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CORACOID TRANSFER IN SHOULDER INSTABILITY: FROM OPEN TO ARTHROSCOPIC SURGERY – REVIEW OF LITERATURE

Bartłomiej Kordasiewicz
Shoulder Subunit, Trauma and Orthopedics
Department, A. Gruca Hospital, Otwock
Postgraduate Medical Education Centre,
Warsaw, Poland

SUMMARY

Introduction

Latarjet coracoid bone block stabilization remains one of the most efficient surgical treatment options for anterior shoulder instability. This procedure has undergone a gradual modification process since it was described by Latarjet in 1954.

Aim

The goal of this study was to review the literature and to present its evolution and the current statement about open and arthroscopic Latarjet stabilization.

Material and methods

A systematic review of the literature found in PubMed database was conducted.

Results

The results found in Pubmed were searched as follow: 278 records for “Latarjet procedure”, 115 for “coracoid transfer”, 382 for “glenoid bone loss”. Seventy records were found for “arthroscopic Latarjet”.

Conclusions

A review of modification of Latarjet stabilization for anterior shoulder instability was conducted. The procedure evolved

TRANSFER WYROSTKA KRUCZEGO W LE-CZENIU NIESTABILNOŚCI PRZEDNIEJ BARKU – OD STABILIZACJI METODĄ OTWARTĄ DO ARTROSKOPII – PRZEGLĄD LITERATURY

Bartłomiej Kordasiewicz
Pododdział Chirurgii Barku, Klinika Chirurgii
Urazowej Narządu Ruchu i Ortopedii CMKP
SPSK im. A. Grucy, Otwock

STRESZCZENIE

Wstęp

Stabilizacja kostna sposobem Latarjet (transfer wyrostka kruczego) jest jedną z najskuteczniejszych metod leczenia niestabilności przedniej barku. Od czasu opisanie tej metody przez Latarjet w 1954 roku była wielokrotnie modyfikowana. Obecnie istnieje kilka wariantów stabilizacji metodą otwartą jak i artroskopową.

Cel

Celem pracy było przedstawienie ewolucji stabilizacji barku sposobem Latarjet i przegląd literatury od operacji metodą otwartą do operacji artroskopowej.

Materiał i metody

W pracy dokonano przeglądu literatury zgromadzonej w bazie danych literatury medycznej PubMed.

Wyniki

W bazie danych znaleziono następujące artykuły: 278 publikacji dla hasła „operacja Latarjet”, 115 publikacji dla hasła „transfer wyrostka kruczego”, 382 dla „ubytek brzegu kostnego panewki”. Siedemdziesiąt publikacji zostało znalezionych dla hasła „artroskopowa stabilizacja Latarjet”.

Wnioski

W pracy przedstawiono opisywane w literaturze modyfikacje oryginalnej metody stabilizacji barku sposobem Latarjet.

from many variants of open surgery to arthroscopic stabilization. Arthroscopic and open Latarjet stabilization techniques are both reliable methods of shoulder instability treatment with low recurrence rate and high patients' satisfaction. Up to date the results of arthroscopic stabilization remain similar to the results of open procedure.

Keywords: Latarjet stabilization, coracoid transfer, shoulder arthroscopy, shoulder instability

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Introduction

Latarjet coracoid bone block stabilization remains one of the most efficient surgical treatment options for anterior shoulder instability (Latarjet 1954). This procedure has undergone a gradual modification process since it was described by Latarjet in 1954 (Edwards and Walch 2002). In 2007 Lafosse described the arthroscopic technique (Lafosse *et al.* 2007). From this moment the number of surgeons performing arthroscopic stabilization has increased and the discussion about both techniques has been carrying on.

Aim

The aim of this study was to review the literature and to present its evolution and the current statement about open and arthroscopic Latarjet stabilization.

Material and methods

A systematic review of the literature found in Pubmed database was conducted. The searched terms were "Latarjet procedure" "arthroscopic Latarjet", "coracoid transfer" and "glenoid bone loss". Studies deemed to be appropriate for inclusion were analyzed.

Results

The results found in PubMed were presented as follows: 278 records for "Latarjet

Procedura ewoluowała poprzez liczne metody otwarte do stabilizacji artroskopowej. Techniki artroskopowa i metodą otwartą są skutecznymi sposobami leczenia niestabilności przedniej barku, z niską częstością nawrotów i istotną satysfakcją pacjentów z wyników leczenia. Wyniki techniki artroskopowej są zbliżone do wyników po stabilizacji metodą otwartą.

Słowa kluczowe: stabilizacja Latarjet, transfer wyrostka kruczego, artroskopia barku, niestabilność barku

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procedure", 115 for "coracoid transfer", 382 for "glenoid bone loss". Eleven studies of III and IV level of evidence about open technique with 2 screws stabilization with long term follow-up were found. Seventy records were found for „arthroscopic Latarjet”. About 10 papers describing not only the arthroscopic technique but also evaluating the results were selected. Up to date only 1 study compared the results of open and arthroscopic Latarjet stabilization performed by a single surgeon.

There were not significant differences between two groups of surgeries (open and arthroscopic Latarjet technique) in the literature (Table 1).

Table 1. Statistical data from the literature – open and arthroscopic Latarjet technique.

Variable	Arthroscopic	Open
Concomitant lesions	7%–14%	3.4%–11.6%
Time of surgery (in minutes)	50–240	45–81
Recurrence	0%–3.6%	0%–8%
Complications	10%–29%	11%–30%
Graft healing	78%	85%–98.5%
Recurrence	3.6%–15.6%	4.9%–14.6%
Loss of external rotation in adduction	17°–18°	10.3°–11.7°

Discussion

In 1954 Latarjet described coracoid transfer in anterior shoulder instability (Latarjet

1954). The original technique was based on coracoid insertion into anterior glenoid neck in horizontal position with subscapularis cut and one screw fixation. Subscapularis split was described as an alternative for the arthrotomy. In 1958 Helfet reported the technique of his former patron Bristow – he proposed positioning the tip of coracoid on anterior glenoid neck through a vertical split in subscapularis tendon, sutured later on over coracoid and conjoined tendon (Helfet 1958). Fixation of coracoid with one screw through its tip in standing position was proposed by May in 1970 (May 1970). Patte in 1979 continued modification of the technique describing “triple effect” stabilization: bone block, sling effect and capsule and coracoacromial ligament stump suture to reconstruct anterior capsule. Bone block was fixed with 2 screws, horizontally onto glenoid neck (Patte *et al.* 1979). In 1991 Walch reported excellent results with only 1% of recurrence. He performed subscapularis split along its fibers and fixed the coracoid with 2 screws in flat position (Walch 1991). In 2002 he repeated this results in more than 1000 Latarjet stabilization. In this group 83% of patients came back to sport activity at the same level as before surgery and 98% patients judged the results as good or very good (Edwards and Walch 2002). Another modification of the open technique was proposed by Burkhart *et al.* (2007). Authors recommended twisting the graft 90° to correlate the natural curvature of the glenoid with the curvature of the graft. The Latarjet stabilization procedure remains one of the most efficient techniques in anterior shoulder instability. Bhatia after reviewing the literature reported the rate of recurrence following an open Latarjet procedure from 0% to 8% (Bhatia *et al.* 2014). In 2007 Lafosse described the arthroscopic technique of Latarjet stabilization and in 2010 he reported the first 100 case results with 0% of recurrence (Lafosse *et al.* 2007, Lafosse and Boyle 2010). The arthroscopic technique has been gradually used by

numerous surgeons as well as the discussion about superiority of one or another procedure has been continued. Apparent advantages of arthroscopy are concomitant lesions treatment, better graft positioning and rapid postoperative recovery. Potential troubles are linked with a technically demanding procedure and potential complications including the graft healing problems and neurovascular lesions. The only study comparing open and arthroscopic stabilization results was Cunningham’s *et al.* report evaluating 28 patients in the arthroscopic group and 36 in the open one (Cunningham *et al.* 2016). Other reports are concerning one technique results achieved. The goal of this study was to analyze several factors to evaluate both procedures’ outcome – these factors are discussed below.

Concomitant lesions

A few studies only, reported the presence of concomitant lesions in the shoulders treated with open Latarjet procedure. Allain *et al.* (1998) reported 2 rotator cuff tears in 58 shoulders (3.4%) and Bhatia *et al.* (2014) found 7 HAGL lesions (11.6%) in 60 patients. Lafosse and Boyle reported 7% of associated intra-articular lesions: 6 SLAP tears and 1 posterior labrum lesion treated whilst arthroscopic Latarjet stabilization (Lafosse and Boyle 2010). Castricini *et al.* (2013) disclosed 4 (13%) associated lesions in 30 patients: 2 SLAP lesions, 1 posterior Bankart lesion, and 1 partial cuff tear, which were treated during the course of the procedure.

Time of surgery

Lafosse and Boyle reported an average time of the arthroscopic Latarjet procedure about 50 minutes. Their first cases took up to 4 hours, though (Lafosse and Boyle 2010). Dumont assessed the average time required to complete the procedure by Lafosse for approximately 60 to 75 minutes after gaining some experience (Dumont *et al.* 2014). Castricini *et al.* (2013) described the learning

curve in arthroscopic Latarjet stabilisation: the time of the surgery decreased significantly from 132 in the first 15 cases to 99 min in the last 15 patients. Cunningham *et al.* (2016) reported significantly higher operative time in the arthroscopic stabilization versus open: 146 and 81 minutes respectively. He also showed that surgical time came close to that of open stabilization after 20 procedures. There is almost no data in the literature review concerning the time of the surgery in open Latarjet procedure. However the average time to complete this procedure by an experienced surgeon during “live surgery meetings” is about 45 to 60 minutes.

Stability

Boileau *et al.* (2010) reported no recurrence after arthroscopic Bankart-Bristow-Latarjet stabilization. However some patients (13.6%) were either in pain or presented an apprehension in throwing position. Lafosse and Boyle (2010) also reported no recurrence after 100 procedures. Dumont *et al.* (2014) reported 1 subluxation (1.59%) in Lafosse’s group of reviewed patients. Bhatia *et al.* (2014) after reviewing the literature reported the rate of recurrence following an open Latarjet procedure from 0% to 8%. Elkousy, Fontanesi and Di Giacomo reported no recurrence (Elkousy *et al.* 2010, Fontanesi *et al.* 1995 and Di Giacomo *et al.* 2011). Allain *et al.* (1998) had no recurrence in those patients followed up for 14 years, however 1 patient (2%) reported a sensation of shoulder instability. Butt and Charalambous (2012) in their review study (1658 cases) reported 6% of the recurrence rate: 2.8% dislocations and 3.3% subluxations. Mizuno *et al.* (2014) reported 5.9% of recurrence in 68 patients with an average 20 years follow up (all patients operated on by G. Walch team). The highest rate of recurrence (8%) was reported by Shah *et al.* (2012) – this study included also revision surgeries, which could influence the results. Cunningham *et al.* (2016) reported

no dislocation after open and 1 (3.6%) after arthroscopic procedure.

Complications

Cunningham *et al.* reported no intra-operative complications in either group but there were significantly more postoperative complications in the arthroscopic group: 29% and 11% respectively. In arthroscopic group he reported: 2 non-unions, 3 migrations, and 1 infection, 1 hematoma and 1 recurrence. In open group there were 2 infections and 2 hematomas. Additionally conversion was necessary in 3 cases (Cunningham *et al.* 2016). Lafosse and Boyle reported 4 perioperative complications in 100 shoulders: 2 hematomas, 1 graft fracture and 1 transient musculocutaneous nerve palsy that recovered well. Additionally 7% of grafts were fixed with one screw only (Lafosse and Boyle 2010). In the 5-year follow-up study of Dumont *et al.* (2014) one case of axillary nerve problem was reported. Boileau *et al.* (2010) reported only 1 hematoma as a perioperative complication of arthroscopic Bristow-Bankart-Latarjet procedure, however 6 out of 47 patients had a conversion to an open graft fixation. Casa tricini *et al.* (2013) described 3 cases (10%) of early graft fracture: 2 patients within 2 days of the surgery (including one due to a technical fault – one screw fixation) and 1 patient after direct trauma. Casabianca *et al.* (2016) reported 2 complications in 19 cases: one graft fracture during screwing requiring conversion to open technique and an early case of osteolysis in a medial-positioned graft. In open stabilization Shah *et al.* (2012) reported early complications in 25% of 47 patients – 48 shoulders. Neurological complications were reported in 10% (5 patients): 3 cases of temporary nerve palsies: 2 musculocutaneous and 1 radial nerve – fully recovered in time; 2 persistent axillary palsies including 1 sensory and 1 partial motor deficit. Superficial wound infection occurred in 3 cases (6%). Butt and Charalambous (2012) when

reviewing the literature of an open coracoid transfer, evaluated an average number of complications in the studies as follows: hardware defect 6.5%, graft union problem 10.1%, graft osteolysis 1.6%, nerve palsy 1.2% and infection in 1.5%. In another review study Griesser *et al.* (2013) assessed the complication risk of Bristow-Latarjet procedure up to 30%, including recurrence.

Radiographic results

Cunningham *et al.* (2016) reported better radiographic results in open group. Arthroscopic and open group results were respectively: superior screw angle 11° versus 6° and inferior screw angle 12° versus 8°. Divergent screws (over 10° to the glenoid) putting the suprascapular nerve at risk were found respectively in 46% and 22%, correct graft position 93% and 97%. In 2010 Lafosse and Boyle (2010) reported 7 radiological findings – 4 graft non-unions and 3 graft osteolysis. Casabianca *et al.* (2016) evaluated the graft fusion rate as 78% with no lateral overhanging. The mean angle of the screw was 19.9° with 27% of the screws with the angle above 25°. In open technique there were more studies describing radiographic results. Hovellius *et al.* (2006) presented 85% of graft osseous healing at 15 years' follow-up in open Latarjet procedure. Mizuno *et al.* (2014) reported detailed results in 68 patients in average 20 years of follow-up after open Latarjet stabilization: the coracoid graft was positioned medially in 5 patients (7.4%), flush with the glenoid in 54 patients (79.4%), and with lateral overhang in 9 patients (13.2%). Pseudoarthrosis of the coracoid graft occurred in 1 shoulder (1.5%). Screw fracture was identified in 1 shoulder (1.5%) and screw loosening occurred in 2 shoulders (2.9%) (Mizuno *et al.* 2014). Allain *et al.* (1998) also documented radiographic results of 56 patients (58 shoulders) after open Latarjet stabilisation with average follow-up of 14 years. The position of the graft was considered to be perfect in 24 shoulders (41%),

too lateral in 31 (53%), and too medial in 3 (5%). Two shoulders (3%) had a non-union of the transferred coracoid process and 10 (17%) had partial osteolysis of the transplant (Allain *et al.* 1998).

Revision

In the study of Cunningham *et al.* (2016) one patient with recurrency (3.6%) after arthroscopic technique required restabilisation. Dumont *et al.* reported 15.6% (10 of 64 patients) revisions after arthroscopic stabilisation: 1 patient underwent refixation of a displaced coracoid, 8 patients had prominent screws removal, 1 underwent total shoulder arthroplasty for arthrosis (Dumont *et al.* 2014). Three revisions (10%) for graft fractures were performed in Castricini's report (Castricini *et al.* 2013). Shah *et al.* reported 7 revisions (14.6%) in open Latarjet stabilization: 3 for infection and 4 for recurrence (Shah *et al.* 2012). Butt and Charalambous (2012) in their review study of open Latarjet technique reported the rate of revision surgery as 4.9% of the cases. Griesser *et al.* (2013) in a similar review study assessed the revision rate as 7%.

Loss of external rotation

Loss of external rotation in adduction was always important factor after stabilisation procedures. After arthroscopic Latarjet procedure, the loss of external rotation was 17° according to the study of Boileau's and 18° in Lafosse's study (Boileau *et al.* 2010, Lafosse and Boyle 2010). Shah *et al.* (2012) reported 10.3° of loss of external rotation after open procedure. Greisser *et al.* (2013) in the review study evaluated the mean loss of external rotation as 11.7°. Cunningham *et al.* (2016) reported similar external rotation in both groups: 55° in the arthroscopic group and 51° in the open.

Conclusions

Arthroscopic and open Latarjet stabilization are both reliable methods of treatment with low recurrence rate and high patient

satisfaction. Presented data confirmed the arthroscopic stabilization results are staying in proximity to the results achieved after open procedure. The arthroscopic stabilization is relatively a new technique, still developing, requiring some gentle “polishing” and meticulous investigation.

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*Author responsible for correspondence:
Bartłomiej Kordasiewicz
Shoulder Subunit, Trauma and Orthopedics
Department, A. Grucza Hospital, Otwock
Postgraduate Medical Education Centre,
Warsaw, Poland
Konarskiego 13*

*Autor odpowiedzialny za korespondencję:
Bartłomiej Kordasiewicz
Pododdział Chirurgii Barku, Klinika Chirurgii Urazowej Narządu Ruchu i Ortopedii
CMKP SPSK im. A. Grucy,
Warszawa, Polska
ul. Konarskiego 13*

*05-400 Otwock, Poland
kl.chir.ur@spskgruca.pl*

*05-400 Otwock, Polska
kl.chir.ur@spskgruca.pl*