

# RESULT OF BONE BLOCKING SURGERY IN COMBAT ATHLETES WITH ANTERIOR SHOULDER INSTABILITY: A PROSPECTIVE STUDY

## RESULTADO DA CIRURGIA DE BLOQUEIO OSSEO EM ATLETAS DE LUTA COM INSTABILIDADE ANTERIOR DO OMBRO: UM ESTUDO PROSPECTIVO

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### ABSTRACT

**Objective:** This study aims to understand the way fighting athletes respond to bone block surgery in the treatment for shoulder instability. **Methods:** Prospective clinical study with competitive fighters with shoulder instability who underwent bone block surgery from 2013 to 2016, followed by a postoperative rehabilitation protocol. For the evaluation, eight combat athletes with anterior shoulder instability were treated, with a total of nine shoulders, since one athlete underwent bilateral surgery. All patients signed the Free and Informed Consent Form. The evaluation protocol included medical consultation, radiography of the operated shoulder, degree of active and passive lateral rotation; degree of active and passive elevation; visual analogue scale (VAS) for pain; Athletic Shoulder Outcome Rating Scale (EROE; acronym in Portuguese) scores; Western Ontario Shoulder Instability Index (WOSI), and American Shoulder and Elbow Surgeons (ASES). **Results:** We observed a decrease in the range of passive and active movement in the recent postoperative period. In later postoperative, values were close to those in the preoperative period at the end of the follow-up. There was improvement in pain, and in all ASES, WOSI and EROE scores no complications were documented. As for returning to sport, two athletes did not return, one of them due to shoulder pain and the other due to retirement. **Conclusion:** Bone block surgery has shown good functional results in uncomplicated combat athletes. **Level of Evidence IV, Prospective Case Series.**

**Keywords:** Shoulder Dislocation. Athletic Injuries. Return to Sport.

### RESUMO

**Objetivo:** Este estudo objetiva entender como atletas de luta respondem ao tratamento para instabilidade do ombro após cirurgia de bloqueio ósseo. **Métodos:** Estudo clínico prospectivo com pacientes lutadores competitivos que apresentavam instabilidade do ombro submetidos à cirurgia de bloqueio ósseo de 2013 a 2016, seguido por protocolo pós-operatório de reabilitação. **Oito atletas de luta com instabilidade anterior do ombro foram tratados, sendo, no total, 9 ombros. Um atleta foi submetido a cirurgia bilateral. Todos os pacientes assinaram o Termo de Consentimento Livre e Esclarecido. O protocolo de avaliação incluía consulta médica, radiografia do ombro operado, grau de rotação lateral ativa e passiva; grau de elevação ativa e passiva; escala visual analógica da dor (EVA); escores EROE; WOSI e ASES. Resultados:** Observamos diminuição do arco de movimento passivo e ativo no pós-operatório recente e valores próximos aos do pré-operatório ao final do acompanhamento. Houve melhora da dor e em todos os escores ASES, WOSI e EROE no período pós-operatório, não havendo complicações. Quanto ao retorno ao esporte, dois atletas não retornaram ao esporte, sendo um deles por dor no ombro e outro por aposentadoria. **Conclusão:** A cirurgia de bloqueio ósseo apresentou bons resultados funcionais em atletas de luta sem complicações. **Nível de Evidência IV, Série de Casos Prospectivo.**

**Descritores:** Luxação do Ombro. Traumatismos em Atletas. Volta ao Esporte.

**Citation:** Baldan AR, Pereira VL, Lara PHS, Ejnisman B, Belangero PS. Result of bone blocking surgery in combat athletes with previous shoulder instability: a prospective study. *Acta Ortop Bras.* [online]. 2022;30(2): Page 1 of 5. Available from URL: <http://www.scielo.br/aob>.

### INTRODUCTION

Anterior shoulder instability affects mainly young athletes. The bone block technique (coracoid process transfer) is an option to the retentive

process of soft tissue, especially in patients with bone loss in the glenoid and/or humeral head.<sup>1,2</sup>

All authors declare no potential conflict of interest related to this article.

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Article received on 10/13/2020, approved on 01/19/2021.



Combat sports encompass all martial arts modalities involving competition. The rules of each modality vary, as well as the epidemiology of the lesions. However, we can observe shoulder dislocation in all fighting modalities.<sup>3</sup>

The literature indicates that athletes of contact sports such as rugby, hockey and American football have higher rates of relapse and worse prognosis regarding evolution, often requiring bone block surgery, especially with > 20% to 25% bone loss.<sup>4,5</sup> The efficacy of this type of surgery for athletes of contact sports has shown good results in several modalities.<sup>6,7</sup> However, the literature lacks specific data on combat athletes, such as epidemiology, clinical and functional results of open bone block surgery.

This study aims to evaluate the outcome of treatment with bone block in anterior shoulder instability in combat athletes.

## MATERIALS AND METHODS

The patients signed the informed consent form before participation. From February 2013 to October 2016, eight combat athletes with anterior shoulder instability were treated, totalizing nine shoulders, since one athlete underwent bilateral surgery. The general characteristics of the sample are shown in Table 1.

Only in one of the athletes the non-dominant limb was affected. The body mass index (BMI) mean of the patients was 24.5 kg/m<sup>2</sup>, ranging from 20.8 to 27.1 kg/m<sup>2</sup>. The distribution of modalities is found in Table 2. Four athletes were professionals and four amateur competitors, with weekly practice above 10 hours of training. The average practice of the athletes before dislocation was 85.3

months, ranging from 12 to 228 months. The mean follow-up was 21.13 months, ranging from six to 51 months.

The inclusion criteria required patients who had never undergone shoulder surgery and who were followed-up in the postoperative period for at least six months. Exclusion criteria observed patients with previous shoulder surgery and those with postoperative follow-up shorter than six months.


All patients were prospectively evaluated according to a pre-established protocol (Figure 1), in which they were evaluated by physicians and physiotherapists of the Sports Traumatology Center of the Paulista School of Medicine. Besides medical consultation, all patients underwent radiography and computed tomography of the operated shoulder. Patients were evaluated both pre and postoperatively, considering the following: degree of active and passive lateral rotation; degree of active and passive elevation; visual analog scale (VAS) for pain;<sup>8</sup> Athletic Shoulder Outcome Rating Scale (EROE) score;<sup>9</sup> Western Ontario Shoulder Instability Index (WOSI) score<sup>10</sup> and American Shoulder and Elbow Surgeons (ASES) score.<sup>11</sup> The EROE<sup>9</sup> score assesses shoulder stability, range of motion, daily function and pain. In this score, bad results are related to scores ≤ 50 points; regular results to scores between 51 to 74 points; good results to scores between 75 to 89 points; and excellent scores to 90 to 100 points. The WOSI<sup>10</sup> score assesses quality of life in patients with shoulder instability, in which a higher score indicates worse quality of life, being 0 (excellent) and 210 (very poor). The ASES<sup>11,12</sup> score evaluates pain and shoulder function from 0 to 100, with higher values indicating better results. The postoperative evaluation periods followed the protocol (Figure 1). Moreover, it was also evaluated if the patients returned to sports practice, if there were any complications or new episodes of dislocation after surgery.

**Table 1.** General characteristics of the sample.


Patient sample (N = 8)	
Age (years)	
Average	24.6
Variation	20-35
Gender (N.,%)	
Male	8 (100%)
Affected limb (N.,%)	
Left	5 (55%)
Right	4 (45%)
Dislocation Mechanism (N.,%)	
Traumatic	8 (88%)
Atraumatic	1 (12%)
Category	
Amateur	4 (50%)
Professional	4 (40%)

**Table 2.** Fighting modalities practiced by the athletes.

Case	Modalities
1	Olympic Wrestling Jiu-Jitsu Judo
2	Jiu-Jitsu Capoeira
3	Kickboxing
4	Muay Thai Jiu-Jitsu
5	Mixed Martial Arts
6	Jiu-Jitsu
7	Chinese Boxing
8	Mixed Martial Arts
9	Boxing



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Shoulder Ambulatory

**PROJECT OF BONE BLOCK SURGERY  
CHECK LIST**

**Preoperative**

- VAS (Visual Analog Scale for pain)
- ADM of External Rotation (ER) and Bilateral Passive Elevation
- ADM of ER and Bilateral Active Elevation
- ASES
- SQR
- WOSI

**1° and 2° WEEK OF POSTOPERATIVE:**

- VAS (Visual Analog Scale for pain)

**4° WEEK OF POSTOPERATIVE:**

- VAS (Visual Analog Scale for pain)
- ADM of ER and Bilateral Passive Elevation
- ADM of ER and Bilateral Active Elevation

**8° WEEK OF POSTOPERATIVE:**

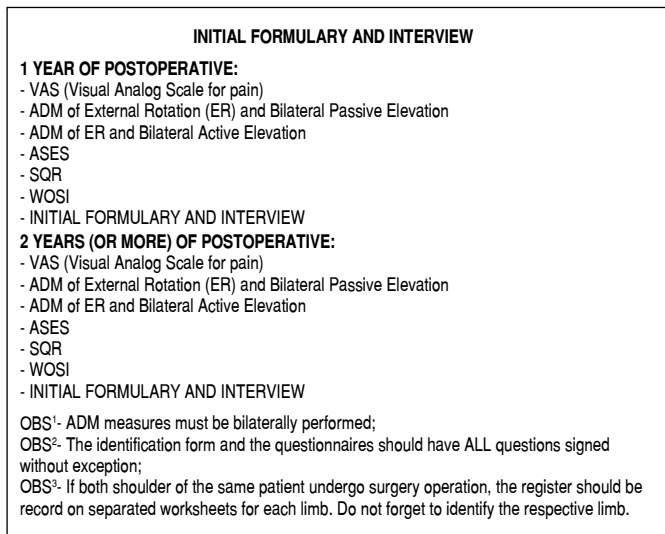
- VAS (Visual Analog Scale for pain)
- ADM of ER and Bilateral Passive Elevation
- ADM of ER and Bilateral Active Elevation

**12° WEEK OF POSTOPERATIVE:**

- VAS (Visual Analog Scale for pain)
- ADM of ER and Bilateral Passive Elevation
- ADM of ER and Bilateral Active Elevation

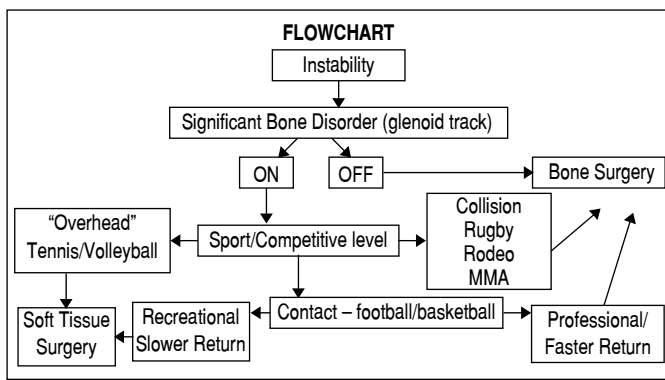
**6 MONTHS OF POSTOPERATIVE:**

- VAS (Visual Analog Scale for pain)
- ADM of External Rotation (ER) and Bilateral Passive Elevation
- ADM of ER and Bilateral Active Elevation
- ASES
- SQR
- WOSI



**Figure 1.** Evaluation protocol of the athletes.

Regarding the referral for surgery, all patients underwent bone block surgery (described by Latarjet) according to the flowchart (Figure 2). Regarding surgical technique, all patients were operated in the beach chair position, and the anterior access was about 5 cm, performed on the coracoid process extending to the deltopectoral interval. The coracoid process was osteotomized at 1.5 to 2 cm from its tip, at the origin of the joint tendon. The graft was prepared according to the Latarjet technique. The subscapularis muscle was opened longitudinally between the upper two-thirds and the lower third and the joint capsule was opened vertically. The graft was fixed at the anterior edge of the glenoid with two screws. Regarding the type of implants, screws with washers for small fragments were used in all cases.



**Figure 2.** Surgery indication flowchart.

All patients underwent the same postoperative rehabilitation protocol, performed by the team of physical therapists of the Sports Traumatology Center of the Paulista School of Medicine. Immobilization using arm sling for three weeks, followed by progressive increase in the range of active and passive movement and beginning of strengthening exercises at eight weeks. The Ethics Committee of Paulista School approved this study (1.660.771).

**Statistical Analysis**

We used statistical parametric evaluations since data are quantitative and continuous. We used the Two-Proportion Equality test to characterize the distribution of the relative frequency of qualitative variables. To verify the correlation between variables, the Pearson

correlation coefficient was used. Differences with  $p < 0.05$  were considered statistically significant and the analysis was performed using SPSS V20 software.

**RESULTS**

Regarding shoulder mobility, we observed that passive and active elevations and passive and active lateral rotations show a diminution in the recent postoperative period, reaching values close to those of the preoperative period at the end of the follow-up. Table 3 shows the results.

Regarding the results of the scores in Table 4 and 5, the postoperative period improved in all cases.

**Table 3.** Description of the functional data of the individuals.

Variables	Active Lateral Rotation	Passive Lateral Rotation	Active Elevation	Passive Elevation	N
Preoperative	62	73.2	163.7	170.4	9
4 weeks	14.6	24.2	107.8	120	9
8 weeks	25.3	30.7	115	123.9	9
12 weeks	36.7	42.8	122	132.6	9
6 months	52	56.6	132.6	140.4	9
1 year	48.8	51	150	154.6	5
2 years old	55.5	63.8	152.5	162.5	4
3 years	75	80	159	165	2
4 years old	75	80	158	160	1

**Table 4.** Description of the results of the evaluated scores.

Variables	ASES	WOSI	EROE	N
Preoperative	47.8	112.9	47.2	9
6 months	69.2	63.4	70.6	9
1 year	73.2	42.4	73.4	5
2 years old	78.5	59.3	82.3	4
3 years	82	62.5	93	2
4 years old	92	66	88	1

**Table 5.** Distribution of athletes according to EROE Score.

EROE	Weak		Regular		Good		Excellent	
	N	%	N	%	N	%	N	%
Pre	4	44.4	4	44.4	1	11.1%	0	0%
6 months	2	22.2%	1	11.1%	5	55.5%	1	11.1%
1 years old	1	20%	0	0%	3	60%	1	20%
2 years old	0	0%	1	25%	2	50%	1	25%
3 years	0	0%	0	0%	1	50%	1	50%
4 years old	0	0%	0	0%	1	100%	0	0%

Regarding the Visual Analog Scale (VAS) for pain, we also observed an improvement. Postoperative period indicated an average of 4.22 (0-7) and at six postoperative months indicates an average of 1.33 (0-6). The athletes did not present complications during the follow-up period and new episodes of dislocation did not occur. Regarding the return to the sport, two athletes did not return. One of them due to shoulder pain and the other for having retired from professional wrestling.

**DISCUSSION**

The practice of fighting has spread out in our country and throughout the world. Thus, the knowledge about the correct procedures for combat athletes presenting anterior shoulder instability will increase. Duazère et al.<sup>13</sup> compared active elevation and active and passive lateral rotation in the postoperative period and in the follow-up of

patients undergoing bone block surgery. Their values were similar to those found in our study, with averages of 167 degrees for active elevation; 50 degrees for active lateral rotation; and 82 degrees for passive lateral rotation at follow-up. The study by da Silva et al.<sup>14</sup> evaluated active lateral elevation and rotation in the postoperative period and also found similar results to our investigation, with an average of 146 degrees of elevation and 59 degrees of lateral rotation. In the study by Mook et al.,<sup>15</sup> American Shoulder and Elbow Surgeons (ASES) score was compared before and after surgery, with an average of 70.2 (28.3-100) in the preoperative period and 89.2 (56.6-100) in the postoperative period. Our study showed an average of 47.8 (25-75) and 69.2 (55-80). The results showed difference; however, we emphasize that the study conducted by Mook et al.<sup>15</sup> included athletes and nonathletes. Several studies used the ROWE score to evaluate the outcome of bone block surgery. The main ones are illustrated in Table 6. For this analysis, we used the results of 6 months of follow-up

**Table 6.** Comparison of the EROE Score in several studies.

Study	Patients	Follow-up (months)	Redislocation rate	Excellent ROWE score	Good ROWE score	Regular ROWE score	Weak ROWE score
Banas et al. 1993	79	103	4%	74%	11%	9%	6%
Singer et al. 1995	14	246	0%	36%	57%	7%	1%
Pap et al. 1997	31	31	3%	45%	39%	6%	10%
Hovellius et al. 2004	118	182	4%	71%	15%	11%	4%
Matthes et al. 2007	29	38	0%	59%	24%	10%	7%
Ruci et al. 2015	42	46	0%	64%	22%	9.5%	4.5%
Current study	8	21	0%	11.1%	55.5%	11.1%	22.2%

because we have the data of all athletes included in this period. As in previous studies, most patients are in the excellent or good categories of the score, demonstrating satisfactory results in this group of patients.

In the study by Beranger et al.,<sup>8</sup> 100% of the patients returned to sport after Performing Latarjet surgery. On the other hand, in the study by Neyton et al.<sup>16</sup>, who rated only Rugby players, the rate of return was 56%. In our study, the rate of return was 75%.

Griesser et al.<sup>17</sup> reported a complication rate of 30%, which were recurrences, neurovascular lesions, hematomas, infections, graft pseudarthrosis and limitations to the movement arc. We had no complications in our study.

In the work of Stein et al.<sup>18</sup> an evaluation of the results of arthroscopic surgery of retensioning on soft tissue was performed in several types of sports. Martial arts athletes have a worse rehabilitation beginning than in other athletes, but present similar results at the end of rehabilitation. Moreover, 66% of professional martial arts athletes started playing sports recreationally after surgery.

The strengths of our study are: first study to address this theme (result of bone block surgery for anterior shoulder instability in combat athletes) providing epidemiological data of injuries in this specific group of athletes; homogeneous nature of the sample, since it presents young male athletes. All athletes were treated with a surgical procedure studied in the literature for patients who were athletes of contact modalities, associated with bone injury.<sup>15</sup>

One limitation of our study was the small number of cases, besides a short follow-up period for a procedure that presents good functional results, but, at the same time, does not reproduce the original anatomy of the shoulder. Complications such as arthrosis (which has been described as one of the complications of the bone block procedure) require a longer postoperative follow-up period to verify its incidence.

## CONCLUSION

Bone block surgery showed good functional results in combat athletes with no complications, being a good option for this group of athletes with anterior shoulder instability.

**AUTHORS' CONTRIBUTIONS:** Each author contributed individually and significantly to the development of this article: ARB: writing, evaluation of patients and performing surgeries; VLP: writing, evaluation of patients and performing surgeries; PHSL: evaluation of patients, statistical analysis and performance of surgeries; BE: review and advising; PSB: review and advising.

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