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Outcomes of Non-Operative Vs. Operative Management of Superior Labrum Anterior Posterior Tear in Athletic: A Systematic Review

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Abstract

Objectives: To clarify the outcomes of Non-Operative vs. Operative Management of SLAP tear in athletic.

Data Sources: Medline databases (PubMed, Medscape, Science Direct. EMF-Portal, google scholar). All materials available in the Internet from 2017 to 2024.

Study Selection: The search results of the articles were screened by title and abstract then by full-text. The eligible full text articles were downloaded to be utilized in further analytics procedures. Inclusion criteria were articles on outcomes of Non-Operative vs. Operative Management of SLAP tear in athletic.

Data Extraction: If the studies did not fulfill the inclusion criteria, they were excluded. Study quality assessment included whether ethical approval was gained, eligibility criteria specified, adequate information and defined assessment measures.

Data Synthesis: Comparisons were made by structured review with the results tabulated.

Findings: In total 8 potentially relevant publications were included, there was better outcomes regarding improvement of shoulder function, pain reduction, return to sport and return to work in operation management in SLAP cases.

Conclusion: The operative treatment of SLAP is associated with better outcomes regarding improvement of shoulder function, pain reduction, return to sport and return to work on the other hand range of motion and patient satisfaction was comparable between operation and non- operation management.

Keywords: SLAP, operation, non-operation, athletic.

Introduction

Snyder et colleagues first characterized an injury to the superior labrum that extends both anteriorly and posteriorly to the biceps anchor in 1990. SLAP lesions, which refer to superior labrum anterior posterior lesions, may cause discomfort and impair shoulder function, especially in those who are physically active. Despite the unsatisfactory results associated with labral debridement [(1)].

These injuries often occur due to either direct impact on the shoulder or the gradual deterioration caused by prolonged and excessive usage. Tears caused by chronic usage are often seen in athletes that engage in overhead activities. These tears are believed to occur either due to the arm decelerating during the follow-through phase of throwing or as a consequence of the "peel-back mechanism" that occurs during the cocking phase when the arm is abducted and externally rotated [(2)].

Although conservative therapy may be successful for some individuals, if it is not, arthroscopic SLAP repair with suture anchor fixation is a very effective therapeutic option that produces favorable outcomes, particularly in young patients [(3)].

Several papers exist that indicate favorable results from surgical correction of SLAP rips. However, there is a scarcity of literature on individuals who had a favorable outcome with nonoperative therapy[(3)].

The majority of the literature on SLAP injuries has concentrated on outcomes following surgical repair. According to a prior investigation, débridement in isolation does not yield long-lasting alleviation of symptoms. According to a prior systematic review of surgical repair of SLAP injuries, overhead athletes recover to their previous level of performance in 20–94 percent of cases and in 22–64 percent of cases [(4)].

A more recent systematic review assessing the return to sport following surgical treatment for SLAP injuries found that biceps tenodesis had a return-to-sport rate of 76.6%, while SLAP repair had one at 79.5%. Seventy percent of overhead athletes who underwent a biceps tenodesis for a SLAP injury were able to resume to competition, according to a systematic review. Surgical treatment of SLAP injuries may be effective, but its prognosis is not always certain, particularly in overhead athletes, according to these studies [(5)].

While initial treatment for these injuries frequently involves focused shoulder rehabilitation and nonoperative treatment, there is a dearth of literature examining the outcomes of nonsurgical approaches. It is imperative to comprehend the results of nonsurgical management in order to counsel patients with SLAP injuries and make informed treatment decisions [(6)].

Moreover, the available data regarding the efficacy of validated outcome scores in defining a successful or unsuccessful course of nonoperative treatment is limited. Conventional nonoperative interventions have focused on extending the posterior capsule while preserving the strength and stability of the periscapular and glenohumeral regions [(6)].

This study was conducted to clarify the outcomes of Non-Operative vs. Operative Management of SLAP tear in athletic.

Methods

Database searching

We followed the Preferred Reporting Items for Systematic Reviews guidelines when conducting our study as we searched for the outcomes of Non-Operative vs. Operative Management of SLAP tear in athletic. From Medline databases which are (Pub Med, Medscape, and Science Direct) and materials available in the Internet. We used Non-Operative, Operative, SLAP, athletic. Additional records were identified by reference lists in retrieved articles. The search was established in the

electronic databases from 2017 to 2024 for eligible articles to be included in our study according to the required inclusion and exclusion criteria.

Eligibility criteria and screening

The search results of the articles were screened by title and abstract then by full-text. The eligible full text articles were downloaded to be utilized in further analytics procedures. Inclusion criteria were articles on outcomes of Non-Operative vs. Operative Management of SLAP tear in athletic. We included all types of observational studies (cohort, case-control, and cross-sectional) in addition to randomized controlled trials (RCTs). We exclude studies investigating other techniques, case reports.

Data extraction

Using Microsoft Excel sheets, data were extracted including baseline characteristics and Outcomes. Summary of the included studies was also extracted in the form of aim and main findings of the studies.

Quality assessment

The analyzed publications were evaluated according to evidence-based medicine (EBM) criteria using the classification of the U.S. Preventive Services Task Force & UK National Health Service protocol for EBM in addition to the Evidence Pyramid.

U.S. Preventive Services Task Force:

- Level I: Evidence obtained from at least one properly designed randomized controlled trial.
- Level II-1: Evidence obtained from well-designed controlled trials without randomization.
- Level II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence.
- Level III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.
- Quality assessment: quality of all the studies was assessed. Important factors included, study design, ethical approval, calculation of evidence power, specified eligibility criteria, appropriate controls, adequate information and specified assessment measures. It was expected that confounding factors would be reported and controlled for and appropriate data analysis made in addition to an explanation of missing data.
- Data Synthesis: A structured systematic review was done with the results tabulated.

Results

Search strategy and screening

The search strategy resulted in a total of 268 articles which became 187 after the removal of duplicates. By title and abstract screening, 27 articles were included for full text screening which resulted in a total of 7 [2, 6-11] eligible articles to be included for the final analysis. (Figure 1)

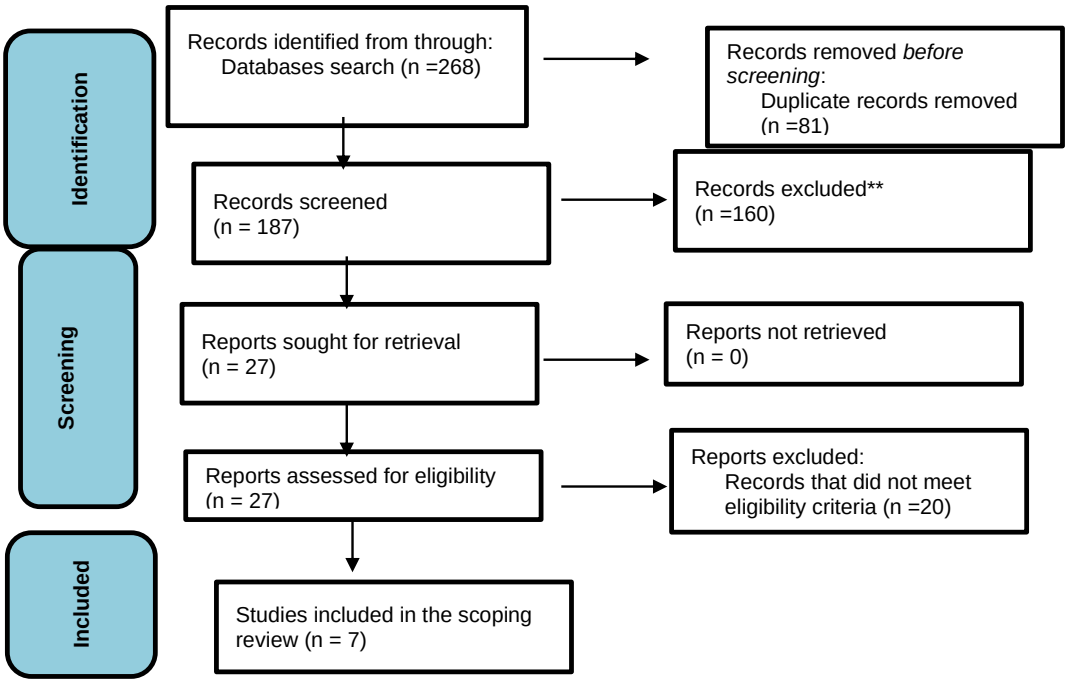

Figure 1. PRISMA flow diagram of the included studies and screening process

Demographic

The demographic characteristics of the patients in the included studies were illustrated in Table 1. Pogorzelski et al[7] conducted their research on twenty patients with SLAP tears, ten of whom were female and ten of whom had a mean age of 83.5 years. Following up on sixteen cases between 2007 and 2015, eleven were engaged in overhead activities and five were engaged in non-overhead activities. Murphy et al. [12] conducted their study on 61 patients, out of whom 36 (59%) engaged in recreational sports or higher-level activities before their injury, with 6 of them participating at a national level. The average age of the group was 39, ranging from 20 to 53, and consisted of 54 men and 7 females. Moreover, Hashiguchi et al. [8] included Forty-five men baseball players with SLAP lesion with mean age of 21.6 (range, 16–36) years. In Steinmetz et al. [6] review article, The average ages varied between 20.3 and 38.0 years. The prevalence of Type II SLAP tears was highest, with baseball, softball, and weightlifting being the primary sports associated with these injuries. Park et al. [10] included male athletes diagnosed with SLAP, with an average age of 20.3 ± 4.43 years (ranging from 15 to 34 years) at the time of presentation. The average duration of follow-up was 35.9 ± 12.3 months, with a range of 24 to 62 months. The study included a total of 31 patients who were highly skilled athletes specializing in overhead sports. Among them, 18 were at the university or high school level, while 13 were professional players. Out of the total of 31 patients, the majority (28) were baseball players, while the remaining 3 were 1 basketball player, 1 volleyball player, and 1 badminton player.

Authors	Number of patients	Age	Sex	Type of sport
Murphy et al. [12]	61 cases categorized into two groups; 22 patients in the 'early repair' group (surgery within six months	39 (20–53)	54 male, 7 female	36 (59%) patients played hobby

	or less of symptom onset) and 39 in the 'late repair' group (surgery after at least six months of symptoms).			sport or higher, with 6 playing at a national level.
Pogorzelski et al[7]	20	38.5 years (range 21-45)	10 male, 10 female	Overhead Activities (n = 11) Non-overhead Activities (n =5)
Hashiguchi et al. [8].	Forty-five	21.6 (range, 16–36) years	All were men	baseball players
Steinmetz et al. [6]	244 total athletes	20.3 to 38.0 years		baseball, softball, and weightlifting were the most common sports involved.
Park et al. [10]	31	20.3 ± 4.43 years (range, 15–34 years)	Male	28 Baseball Players, 1 basketball player, 1 volleyball player, and 1 badminton player
Gilliam et al. [11]	216	19.5 ±6 2.8 years (range, 10.3-31.0 years)		baseball players
Abdul-Rassoul et al. [2]	222 SLAP	22 years		

Functional assessment

Functional outcomes did not differ significantly between the 'early repair' and 'late repair' groups before the operation ($p > 0.05$). Equal rates of improvement were observed in both groups for the first six months following surgery. At least two years after surgery, the 'early repair' group exhibited reduced stiffness and easier back muscle mobility in comparison to the 'late repair' group (none versus modest, $p = 0.04$, and none versus a little, respectively) [12].

Regarding the assessment of postoperative functional assessment in Pogorzelski et al [7] study, Postoperatively, the Quick Disability of the Arm, Shoulder, and Hand (Quick DASH) score decreased significantly from 31 (13-52) preoperatively to 8 (0-39) ($p=0.003$). In a previous study

by Hashiguchi et al. [8] 32% of the 45 patients who underwent follow-up did not experience dysfunction during that time period (6–27 months, on average; range: 12.6 months). Steinmetz et al. [6] reported that in summary, the functional assessment was conducted using American Shoulder and Elbow Surgeons (ASES) scores before and after nonoperative management of SLAP tears. The results demonstrated a significant improvement with an AES score range of 84.7-86.4 (post-treatment) compared to 54.1-58.5 (pretreatment). Park et al. [10] reported that the ASES score went from 54.1 ± 14.3 pre-treatment to 85.9 ± 10.1 post-treatment ($p<0.01$).

Authors	Intervention	Outcome
Murphy et al. [12]	**Operative treatment**	The 'early repair' group were less stiff and had less difficulty reaching behind their back than the 'late repair' group at more than two years after surgery (none vs. a little, p = 0.001 and none vs. mild, p = 0.04, respectively)
Pogorzelski et al [7]	Operative	Significant decrease in Quick DASH 8 (0-39) postoperatively compared to preoperative
Hashiguchi et al. [8].	Non-surgical	32 from 45 patients did not suffer from dysfunction
Hermanns et al., [9]	Surgical repair	
Steinmetz et al. [6]	Non-surgical	a significant improvement after nonsurgical treatment with the range of American Shoulder and Elbow Surgeons scores of 54.1-58.5 (pretreatment) to 84.7-86.4 (post-treatment).
Park et al. [10]	nonsurgical treatment (rehabilitation)	from 54.1 ± 14.3 pre-treatment to 85.9 ± 10.1 post-treatment

Quick DASH: Quick Disability of the Arm, Shoulder, and Hand.

Pain assessment

Regarding pain assessment, **Murphy et al.** [12] reported that 'early repair' patients had less pain and difficulty with overhead activities > two years after repair than 'late repair' patients (p = 0.002). Pogorzelski et al[7] reported that all of their patients were in good health, with the exception of one gentleman who reported moderate shoulder pain six months after the procedure. Hashiguchi et al. [8] 32 patients from 45 patients had not suffered from recurrent pain in the follow-up period (average 12.6 months, range, 6–27 months). Steinmetz et al. [6] also showed that the results of an evaluation of VAS scores prior to and following nonoperative treatment revealed a statistically

significant improvement in scores following nonoperative management (range: 4.5-6.2 to 1.7-2.2). Park et al. [10] reported that the VAS for pain improved from 6.5 ± 1.4 pre-treatment to 2.2 ± 1.7 post-treatment ($p<0.01$).

Authors	Intervention	Outcome
Murphy et al. [12]	**Operative treatment**	patients had reduced level of pain postoperatively ($p = 0.002$)
Pogorzelski et al[7]	Operative	1 case experiencing mild shoulder pain 6 months postoperatively.
Hashiguchi et al. [8].	Non-surgical	32 from 45 patients had not suffered from recurrent pain
Hermanns et al., [9]	Surgical repair	
Steinmetz et al. [6]	Non-surgical	VAS improved from 4.5-6.2 to 1.7-2.2
Park et al. [10]	nonsurgical treatment (rehabilitation)	VAS score improved from 6.5 ± 1.4 pre-treatment to 2.2 ± 1.7 post-treatment ($p<0.01$).

Range of motion

Patients who underwent 'early repair' had a reduced range of external rotation shoulder motion compared to those who underwent 'late repair' (32 vs. 45, $p = 0.01$). However, after six months, this difference ceased to exist ($p = 0.5$). The 'early repair' group exhibited greater abduction and internal rotation at over two years post-surgery compared to the 'late repair' group ($p = 0.03$ and $p = 0.04$, respectively) **Murphy et al.**[12]. The majority of patients were immobilized in a splint and directed to perform specific motion exercises, including pendulum, elbow, and wrist exercises, which were considered to be passive or AAROM exercises [9]. Significant differences were observed between the two groups regarding internal and external rotation during the initial medical examination, as well as the rotation of 90° abduction two months following treatment. Additionally, total rotation and internal rotation of 90° abduction two months after treatment were identified as factors amenable to improvement through nonsurgical intervention and exhibited a high odds ratio as observed by Hashiguchi et al. [8]

Authors	Intervention	Outcome
Murphy et al. [12]	**Operative treatment**	the ‘early repair’ group had more abduction and internal rotation than the ‘late repair’ group ($p = 0.03$ and $p = 0.04$, respectively)
Hashiguchi et al. [8].	Non-surgical	range of total rotation of 90° abduction 2 months
Hermanns et al., [9]	Surgical repair	Most patients were immobilized in a sling while

		instructed to do certain motion exercises

Strength

Pre-operatively, patients classified as 'early repair' had lower lift off strength compared to patients classified as 'late repair' (38 N vs. 56 N, p = 0.04). Following the surgical procedure, this discrepancy ceased to exist. No significant variations in strength were observed (p > 0.05) **Murphy et al.** [12].

Return to sport

When assessing the effectiveness of the return-to-play process, we determined the overall percentage of successful return to play. We discovered that the overall rate of successful return to play in all athletes was 88.3% (53 out of 60) according to Hermanns et al. study [9] after surgical repair and was 53.7% (131 of 244) in study done by Hashiguchi et al.[8] who applied non-surgical treatment for their participants moreover, 100 (16/16) returned to play after surgical intervention in Pogorzelski et al. study [7]. Additionally, Steinmetz et al. [6] assessed the results of non-surgical treatment for SLAP injuries in sports and found that 53.7% (131 out of 244) of the athletes were able to return to play. Park et al. [10] Demonstrated that 74.2% of the athletes, namely twenty-three out of thirty-one, resumed playing sports after nonsurgical therapy, which included rehabilitation. Gilliam et al. [11] demonstrated that out of the 216 baseball players, 133 were successfully contacted for a follow-up interview. The average time since their first interview was 78 months, with a range of 27 to 146 months. In all, 62% of individuals were able to effectively resume playing. Abdul-Rassoul et al. [2] demonstrated that the rate of return to play was 76.6% among all patients who had surgical therapy. **Murphy et al.** [12] stated that all patients were able to effectively resume participating in sports after their surgery.

Authors	**Intervention**	**Outcome**
Murphy et al. [12]	**Operative treatment**	all patients returned to sport successfully postoperatively
Pogorzelski et al[7]	Operative	100 (16/16)
Hashiguchi et al. [8].	Non-surgical	53.7% (131 of 244)
Hermanns et al., [9]	Surgical repair	88.3% (53/60)
Steinmetz et al. [6]	Non-surgical	53.7% (131 of 244)
Park et al. [10]	nonsurgical treatment (rehabilitation)	74.2% (23 of 31)
Gilliam et al. [11]	Surgical repair	62%
Abdul-Rassoul et al. [2]	Surgical repair	76.6%

Return to work

Before the accident and surgery occurred, there were no discernible disparities between the patients who had "early repair" and those who underwent "late repair" in terms of their degree of work-related activities. After surgery, patients who had 'early repair' were able to resume a greater degree of job activity sooner than patients who underwent 'late repair' (p< 0.01). After more than 2 years after the operation, the group who had their repair done later showed improvement and reached the same level of work activity as the group that had their repair done earlier **Murphy et al.** [12]. Hashiguchi et al. [8] revealed that the total percentage of return to previous performance was 42.6%, but for athletes who successfully completed their rehabilitation, this rate jumped to 72%. Patients who chose surgery instead of continuing with the rehabilitation program had an

average of 8 physical therapy sessions, whereas patients who had effective nonoperative treatment had an average of 20 sessions.

Authors	Intervention	Outcome
Murphy et al. (12)	**Operative treatment**	By > 2 years post-operatively, the 'late repair' group had improved and equalled the 'early repair' groups level of activity at work

Satisfaction

In the evaluation of post treatment satisfaction, Pogorzelski et al[7] showed that the post operative satisfaction score among the SLAP tear cases was 8.5 points (range 1-10) at a mean follow-up of 3.4 years (range, 2.0-6.3 years). **Murphy et al.** [12] found that patients who had early repair of their shoulders reported substantially higher levels of satisfaction compared to those who underwent late repair, during a follow-up period of more than 2 years after the surgery (p = 0.04).

Authors	Intervention	Outcome
Murphy et al. (12)	**Operative treatment**	After two years follow up, there was a significant satisfaction level postoperatively (p = 0.04).
Pogorzelski et al[7]	Operative	8.5 points (range 1-10) at a mean follow-up of 3.4 years (range, 2.0-6.3 years).

Discussion

According to the research we reviewed, the nonsurgical treatment of SLAP tear resulted in a successful return-to-sport rate of slightly over 50% for all athletes. Additionally, the percentage of returning to the same level of performance as before the injury was slightly above 40%. Unsurprisingly, both results showed significant improvement when the players were allowed to fully complete their rehabilitation routine before trying to return to playing, with a success rate of 78%. Studies examining surgical treatment of SLAP tears have shown a range of return to play rates, from 20% to 100%. A recent systematic analysis reported an average return to play rate of 79.5% [13].

The percentage of returning to sports following a biceps tenodesis for SLAP tears has varied from 73% to 100%. A recent systematic study found that, on average, 84.5% of all athletes were able to return to sports after this procedure. Frantz et al demonstrated a 70% incidence of athletes returning to their sport after undergoing biceps tenodesis for this particular problem. Our research indicates that choosing nonoperative therapy for SLAP tears leads to a decreased rate of return to play compared to surgical treatment. Nevertheless, among the subgroup of patients who are capable of successfully undergoing rehabilitation, it is often possible to resume athletic activity, therefore endorsing the use of conservative treatment as a viable option for the majority of athletes with a SLAP rupture [13].

Across all studies in our systematic review, the rehabilitation steps for SLAP tears shown a high degree of similarity. The primary goal of these protocols was to detect and rectify aberrant movement patterns of the shoulder girdle, particularly scapulothoracic motion and GIRD. Additionally, the treatments aimed to relieve tightness in the posterior capsule and reduce

inflammation. It has been suggested that acquiring and maintaining proper scapular posture and control is important. Scapular forward position has been identified as a detrimental feature that affects the likelihood of effective nonoperative treatment for these injuries [(14)].

Furthermore, the development of SLAP tears in overhead athletes has been associated with GIRD (glenohumeral internal rotation deficit) and a decrease in the overall range of motion. After addressing scapular stability and mobility deficiencies, the focus is usually on strengthening and improving endurance of the rotator cuff and periscapular muscles, while also maintaining proper scapular posture. Aside from diagnosing and addressing any limitations in movement and/or muscle strength in the shoulder area, it is crucial to prioritize the enhancement of neuromuscular control and coordination. Prior to resuming sports activity, rehabilitation should take into account the full kinetic chain and focus on enhancing lower extremity strength, hip mobility, and core strengthening/flexibility, particularly in overhead and throwing players [(14)].

Interestingly, those who successfully resumed playing sports after receiving nonoperative treatment for a SLAP injury had an average of 20 physical therapy sessions, whereas those who opted for surgery only had 8 sessions. While the number of treatment sessions completed by an athlete may not directly indicate the quantity of therapy work accomplished, it does imply that a guided therapy program may be beneficial for athletes with these ailments. It is crucial to carefully observe and assess rehabilitation methods, especially when focusing on enhancing scapulothoracic rhythm, in order to make advancements in nonoperative treatment. Additional comprehensive, future investigations would be advantageous in determining the athletes who are most inclined to have positive results from nonoperative therapy, as well as comprehending the precise rehabilitation techniques that enhance the patient's outcomes via conservative treatment [(14)].

There exist some limitations in the present study including variety among the studies in some of the operating techniques, small sample size in some of the studies, pooling of results in the studies with different study design such as observational studies and RCTs. Another limitation is presented in the statistically significant heterogeneity in some of the outcomes.

We recommend further longitudinal studies and RCTs with adequate follow up period and a high sample size in order to adequately investigate the difference between the two techniques and produce accurate results.

Conclusion

The operative treatment of SLAP is associated with better outcomes regarding improvement of shoulder function, pain reduction, return to sport and return to work on the other hand range of motion and patient satisfaction was comparable between operation and non- operation management.

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