



Comparison of Belt and Suspender's Technique with simple double-row rotator cuff repair in patients with chronic rotator cuff tear

Kronik rotator manşet yırtığı olan hastaların tedavisinde basit çift-sıra rotator manşet tamiri ile "Belt and Suspender's" tekniğinin karşılaştırılması

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Abstract

Aim: Surgical treatment of chronic rotator cuff tears is still unclear. Many surgical techniques have been used in the treatment. The aim of the study is to compare the functional outcomes of two different surgical techniques.

Methods: Of the 27 patients in the study; 13 underwent Belt and Suspender's Technique (2 male, 11 female), 14 underwent simple double row rotator cuff repair technique (4 male, 10 female). Clinical assessment was made according to American Shoulder and Elbow Surgeons (ASES) scoring system and Visual Analog Scale (VAS).

Results: There was no statistically significant difference between postoperative ASES scores, VAS scores, range of motions (ROM) and complications. In both groups, failure of healing was seen in one each patient.

Conclusion: According to this study treatment for chronic rotator cuff tear using a Belt and Suspender's technique is as effective and reliable as simple double row cuff repair technique method with low complication rates and good results can be achieved in clinical outcomes in the early postoperative period.

Key Words: Chronic rotator cuff tear, double-row repair, functional outcome, Belt and Suspender's technique.

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Öz

Amaç: Kronik rotator manşet yırtıklarının tedavisi henüz açıklığa kavuşmamıştır. Birçok cerrahi teknik kullanılmıştır. Bu çalışmanın amacı farklı iki cerrahi tekniğin fonksiyonel sonuçlarının karşılaştırılmasıdır.

Yöntem: 27 hastanın 13'üne (2 erkek, 11 kadın) Belt and Suspenders tekniği, 14 'üne (4 erkek, 10 kadın) klasik çift-sıra tekniği ile rotator manşet tamiri uygulanmıştır. Klinik değerlendirme American Shoulder and Elbow Surgeons (ASES) skorlama sistemi ve ve Görsel Analog Skala (VAS) kullanılarak yapılmıştır.

Bulgular: Ameliyat sonrası dönem ASES ve VAS skorları arasında, eklem hareket açıklıkları arasında ve komplikasyonlar bakımından anlamlı farklılık görülmedi. Her iki grupta da birer hastada iyileşme de yetersizlik görüldü.

Sonuç: Çalışmamıza göre Belt and Suspender's tekniği en az basit çift sıra rotator manşet tamiri kadar etkili ve güvenilirdir. Ameliyat sonrası erken dönemde iyi fonksiyonel sonuçlar elde edilebilir.

Anahtar Kelimeler: Kronik rotator manşet yırtığı, çift-sıra tamir, fonksiyonel sonuç, "Belt and Suspender's" tekniği.

Introduction

Rotator cuff creates most of the shoulder joint [1]. The shoulder may be exposed to trauma because it is one of the most active joints of the body. In addition, rotator cuff tears can occur spontaneously after middle age and become an important cause of shoulder pain. Chronic rotator cuff tears can be very painful and are a common cause of limited shoulder function [2, 3].

Conservative and surgical treatment methods are applied in rotator cuff tears. Surgical approaches in rotator cuff tears in the world and in our country are rapidly developing and diversifying. There are a few options for repairing of chronic rotator cuff tears [4, 5].

The aim of this study is to evaluate the results and effectiveness of two different techniques of arthroscopic repair on patients with chronic rotator cuff tear and to contribute to the literature on its advantages, challenges and complications.

Material and methods

This study was approved by the ethics committee of the Umraniye Training and Research Hospital. Informed consent was obtained from all patients who participated in the study. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Patients with Patte class 2 rotator cuff tear in the shoulder MRI who referred to the clinic with a shoulder pain complaint and underwent arthroscopic rotator cuff repair with two different double-row techniques identified as the target group. Patients were evaluated retrospectively by being invited to the outpatient clinic.

Inclusion criteria were; patients having double row repair for chronic rotator cuff tear, being 40-70 years of age, having at least six months time period after surgery.

Exclusion criteria were; having open surgery, patients with massive-irreparable rotator cuff tear, patients out of standard rehabilitation criteria, individuals having fatty atrophy in their rotator cuff muscles.

Surgical indications were presence of a chronic rotator cuff tear which non-operative treatment methods; pain medication and physical therapy were failed.

Clinical Evaluation

Patients were evaluated before and after the operation in terms of physical examination with the American Shoulder and Elbow Surgeons (ASES) scoring system (highest 100 points) and clinical and functional outcomes were assessed [6]. In the last control, the range of motion was measured with a goniometer in the patient sitting position. Muscle strength was assessed manually. Patients with unexplained shoulder pain at last follow-up were evaluated with shouldermagnetic resonance imaging (MRI).

Surgical technique

All surgeries performed by one surgeon (I.T.). All patients were operated under general anesthesia, in the beach chair position, with standard anterior, posterior, anterolateral and posterolateral portals opening after 1-gram cefazolin sodium prophylaxis. No patient underwent block anesthesia. In addition to the routine glenohumeral joint examination, the rotator cuff

was examined. All the patients underwent biceps tenotomy and subacromial decompression. Rotator cuff tears were treated with two different techniques.

Belt and Suspender's technique

First, a medial row was created by placing a metal anchor (5.0 mm titanium anchor, Twinfix, Smith and Nephew, USA) (including two white and two blue threads). One blue and one blue white were passed upwards through the cuff tear by suture passer and these were brought out the lateral cannula tied together, and then the un-tied white and blue sutures were tensioned which brings the knot over cuff tear (this is the belt or the transverse limb); remaining untied sutures were brought up through the cuff on either side of the transverse limb, and were then passed through a knotless anchor which forms the lateral sided fixation; (these form the suspenders) when the knotless anchor was tensioned, not only were the suspenders tensioned but also the belt was tensioned (Figure 1, 2) [7-11].

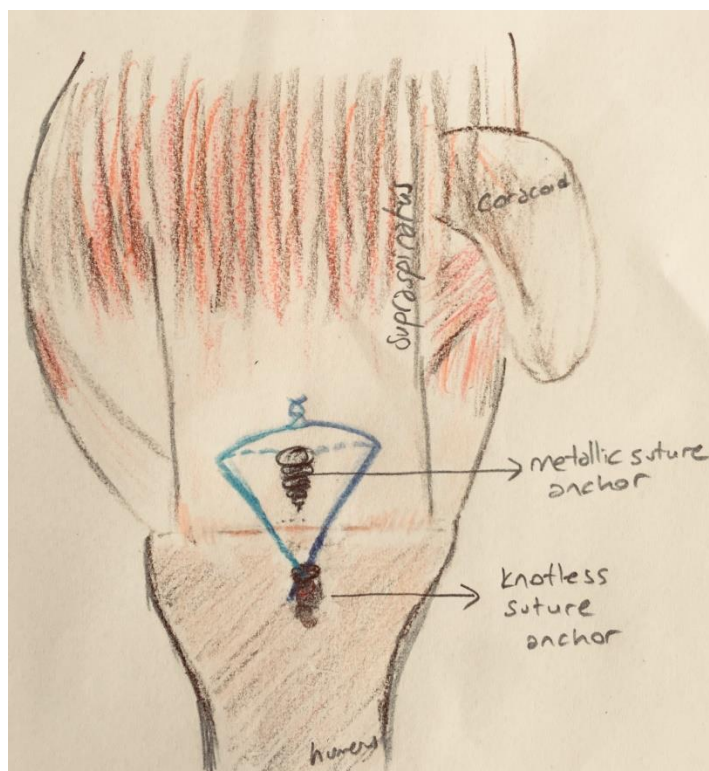


Figure 1. Schematic drawing representing Belt and Suspender's technique (axial view).

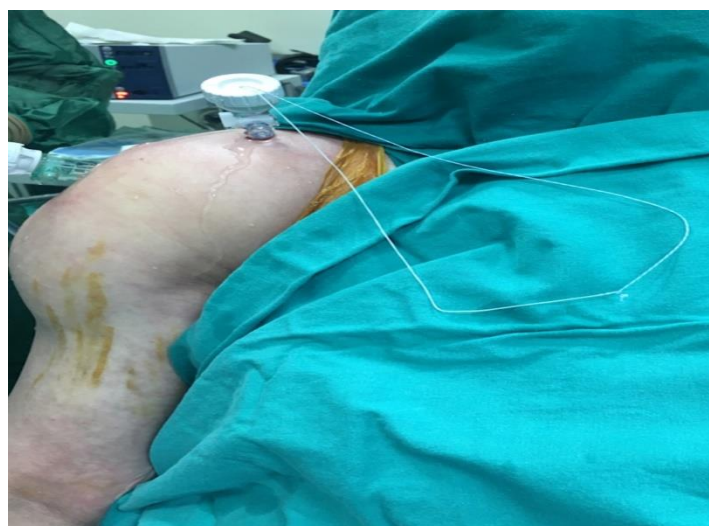


Figure 2. One blue and one white strand tied out of anterior portal (Belt and Suspender's technique) (anterior view).

Simple double-row technique

First, a medial row was created by placing a metal anchor (including two white and two blue threads). Two blue and two white were passed through the cuff and these four were brought out the lateral canula together without ant tying and than passed through a knotless anchor thus the lateral row was created (Figure 3).

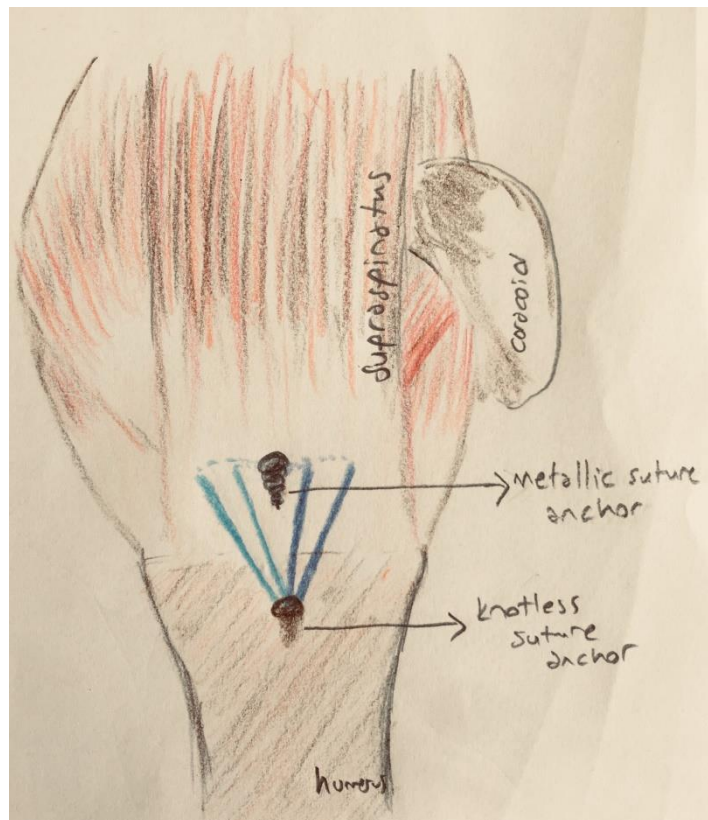


Figure 3. Schematic drawing representing simple double row rotator cuff repair technique (axial view).

Rehabilitation

The shoulder arm sling at the 30-degree abduction was routinely used for 3 weeks. The physical therapy protocol consisted of 4 phases. Postoperative rehabilitation was performed as two separate periods; clinic rehabilitation program and home exercise program. Patients were followed until assuring painless ROM and scapular dyskinesia.

Radiologic Evaluation

MRIs performed before and after the operation. Single radiologist who did not know the clinical outcomes of the patients evaluated the MRIs. Tendon continuity or recurrent tears were assessed on T2-weighted coronal oblique and proton density-weighted images as well as short inversion recovery sequences according to defined MRI criteria. Accordingly, at least one of the T2-weighted or repressed fat sections was interpreted in favor of rotator cuff tendons or to obtain a fluid-like signal image in favor of a full-thickness recurrent tear.

Statistical Analysis

IBM SPSS (Statistical Package for Social Sciences for Windows, Version 21.0, Armonk, NY, IBM Corp.) package software were used for statistical analyses. The Kolmogorov-

Smirnov test was used to determine population distributions. We used the Shapiro-Wilk test for normally distributed data and Levene's Test for homogeneity of the variances. We found it inconvenient to use the Student's t-test as a result of not finding an appropriate condition. P-values less than 0.05 were considered statistically significant.

Results

Of the 27 patients in the study; 13 had Belt and Suspender's technique (2 male, 11 female) (Group A), 14 had simple double-row repair technique (4 male, 10 female) (Group B). The mean age of the patients having Belt and Suspender's technique was 61.89 years, body mass index (BMI) 26.5 kg-m² and the mean follow-up period was 23 months (7-47 months). The mean age of the patients having simple double-row repair technique was 60.27 years; mean BMI 27.0 kg-m² and the mean follow-up period was 45 months (7-82 months) (Table 1).

There was no statistically significant difference between postoperative ASES scores, VAS scores, range of motions (ROM) and complications (Table 2, 3). In both groups, failure of healing was seen in one patient in each group (Table 2).

Table 1: Characteristics of the patients in Group A and Group B.

	Group A (Belt and Suspender's technique)	Group B (Double-row repair)
Average Age (Years)	61.89 ± 9.31(40-70)	60.27 ± 5.41 (40-70)
Sex (M/F)	11 female, 2 male	10 female, 4 male
Weight (kg)	76.4±19.4	78.6±14.9
BMI (kg/m ²)	26.5±5.5	27.0±5.8

BMI: Body Mass Index

Table 2: Number of complications.

	Belt and Suspender's technique	Double-row repair technique
Rerupture/failure of healing	1	1
Stiffness	0	0
Implant failure	0	0
Reflex symphatic dystrophy	0	0
Infection	0	0

Table 3. Comparison of groups in terms of functional outcomes.

	Group A	Group B	P
ASES score-preop	47 ± 10	50.8 ± 14	NS
ASES score-postop	94.5 ± 12	91.5 ± 15	NS
VAS score-preop	7.2 ± 2	7.2 ± 1.8	NS
VAS score-postop	0.6 ± 2	0.6 ± 1	NS
Forward flexion-preop	160 ± 10	160 ± 15	NS
Forward flexion-postop	170 ± 11	172 ± 9	NS
Abduction-preop	165 ± 10	165 ± 20	NS
Abduction-postop	170 ± 10	171 ± 1	NS

NS: non significant (p>0.05)

Discussion

Primary findings of the present study suggest that both techniques are safe and reliable for the treatment of patte class 2 rotator cuff tears. In this study, failure of healing was detected in two patients with MRI. Given the patient's examination and functional scores, there was no relationship between failure of healing/re-tear and clinical outcomes. The clinical improvement of the patients in this study can be explained by the mechanism

described by Loehr et al. If the infraspinatus is undamaged, the rotator cuff centering function is not impaired [12]. In the present study none of the patients had infection, stiffness, and implant failure or reflex sympathetic dystrophy. Healing failure was observed in one patient in both groups; however, clinical outcomes and functional scores of these patients were excellent.

The tear in the rotator cuff leads to progressive and perhaps irreversible degenerative changes in the rotator cuff muscles. Atrophy and fatty degeneration can affect various clinical parameters such as prediction of repair results and strength. For this reason, it has been suggested that the rotator cuff repair should be done before these changes occur. Recently, studies have been done quantitatively evaluating rotator cuff muscles [13]. MRI is used more frequently in these studies [14]. Turkmen et al. showed that the shoulder muscle mass can be accurately calculated by MRI in a clinic study [15]. One of the factors affecting the results of rotator cuff repair is tear size. Early term results show that the tear size does not affect the results of the surgery. However in recently, relationship between tear size and surgical outcomes is expressed in the literature [16]. Demirhan and Esenyel reported that the main application areas of arthroscopic rotator cuff repairs of middle and small rotator cuff tears and partial tears are to be used more frequently in the future with improved techniques and learning process [17]. However, there is still no consensus on this issue. Gartsman have stated that the tear size is not a decisive factor in the repair of the arthroscopic rotator cuff [18]. Other factors affecting clinical outcomes are biceps pathologies and subacromial impingement [16]. In the present study, the groups were homogeneous in this respect.

The most important component of the shoulder joint which is the most mobile and difficult to stabilize is the rotator cuff. Tears of rotator cuff disturb the comfort of the patient and care should be taken to early diagnosis and treatment. For an appropriate assessment; physical examination, ROM and muscle strength assessment and MRI is essential. When additional pathology is considered, methods such as EMG should be consulted. Patients' pathologies, causes of disease, age, presence or absence of systemic diseases are very important prognostic factors. Conservative treatment methods (physical therapy, rehabilitation, medical treatment, local injections) should be tried thoroughly even if operation is considered in all patients [19]. The desired result in treatments is to achieve a painless life, good muscle strength and ROM.

We think that middle and small rotator cuff tears and partial tears are the main application areas of arthroscopic rotator cuff repair. In addition, in the elderly, when it is necessary to perform partial repair in large ruptures, it is possible to obtain successful results with debridement [20]. Arthroscopic rotator cuff repair, a developing technique, will be used more frequently in the future with improved techniques and learning process. In this study, using one knotted suture anchor and one knotless suture anchor in the two techniques created different configurations. A relatively inexpensive technique has been used compared to conventional techniques with two techniques.

This study has certain limitations, most of which are inherent to its retrospective design and relatively small sample size. Assessment of clinical outcomes was limited to chart documentation, which has a risk of bias as can be expected in a retrospective study of this nature. This study has the strength of including two different techniques. The clinical relevance of this study is that surgeons may prefer "Belt and Suspender's Technique" in the surgical treatment of Patte class 2 chronic rotator cuff tears.

In conclusion, we believe that treatment for chronic rotator cuff tear using a Belt and Suspender's technique is as

effective and reliable as simple double row cuff repair technique method with low complication rates and good results can be achieved in clinical outcomes in the early postoperative period.

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