Research Article / Araştırma Makalesi

Comparison of the Functional Outcomes of Arthroscopic Debridement and Repair of Bursal-side Partial-thickness Rotator Cuff Tears

Bursal Yüz Kısmi Kalınlıkta Rotator Manşet Yırtıklarının Artroskopik Debridman ve Tamirinin Fonksiyonel Karşılaştırılması

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Abstract

Background: To compare the clinical and functional scores of arthroscopic debridement and repair (conversion to full thickness) surgeries in patients with bursal-side partial-thickness rotator cuff tears (BPTRCT).
Materials and Methods: A single-center retrospective study was conducted to compare the arthroscopic debridement and arthroscopic repair for BPTRCT performed between March 2017 and September 2021. Arthroscopic debridement patients were grouped as Group 1 and the repair group as Group 2. A total of 98 patients with an average age of 57.5 years (range 29-83 years), including 41 male and 57 female patients, met the inclusion criteria. VAS (Visual Analogue Scale) and UCLA (University of California Los Angeles) shoulder scores applied in the preoperative period and in the 12th month of the postoperative clinical follow-ups were evaluated. In addition to the preoperative and postoperative comparison of both scores, their improvement of these scores was also compared.
Results: The mean age of the repair group and the debridement group was 64.4 ±11.02 and 52.6 ±11.24, respectively. No significant difference between the two groups was observed in terms of demographic characteristics (p>0.05). The mean operation time was 91.46 ±16.44 min in the repair group and 49.82 ±13.46 min in the debridement group. The VAS score dramatically improved, from preoperative 5.10±1.23 to postoperative 3.68±1.33 points in the debridement group and from preoperative 5.17±1.35 to postoperative 3.58±1.16 points in the repair group. The two groups had no statistically significant difference in postoperative VAS scores (p=0.991). Preoperative and postoperative VAS score improvement was also compared between the groups, however, there was also no statistically significant difference in terms of VAS score changes (p=0.132). The UCLA scores also dramatically improved, from preoperative 17.14±4.19 to postoperative 24.57±5.04 points in the debridement group and from preoperative 17.46±5.05 to postoperative 25.48±5.61 points in the repair group. No statistically significant difference was observed between the two groups in terms of postoperative UCLA scores (p=0.361). In the postoperative first-year follow-up, no re-tears were observed either in the debridement or in the repair group.
Conclusions: Both arthroscopic debridement and arthroscopic repair surgeries provide clinically comparable successful results and high satisfaction for patients with bursal-side rotator cuff tears. No statistically significant difference was observed between these two methods. Easier early postoperative rehabilitation seems to be the main advantage of the debridement method.

Key Words: Bursal-side, Partial-thickness rotator cuff tear, Arthroscopy, Repair

Öz

Amaç: Bursal yüz kısmi kalınlıkta rotator manşet yırtığı (BPTRCT) olan hastalarda artroskopik debridman ve tamir (tam kata dönüştürerek) ameliyatlarının klinik ve fonksiyonel sonuçlarını karşılaştırmak.
Materyal ve Metod: Mart 2017-Eylül 2021 tarihleri arasında opere edilen BPTRCT'de artroskopik debridman ve artroskopik tamiri karşılaştırmak için tek merkezli retrospektif bir çalışma yapıldı. Artroskopik debridman hastaları Grup 1, tamir grubu Grup 2 olarak adlandırıldı. Toplam 98 hasta (41 erkek ve 57 kadın) çalışmaya dahil edildi. Hastaların ortalama yaşı 57,5 (29-83 yıl) idi. Ameliyat öncesi ve postoperatif 12. ay VAS (Visual Analog Scale) ve UCLA (University of California Los Angeles) omuz skorları değerlendirildi. Her iki skorun preoperatif ve postoperatif karşılaştırmasına ek olarak, bu skorlardaki değişimler de karşılaştırıldı.
Bulgular: Tamir grubunun ve debridman grubunun yaş ortalaması sırasıyla 64,4 ±11,02 ve 52,6 ±11,24 idi. Demografik özellikler açısından iki grup arasında anlamlı bir fark gözlenmedi (p>0.05). Ortalama operasyon süresi tamir grubunda 91,46 ±16,44 dk, debridman grubunda 49,82 ±13,46 dk idi. VAS skoru, debridman grubunda preoperatif 5.10±1.23'ten postoperatif 3.68±1.33 puana ve tamir grubunda preoperatif 5.17±1.35'ten postoperatif 3.58±1.16 puana ilerleme kaydetti. Postoperatif 12. ay VAS skorlarında iki grup arasında istatistiksel olarak anlamlı fark yoktu (p=0,991). Gruplar arasında preoperatif ve postoperatif VAS skorlarındaki iyileşme de karşılaştırıldı ancak VAS skorlarındaki değişimler açısından istatistiksel olarak anlamlı bir fark bulunamadı (p=0,132). UCLA skorları da debridman grubunda ameliyat öncesi 17.14±4.19'dan ameliyat sonrası 24.57±5.04 puana ve tamir grubunda ameliyat öncesi 17.46±5.05'ten ameliyat sonrası 25.48±5.61 puana dramatik bir şekilde iyileşti. Ameliyat sonrası UCLA skorları açısından iki grup arasında istatistiksel olarak anlamlı bir fark gözlenmedi (p=0,361). Postoperatif birinci yıl takibinde debridman ve onarım grubunda tekrar yırtık görülmedi.
Sonuç: Bursal yüz rotator manşet yırtıklarının cerrahi tedavisinde hem artroskopik debridman hem de artroskopik onarım klinik olarak karşılaştırılabilir başarılı sonuçlar vermekte olup hastalar açısından oldukça tatmin edici sonuçlar elde edilebilmektedir. Çalışmamızda bu iki yöntem arasında klinik skorlamalar açısından istatistiksel olarak anlamlı bir fark gözlenmedi. Ameliyat sonrası dönemde daha kolay ve erken rehabilitasyon, debridman yönteminin ana avantajı olarak görünmektedir.

Anahtar Kelimeler: Bursal-yüz, Kısmi-kalınlıkta rotator manşet yırtıkları, Artroskopi, Tamir

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Introduction

Partial-thickness rotator cuff tears (PTRCT) are incomplete tears that can be seen on the bursal or articular part of the rotator cuff tendons, or intratendinous, and may present with different clinical presentations (1). It is stated that the general prevalence is 4% in individuals under 40 years and 26% over 60 years of age (2). Especially during overhead activities and at night, the shoulder pain may be greater than full-thickness tears. (3-5). The main reason for this is the biomechanical higher tensile strength, as more force is loaded on the intact fibers remaining in partial tears (6). It has been shown in studies that partial tears can generally progress to full-thickness tears due to the high tensile force (7).

The treatment of PTRCT is controversial. Conservative treatment, physiotherapy, arthroscopic debridement and arthroscopic repair are the main treatment options, and there is no consensus on the choice of the most appropriate treatment method (8, 9). Most importantly, there is no consensus on which of these patients should undergo surgical treatment and which of those who underwent surgical treatment should be repaired or debrided (7, 8). In a study comparing the natural history of symptomatic and asymptomatic patients followed up with conservative treatment, it was reported that 66% of 30 asymptomatic PTRCTs became symptomatic within two years (10). It has been reported that none of the 10 patients who remained asymptomatic did not transform into a full-thickness tear, and 40% progressed to a full-thickness tear in symptomatic patients. (10). In a study reported by Maman et al. 30 patients with symptomatic PTRCT were followed up with MRI (magnetic resonance imaging) for 24 months, and it was observed that partial tears progressed to full thickness at a rate of 10% (11). As can be seen, partial tears can progress into full-thickness tears, but it cannot be predicted which and how much of them will progress. This causes us to encounter difficulties in determining the treatment method to be chosen in partial tears. Conservative treatment is the first treatment method to be chosen, since the rate of conversion of partial-tears to full thickness is generally low, as seen in the studies above. Surgical treatment is applied in patients who do not benefit from conservative treatment. However, there are few studies comparing debridement and repair options in surgical treatment (12, 13). Therefore, the question of whether debridement is sufficient in surgery or whether it is necessary to repair remains unknown. Besides, only a few studies analyzing this dilemma are observed in the literature during the last decade.

In this study, it was aimed to compare the functional and clinical scores of arthroscopic debridement and repair (conversion to full thickness) options in patients with bursal side partial-thickness rotator cuff tears (BPTRCT) for whom conservative treatment did not work. In this way, it is predicted that it will be easier to choose the more advantageous method on the surgical treatment.

Materials and Methods

A single-center retrospective study was administered to compare the arthroscopic debridement and arthroscopic repair for BPTRCT operated between March 2017 and September 2021 with the approval of the local ethics committee (Approval nr:13). All the surgeries were performed by a single senior surgeon specializing in shoulder arthroscopy with more than 13-year experience. The study involved 57 eligible patients with BPTRCT between March 2017 and January 2018 who received arthroscopic debridement (Group-1), and 41 patients who received arthroscopic full-thickness repair between March 2017 and September 2021 (Group-2). In conclusion, a total of 98 patients (41 male, 57 female) with an average age of 57.5 years (range 29-83 years), met the inclusion criteria. The rotator cuff tears were diagnosed using MRI in the outpatient clinic and confirmed via arthroscopic surgery thereafter. Failure of conservative treatment such as medication, lifestyle changes, and physical therapy for more than 3 months and complete follow-up data were the other inclusion criteria. The exclusion criteria were as follows: articular side partial-thickness rotator cuff tears (APTRCTs), intra-articular partial tears, full-thickness rotator cuff tears (FTRCT), massive unrepairable rotator cuff tears, frozen shoulder, previous shoulder surgeries, tumoral lesions, inflammatory diseases such as rheumatoid arthritis, labral lesions, contraindication for anesthesia and surgery. Informed consent was obtained from all patients and the study was approved by the ethical review board (Approval Nr:13). VAS (Visual Analogue Scale) and UCLA (University of California Los Angeles) shoulder scores applied in the preoperative period and in the 12th month of the postoperative clinical follow-ups were evaluated. In addition to the preoperative and postoperative comparison of both scores, their improvement of these scores was also compared.

Surgical Procedure

Surgeries were accomplished by the same orthopedic surgeon under general anesthesia after the patients were placed in a beach chair position. The standard posterior portal was established, and the anterior portal was placed via the outside-in technique using a spinal-tap needle. A simple debridement was performed after examining the glenohumeral joint space. The rotator interval, biceps tendon, labrum, subscapularis tendon, bicipital groove, and the articular surface of the rotator cuff were examined via the posterior portal. Thereafter, the arthroscope was removed from the capsular area and inserted into the subacromial space. The hypertrophic bursa was removed using an arthroscopic shaver and radiofrequency ablation device via the standard lateral portal. Acromioplasty and coracoacromial ligament debridement was performed. The rotator cuff was then exposed and examined using an examination probe. The patients were treated with arthroscopic repair or debridement based on the preoperative

management. For the debridement group, subacromial bursal debridement and acromioplasty were performed (Figure 1,2). In the repair group, partial tears were detected using the probe and progressed into full-thickness tears and then sutured after the subacromial space was debrided after the subacromial bursal debridement and acromioplasty. The rotator cuff was sutured with a single-row suture anchor (Figure 3,4).

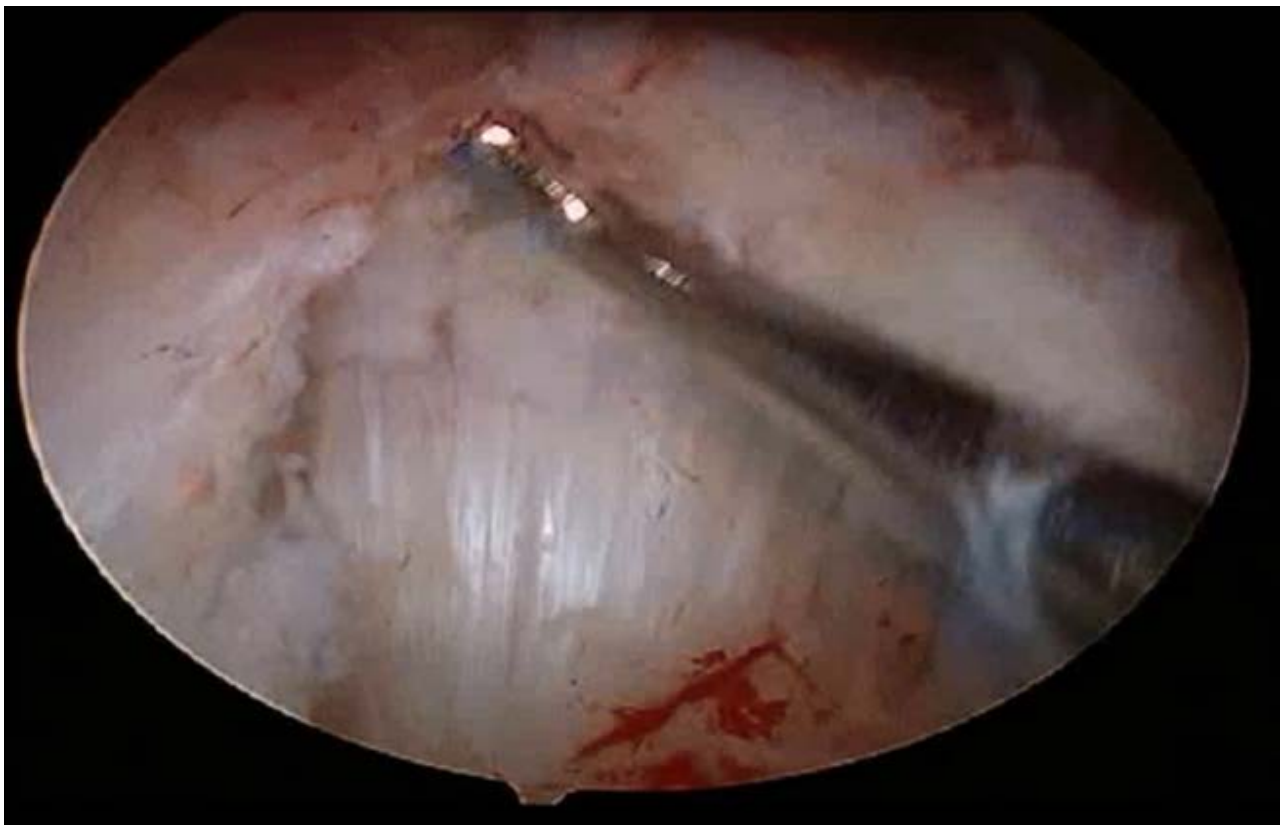

Figure 1. Preoperative arthroscopic image of a bursal-side partial-thickness rotator cuff tear

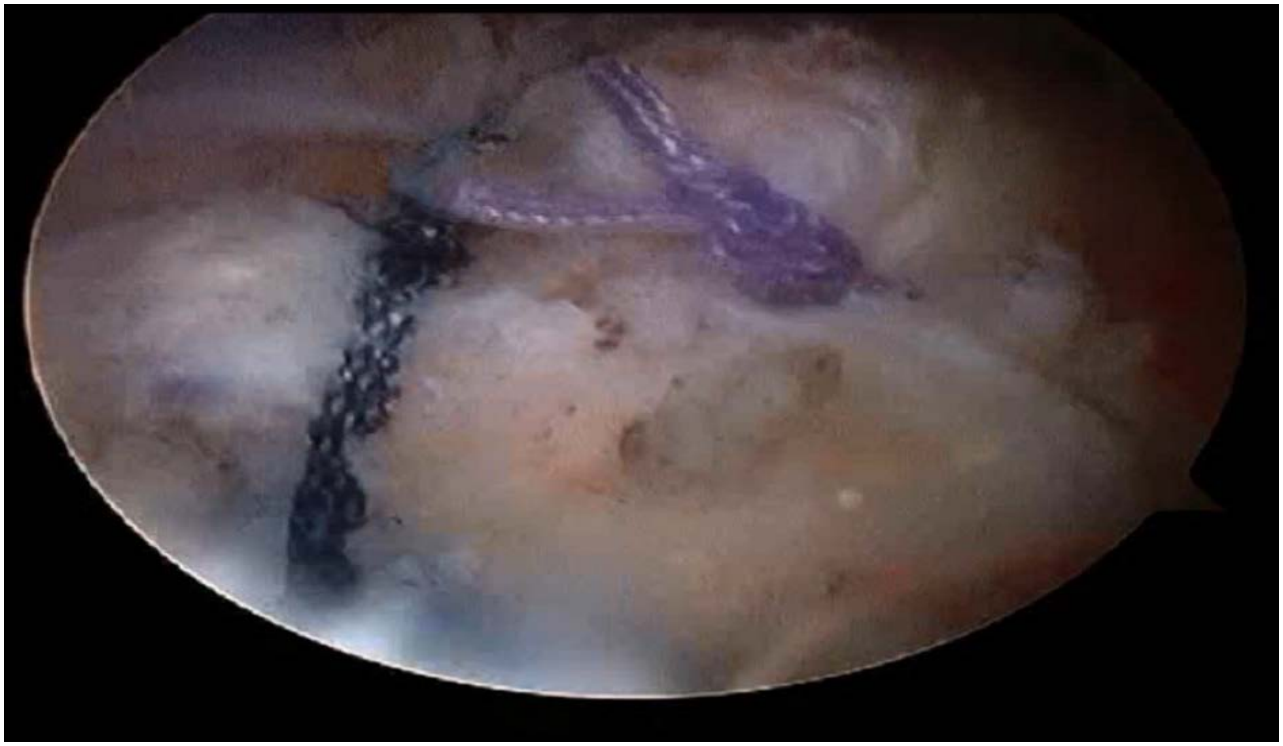

Figure 2. Postoperative arthroscopic image of a bursal-side partial-thickness rotator cuff tear debridement

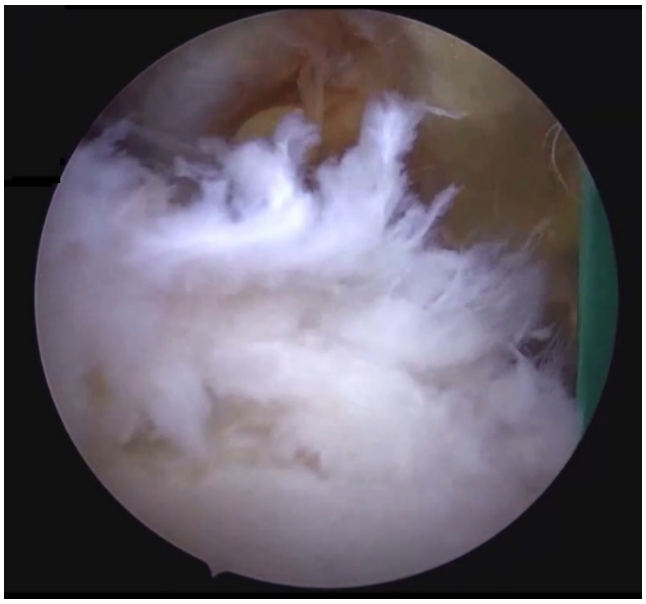

Figure 3. Preoperative arthroscopic image of a bursal-side partial-thickness rotator cuff tear

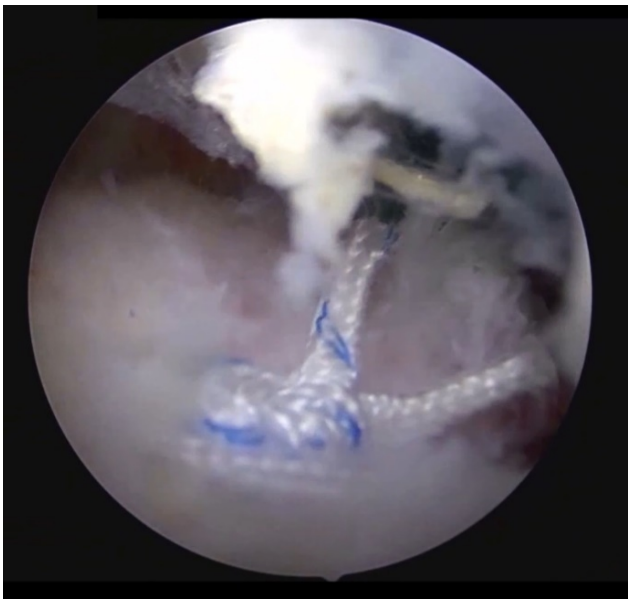

Figure 4. Postoperative arthroscopic image of a bursal-side partial-thickness rotator cuff tear repair with an anchor

Postoperative Rehabilitation

The repair group patients' shoulders were fixed for 3 weeks with a shoulder sling. Velpeau bandage was not used because of the patient inconformity. Pendulum exercises were initiated immediately on the next day after the surgery and passive range-of-motion (ROM) exercises were initiated on the first week. Self-help active ROM exercises were initiated after 3 weeks and active elevation exercises were initiated 6 weeks after the surgery. Any loss of the ROM was consulted to the physical therapy department and physiotherapy was initiated if necessary.

The debridement groups' passive ROM and pendulum exercises were initiated on the next day of the surgery. A shoulder sling was also used in this group for 3 weeks. Active ROM exercises were allowed on the third week of the postoperative period.

Statistical Analysis

Statistical analysis was carried out using SPSS v.22.0 software (SPSS Inc., IBM Corporation, Armonk, New York, USA). Due to the data not being normally distributed ($p < 0.05$, Shapiro-Wilk test), non-parametric tests were used. Mann Whitney-U test was used to compare the groups. Preoperative and postoperative scores were compared using a repeated-measure Wilcoxon signed rank test. The study was carried out at 95% confidence level and $p < 0.05$ was considered statistically significant.

Results

A total of 98 patients with an average age of 57.5 years (range 29-83 years), including 41 male and 57 female patients, met the inclusion criteria. 73 right and 25 left shoulders were operated and followed up.

The mean age of the repair group and the debridement group was 64.4 ±11.02 and 52.6 ±11.24, respectively. No significant difference between the two groups was observed in terms of demographic characteristics such as age and gender ($p>0.05$).

The mean ± SD operation time was 91.46 ±16.44 min in the repair group and 49.82 ±13.46 min in the debridement group.

The mean preoperative and postoperative functional scores of the groups are presented in Table-1. The VAS score dramatically improved, from preoperative 5.10±1.23 to postoperative 3.68±1.33 points in the debridement group and from preoperative 5.17±1.35 to postoperative 3.58±1.16 points in the repair group. There was no statistically significant difference in terms of postoperative VAS scores between two groups ($p=0.991$). Preoperative and postoperative VAS score improvement was also compared between the debridement and the repair group, however, there was also no statistically significant difference in terms of VAS score changes ($p=0.132$).

The UCLA scores also dramatically improved, from preoperative 17.14±4.19 to postoperative 24.57±5.04 points in the debridement group and from preoperative 17.46±5.05 to postoperative 25.48±5.61 points in the repair group. No statistically significant difference was observed between the two groups in terms of postoperative UCLA scores and the UCLA score improvements ($p=0.361$, $p=0.294$, respectively).

No re-tears were observed either in the debridement or in the repair group in the postoperative first-year follow-up.

Table 1. Functional outcomes of the groups in terms of VAS and UCLA scores

Functional Scores	Surgery Type		P value
	Repair	Debridement	
	Mean±SD	Mean±SD	
Preoperative VAS Score	5.17±1.35	5.11±1.23	0.778
Postoperative VAS Score	3.59±1.16	3.68±1.33	0.991
Preoperative UCLA Score	17.46±5.05	17.14±4.19	0.828
Postoperative UCLA Score	25.49±5.61	24.58±5.04	0.361
VAS Score Change	1.59±0.29	1.42±0.48	0.132
UCLA Score Change	8.02±2.04	7.44±1.85	0.294

(UCLA: University of California Los Angeles, VAS: Visual Analogue Scale,)

Discussion

BPTRCT is one of the less studied shoulder pathologies in the literature compared to articular-side partial thickness tears. Diagnosis is more difficult than full-thickness or articular-side tears and it can be diagnosed with good quality MRI sections (14). The most important cause of bursal tears is reported as subacromial impingement (15-18). In the literature, debridement alone, repair alone, and repair by converting into full-thickness tear methods are recommended in BPTRCT surgery, but there is no consensus on which surgical method has better clinical results (8, 9). In our current study, both arthroscopic debridement and repair options provided high satisfactory results which are discussed with the current literature on the upcoming lines. However, no statistically significant difference was observed between the functional outcomes of the two methods. Zhang et al. compared the results of debridement and repair alone in patients with Ellman grade II BPTRCT (12). In this study in which the authors applied arthroscopic debridement to 20 patients and arthroscopic repair to 26 patients, they compared clinical results at 6, 12 and 24 months with several evaluation tests. The authors stated that the clinical results of the patients in both the debridement and repair groups were quite satisfactory, but debridement gave better results, especially in the 6-month period. The reason for the better results of the patients in the debridement group in the first 6 months may be that the rehabilitation process required after the repair is longer and more difficult. When the two groups were compared in terms of two-year re-tear, they found no statistical difference. In this current study, we did not observe a statistical difference between the debridement and repair groups in terms of VAS and UCLA clinical scores in the first year postoperatively. Better clinical outcomes can be expected in the debridement group in the first months because postoperative rehabilitation can be initiated earlier and is easier in patients who have only been debrided. On the other hand, postoperative active joint motion can be initiated later and is more difficult in repaired tears. However, after the full recovery period, there is no difference between the two groups in terms of clinical outcomes. The VAS and UCLA scores of both the debridement and repair groups improved significantly after surgery. The VAS score dramatically improved, from preoperative 5.10±1.23 to postoperative 3.68±1.33 points in the debridement group and from preoperative 5.17±1.35 to postoperative 3.58±1.16 points in the repair group however, no statistically significant difference in terms of postoperative VAS scores between two groups was observed. Preoperative and postoperative VAS score improvement was also compared between the debridement and the repair group, and no statistically significant difference in terms of VAS score changes was found either. In our study, the UCLA scores also dramatically improved, from preoperative 17.14±4.19 to postoperative 24.57±5.04 points in the debridement group and from preoperative 17.46±5.05 to postoperative 25.48±5.61 points in the repair group. Also, no statistically significant difference was observed between the two groups in terms of postoperative UCLA scores and the UCLA score improvements. Considering our results, it is seen that there was a significant improvement in the clinical outcomes of the patients in both the debridement and repair groups. In this case, it is seen that debridement alone can provide satisfactory results in bursal-side tears. The low probability of progression of partial tears to full-thickness tears in the literature indicates that debridement may be used instead of repair in these patients. We believe that by choosing less invasive methods, early range of motion exercises can be initiated in the postoperative period and more painless treatment can be offered to the patients. As the other studies in the literature comparing debridement and repair were investigated, there are studies stating that debridement is as effective as repair (19, 20). During the debridement of partial tears, proliferative synovial tissues and subacromial bursa in the subacromial area are cleaned and excised, and a decrease in the release of inflammatory cytokines created by these tissues is observed. In addition, the healing process of the rotator cuff tear is stimulated by eliminating the narrowing in the subacromial area. Debridement of the partial tear, removing fibrotic tissues and revealing fresh tissue also accelerates the healing process. In these studies, the authors also state that the rehabilitation process is more difficult and longer in repaired tears than in debrided ones (12, 21).

The main recommendation of this study was that arthroscopic debridement accomplished an abundant curative effect for BPTRCTs. In our study, we compared the therapeutic effect of debridement and repair procedures in patients with bursal-side rotator cuff tears, and we concluded that

both methods are highly effective treatment modalities at the end of a one-year period. In the evaluations made with VAS and UCLA scores, satisfactory improvement was observed in clinical functions in both groups, but statistical superiority of one method over the other could not be demonstrated. During arthroscopic debridement, hypertrophic synovial tissues and bursa on the rotator cuff tendons are excised, and subacromial impingement is eliminated by excision of the coracoacromial ligament and acromioplasty. These excision procedures were applied to the patients in both groups, and subacromial decompression was also performed in the repaired patients. Patients in both groups were able to return to their daily lives and were quite satisfied with the relief of pain.

Retrospective nature and the relatively short follow-up period of the patients constitute the main limitations in our study. Because, patients who achieve satisfactory results after one year usually do not reapply to the clinic due to the relief of their symptoms. In addition, we included only bursal-side tears, not other PTRCT types (intra-tendinous tears, articular-side tears etc.) to make the study more specific. Retear development should be investigated with further long-term studies and long-term clinical and functional results should be compared.

For the surgical treatment of bursal-side partial-thickness rotator cuff tears, both arthroscopic debridement and arthroscopic repair provide clinically comparable successful results and are highly satisfactory for patients however no statistically significant difference exists between these two methods. Easier early rehabilitation in the postoperative period seems to be the main advantage of the debridement method.

Ethical Approval: *Permission was obtained from Mugla Sitki KocmanUniversity Clinical Research Ethics Committee for the study (28.01.2021, Nr:13).*

Author Contributions:
Concept: F.I.C.
Literature Review: F.I.C.
Design : F.I.C.
Data acquisition: F.I.C.
Analysis and interpretation: F.I.C.
Writing manuscript: F.I.C.
Critical revision of manuscript: F.I.C.

Conflict of Interest: *The authors have no conflicts of interest to declare.*

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