *bankart, shoulder* and *instability*. Paper inclusion criteria were as follows: human studies, English language, phase I–IV clinical trials, mean follow-up of 2 years, arthroscopic and/or open Bankart lesion repair, and description of management of failed Bankart lesion repairs.

The exclusion criteria were as follows: animal or specimen studies, non-English language, mean follow-up duration < 2 years, basic science studies, surgical technique studies, biomechanical studies, meta-analysis, review studies, studies of outcomes of non-surgical treatment. Papers meeting the inclusion and exclusion criteria were divided into groups with regard to the surgical technique. A total of four groups were distinguished. Three comprised papers concerned with different arthroscopic techniques: the transglenoid Caspari technique, arthroscopic Bankart repair technique with tacks and arthroscopic Bankart repair with a suture anchor. Group IV comprised studies of open Bankart repair.

The recurrence rate was calculated for each group separately and for all arthroscopic techniques collectively vs. the open technique. Relationships between all the operative techniques were first analyzed collectively to identify correlations between individual techniques. A chi-square test was used and the confidence level was set at $p < 0.05$.

Results

The database query found 741 papers meeting the initial criteria (i.e. containing the keywords *Bankart, shoulder* and *instability*), of which 654 were human studies, 563 were written in English and 35 were Phase I, II, III or IV clinical trial reports. These papers were read and 15 were found to meet the

inclusion and exclusion criteria and were subjected to further analysis (Jorgensen *et al.* 1999; Boszotta and Helperstorfer 2000; Cole *et al.* 2000; Sperber *et al.* 2001; Bottoni *et al.* 2002; Kim *et al.* 2002; Fabbriciani *et al.* 2004; Magnusson *et al.* 2006; Rhee *et al.* 2006; Mahiroğulları *et al.* 2010; Strahovnik and Fokter 2006; Tjoumakaris *et al.* 2006; Elmlund *et al.* 2009; Kim *et al.* 2009; Zaffagnini *et al.* 2012). The basic demographics of patients in those 15 studies are presented in Table 1.

Table 1. The basic demographics of patient

Variable	N
Number of studies	15
Number of patients	683
Mean patients age (yr)	27.5
Mean duration of follow-up (yr)	7.7
Number of open Bankart lesion procedures	256
Number of arthroscopic Bankart lesion procedures	427
Suture anchor	199
Tacks	101
Transglenoid Caspari technique	137

Recurrence rates were calculated for each of the four groups (Table 2). Statistical analysis was carried out in order to determine whether the recurrence rate in a particular group was related to the surgical technique. The analysis revealed that the chi-square test statistic (16.73) was statistically significant ($p = 0.0008$). A likelihood ratio chi-square test was similarly statistically significant (14.39; $p = 0.0042$). These results mean that the treatment outcomes were related to the surgical technique used.

Table 2. Recurrence rates calculated for each of the four groups

Variable	(%)
Open Bankart lesion procedure	8.2%
Arthroscopic Bankart lesion procedure	11.4%
Suture anchor	7.2%
Tacks	19%
Transglenoid Caspari technique	8.1%

A comparison of recurrence rates showed a significantly higher recurrence rate following arthroscopic Bankart lesion repair with tacks ($p < 0.002$) compared to open Bankart repair. Comparison of the other arthroscopic techniques vs. open Bankart repair did not reveal statistically significant differences in recurrence rates: arthroscopic with suture anchor vs. open $p = 0.3$, arthroscopic Caspari vs. open $p = 0.7$ Similarly, a comparison of all arthroscopic procedures collectively vs. open Bankart repair did not reveal a significant difference between the recurrence rates ($p = 0.4$).

Discussion

After Arthur Bankart presented his outcomes for the surgical shoulder instability treatment, the open repair methods became a gold standard in instability treatment for many years. Their value was confirmed in numerous reports involving long follow-up and large patient groups which found lower recurrence rates following surgery (Rowe *et al.* 1978; Simonet *et al.* 1984; Freedman *et al.* 2004).

With the dynamic development of arthroscopic techniques in recent decades, they have become increasingly appreciated in the treatment of shoulder joint instability, including Bankart lesions. Initially, rates of complications associated with arthroscopic repair, mainly recurrences, were significantly higher, but as techniques developed from the Caspari technique to arthroscopic Bankart repair with tacks to arthroscopic Bankart repair with a suture anchor, the recurrence rate decreased steadily (Jorgensen *et al.* 1999; Kim *et al.* 2002; Fabbriciani *et al.* 2004). In addition, with continuous improvement in surgical equipment, it is now possible to perform simultaneous repair of associated intraarticular lesions, such as the Superior Labrum Anterior-Posterior lesion (SLAP) or rotator cuff tears (RCT). Advocates of arthroscopic techniques have also stressed that they are less invasive, produce less blood loss and less post-operative pain

and allow for earlier resumption of physical activity. Accordingly, the question should be asked whether open techniques still remain the gold standard in Bankart lesion repair. Our results do not point to significantly lower recurrence rates following open Bankart repair vs. arthroscopic Bankart repair, except arthroscopic Bankart repair with tacks, thus suggesting that both approaches are equally useful (Jorgensen *et al.* 1999; Cole *et al.* 2000; Sperber *et al.* 2001; Kim *et al.* 2002; Fabbriciani *et al.* 2004). The choice of a particular technique will depend on the operator's experience and the possibilities for repairing intraarticular lesions as well as on patients' life styles and their ever-growing demands.

The key to reducing recurrence rates is assessing risk factors for recurrence, careful patient qualification for surgery and good planning. Recurrence risk factors include fractures of the anteroinferior part of the glenoid involving more than 20% of glenoid surface, extensive Hill-Sachs lesion, engaging Hill-Sachs lesion, male sex, younger age at the time of first dislocation (second decade of life), joint laxity, ALPSA lesions, poor bone quality, patient self-control and participation in contact sports and overhead sports. The patient should be qualified for surgery and the surgical approach and technique chosen only after these factors have been considered (Burkhart and De Beer 2000; Finnoff *et al.* 2004; Porcellini *et al.* 2009).

The presence of bony lesions of the glenoid described above is an indication for performing more extensive surgery such as the Latarjet procedure. Large Hill-Sachs lesions would also point to an open procedure and possibly using a bone graft to reconstruct the humeral head defect. In all other cases, arthroscopic and open Bankart lesion repair can be used successfully and modified according to the presence of other lesions of the dynamic and static shoulder joint stabilizers. Treatment should be comprehensive, with additional lesions, such as SLAP, RCT or engaging Hill-Sachs lesions repaired together with the Bankart lesion to reduce the recurrence rate. The management of recurrent instability following surgery for Bankart lesion is a serious problem facing the operator irrespective of the technique used. According to literature data, successful options for the management of recurrences include both arthroscopic and open techniques, with some patients not requiring surgery and others needing only temporary immobilization. Patients with > 25% glenoid lesions, extensive Hill-Sachs lesion or irreparable RCT seen on imaging studies should use other surgical methods, including augmentation of bony defects and transfer of the coracoid process (Burkhart and De Beer 2000; Finnoff *et al.* 2004; Porcellini *et al.* 2009).

Conclusions

A statistical analysis of literature data failed to reveal significant differences in post-operative recurrence rates following open vs. arthroscopic Bankart lesion repair. Assessment of risk factors for recurrence, including the presence of additional lesions and possibilities for treating them, is useful during the planning of surgery and choosing the surgical technique.

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Authors reported no source of funding.
Authors declared no conflict of interest.

Autorzy nie zgłosili źródła finansowania.
Autorzy nie deklarowali konfliktu interesów

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