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ORIGINAL ARTICLE

Arthroscopic release and decortication provide earlier return to work with similar patient satisfaction compared to continued intensive conservative therapy for recalcitrant tennis elbow: a retrospective observational study

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Abstract

Introduction Tennis elbow management has primarily been conservative over the years with over 90% of the cases being managed conservatively. Surgical intervention may be necessary only for symptomatic recalcitrant cases of tennis elbow cases. However, there are gaps in the literature when it comes to comparison of the return to pre-operative return to their work and level of activities among patients who undergo arthroscopic management and those who receive conservative management.

Methods A retrospective observational study was conducted to compare 23 patients receiving continued intensive conservative (CIC) management in group 1 with 24 patients undergoing arthroscopic release of the extensor carpi radialis brevis and lateral epicondyle decortication (ARD) in group 2. The study had a minimum follow-up period of 3.5 years. The researchers compared the groups in terms of return to work (RTW) at the same intensity or lower level and any changes in their previous work. Objective grip strength and patient-reported outcome measures, such as post-intervention satisfaction level (rated on a scale of 0–100) and visual analog scale (VAS) for residual elbow pain, were also compared between the two groups.

Results Return to work (RTW) occurred significantly earlier in group 2 (mean 6.13 months) compared to group 1 (mean 4.64 months), and a greater number of patients in group 2 (13/24, 54.2%) were able to return to the same of work. Although not statistically significant, the ARD group exhibited comparable patient satisfaction ($p = 0.62$) and visual analog scale (VAS) scores for residual elbow pain ($p = 0.67$). Grip strength was comparable ($p = 0.084$, 0.121) between the affected and unaffected sides of the bilateral upper extremities and among both groups of patients.

Conclusion The use of ARD for RTE (recalcitrant tennis elbow) indicates a significantly earlier return to work (RTW) at the same or lower intensity level compared to the standard CIC therapy protocol. Objective grip strength was comparable to the non-affected side and among the two groups of patients receiving two different management modalities. Comparable patient-reported satisfaction and residual lateral elbow pain were also noted among both the groups.

Level of evidence Retrospective, comparative study, level III.

Keywords Lateral epicondylitis · Tennis elbow · Arthroscopic release · Satisfaction · Return to work · Elbow arthroscopy · Continued intensive conservative therapy · Recalcitrant tennis elbow

Introduction

Tennis elbow is a degenerative condition that primarily affects the common extensor origin, particularly the extensor carpi radialis brevis (ECRB) [1]. It is a significant and chronic debilitating condition, with an annual incidence of 1–3% in adults [2, 3]. Diagnosis is primarily based on clinical examination, although MRI may reveal altered signals in approximately two-thirds of patients [4]. Often, patients seeking treatment present to us at an advanced stage, referred to as the fourth or resistant stage [5] where other conservative therapies have proven ineffective.

Surgical intervention may be necessary for some recalcitrant cases of tennis elbow with persistent symptoms beyond

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six months despite conservative measures of management like physical therapies and local infiltrations with steroids or platelet rich plasma (PRP). Over the years, arthroscopic management for tennis elbow has amplified and has shown very successful results in recalcitrant tennis elbow (RTE) [6–8]. RTE has been defined as failure of conservative management for more than 6 months, including 3 or more corticosteroid injection. Although the surgical growth curve needs to be considered, but with more and more arthroscopy-trained surgeons, the functional outcomes of post-arthroscopic releases for RTE have been promising [9].

One of the essential aspects of RTE remains the affection of the dominant upper limb [10]. Hence, most patients consider workplace compensation as their working potential is often compromised, resulting in a significant economic drain on the industry and resources [11, 12]. Therefore, patients who are able to return to their previous level of activities after proper management require careful re-evaluation and, there is a scarcity of data in the current literature regarding this specific aspect following arthroscopic management of RTE [13].

The aim of this study is to analyze the rate of return to their average intensity pre-condition level of work and post-intervention satisfaction in a group of patients receiving an arthroscopic release of ECRB and lateral epicondyle decortication (ARD) compared to continued intensive conservative (CIC) management. The null hypothesis of the current study is that there is no difference in the rate of RTW and satisfaction level among the two groups of patients.

Materials and methods

Study design

The retrospective observational study was conducted at a university-level tertiary care teaching hospital among patients who received ARD or CIC management protocol for their RTE between June 2022 and November 2022. Prior to conducting this study, an ethical exemption was obtained from the institutional ethics committee, and all participants provided their consent to participate. This study involved the same subset of patients, and the short-term functional outcomes were assessed at a two-year follow-up [14]. Only patients with persistent lateral elbow pain beyond six months of failed conservative management with three or more history of steroid or platelet rich plasma (PRP) infiltrations and a positive cozens test were included in this study. These patients were grouped into RTE and they were divided into the two groups non-randomly on the basis of their choice of treatment opted. The study included two groups of patients consisting of 25 patients in Group 1 who received CIC management as part of their treatment. Conservative management was initiated for one month, which included physiotherapy, ice fomentation, steroid injection or NSAIDs, and the use of a tennis elbow brace during physical work. If the pain was relieved, patients were advised non-drug therapy, and if the pain persisted, additional treatment with ultrasonic therapy (UST) for seven consecutive days. Patients were followed up for a total of 42 months (Supplementary files Figs. 1 and 2). Group 2 comprised of 25 patients who received ARD for the management of RTE. The procedure was performed under interscalene block in the lateral decubitus position. A saline solution of 20 ml was infiltrated to distend the joint, and a tourniquet was used. Two standard anteromedial and anterolateral portals were created, and diagnostic arthroscopy was performed to rule out intra-articular pathology. ECRB release and lateral epicondyle decortication were carried out, as shown in Figs. 1 and 2. No cross-over was allowed between the two groups.

At 42 months, two patients from Group 1 and one patient from Group 2 were lost to clinical follow-up leaving 23 and 24 patients, respectively, who included in this study. Follow-up was conducted through clinical examinations and the use

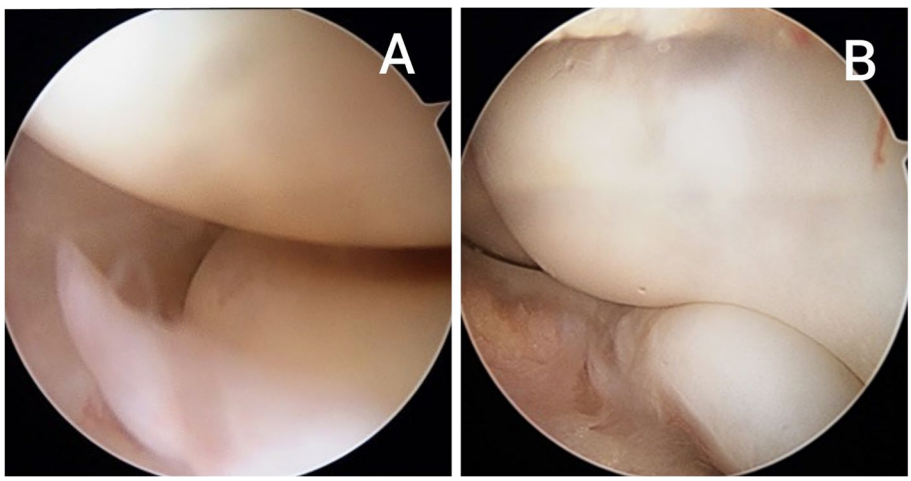

Fig. 1 Arthroscopic view of the elbow joint shows the lateral (**A**) and medial (**B**) sides of the joint

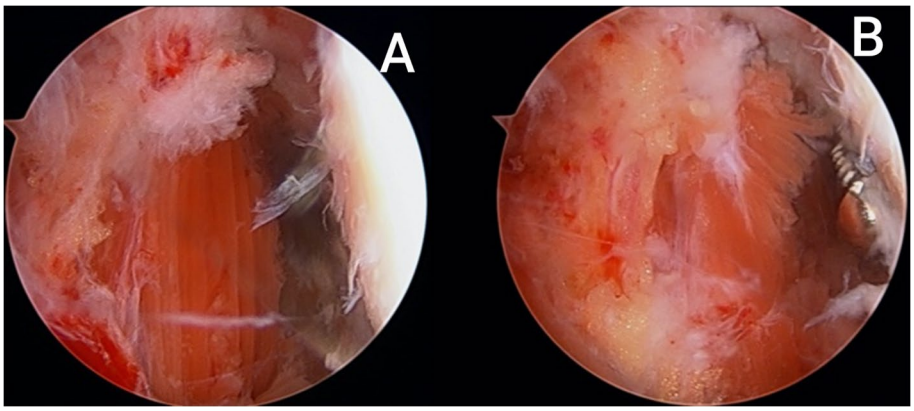

Fig. 2 Intra-operative arthroscopic images show the release of the capsule (**A**) and the ECRB (**B**)

of patient-related outcome measures (PROMs). The main goal of the study was to determine the percentage of patients who achieved a return to their previous level of work and normal activities (RTW). Additionally, the study evaluated the level of satisfaction among the patients and utilized a visual analog scale to assess the extent of residual elbow pain.

Outcome measures

The study analyzed both groups of patients to determine the percentages of individuals who returned to their previous level of work (RTW). The patients were categorized into three groups: those who resumed the same work with the same level of duties, those who returned to the same work but with lighter responsibilities, and those who changed their work due to persistent lateral elbow pain despite completing the management protocol. Objective measurements of grip strength in both upper limbs were recorded using handheld standard dynamometers and compared between the two patient groups. Patient-reported outcome measures (PROMs) including post-intervention satisfaction (on a scale of 0–100 mm) and residual elbow pain during routine work (assessed using a visual analog scale, VAS) were also compared. The end-point observations for all patients in the study were recorded by two orthopedic residents who were blinded to the treatment groups.

Statistical analysis

Data were initially tabulated in a Microsoft (MS) excel spreadsheet. All continuous variables were expressed as means and standard deviations (SD) and categorical variables in absolute numbers and percentages. Any categorical variable was compared using the chi-square test between the two groups. The Shapiro–Wilk test analyzed all parameters to check for normal distribution. All data were seen to be normally distributed. Variables like the return to work – all three categories were compared between the two groups and compared by Chi-square test. The duration of return to work was compared by independent sample T-test. Continuous parametric variables like PROMs and grip strength between both groups were compared using the independent sample T-test or paired T-test when any intra-group comparisons were considered. All statistical tests were two-sided with a significance level of five percent. Results were considered statistically significant if the p-value was less than 0.05. All statistical data analyses were done using SPSS software version 23.0 (SPSS Inc., Chicago, IL, USA).

The sample size calculation was done before starting our prospective study, considering the mean difference in postoperative VAS (Visual Analog Scale) scores for pain (on a scale of 0–10) between the two groups of patients. Assuming a minimal clinically significant difference (MCID) of 1 on the VAS scale, SD of 1.2, with a power of 0.80 and 95% confidence intervals, the sample size was calculated to be 23 in each group. Previous comparative studies on different treatment modalities of RTE report a similar sample size of patients.

Results

Demographic data of the two groups of patients are shown in Table 1. Both groups of patients were comparable.

The return to a level of the same work was higher in group 2 compared to group 1 (13/24 vs. 11/23). Similarly, patients were seen returning to a lower level of the same work in Group 2 compared to Group 1 (8/24 vs. 9/23), Also the duration of return to work was better in Group 2 as compared to Group 1 in both same level of duty (0.023) as well as lower level of duty ($P = 0.037$), three patients in both the groups changed their work ($P = 0.672$) as enumerated in Table 2.

The satisfaction level was slightly higher in Group 2 compared to Group 1. VAS score for residual pain was somewhat higher in Group 1 than in Group 2, although both parameters did not reach statistical significance (Table 3).

The grip strength was compared in each group and between the contralateral side. The grip strength was

Table 1 Baseline characteristics of the patients in both the groups

	Group 1 ($n=23$)	Group 2 ($n=24$)	*P*-value
Age (mean ± SD) (years)	40.34 ± 9.5	39.21 ± 9.7	0.142
Duration of symptoms (mean ± SD) (months)	18.7 ± 4.8	17.86 ± 5.2	0.082
Lesion on dominant side/non-dominant side (numbers, percentage)	Right (15/2, 65.3%/8.7%) left (3/3, 13%/13%)	Right (18/2, 75%/8.33%), left (2/2, 8.33%/8.33%)	0.071
Males: females	5:18	8:16	0.28

Table 2 Comparison of return to work between the two groups

Variables	Group 1 (*n*, %)	Group 2 (*n*, %)	*P*-value
Same work at the same level of duties	11/23, 47.8	13/24, 54.2	0.823[a]
Duration (months), (mean, SD)	6.13, 1.2	4.64, 1,12	**0.023***
Same work, but a lower level of duty	9/23, 39.2	8/24, 33.3	0.46[a]
Duration (months) (mean, SD)	7.89, 1.78	5.2, 1.22	**0.037***
Changed work	3/23, 13	3/24, 12.5	0.672[a]
Duration (months) (mean, SD)	12.1, 0.8	12.23, 0.2	0.126*

SD—standard deviation

P-value* Independent *T*-test was used, *P*-value[a] – chi-square-test, statistically significant *P*-value has been mentioned in Bold types

Table 3 Comparison of the patient-reported level of satisfaction and residual lateral elbow pain between the two groups

Variables	Group 1 (mean, SD)	Group 2 (mean, SD)	*P*-value*
Satisfaction level	71.3, 13.9	73.875, 20.9	0.62
VAS score for elbow pain	2.3, 1.844	2.08, 1.767	0.67

SD—standard deviation, *VAS*—Visual analog scale

*Independent *T*-test was used

comparable and statistically insignificant between the two groups of patients (Table 4).

Discussion

The present study highlights that most patients treated with ARD suggested a statistically significant earlier RTW at the same intensity or lower level than the CIC management protocol. The duration of RTW among patients changing their job was comparable among the two groups. Also, the numbers of patients returning to their previous work were more in Group 2 compared to Group 1. Grip strength was comparable to the non-affected sides and among both groups of patients receiving two different management modalities. Although the study findings suggested better patient-reported satisfaction scores and less residual elbow pain in the group of patients receiving ARD compared to CIC therapy, it was not significant statistically at a minimum 3.5 years follow-up.

Over the years, arthroscopic management of RTE has been routinely used, and it has undergone multiple modifications and advancements. Arthroscopic management being less invasive to open procedures for RTE, has been increasingly utilized to manage RTE [8, 15–17]. Also, arthroscopic management helps to give a proper visualization of the joint, which allows simultaneous identification of joint pathologies [18]. Previous studies have suggested very high percentages of intra-articular lesions, which may

Table 4 Comparison of Grip strength between the two groups

Grip Strength (Kgs)	Group 1 (mean, SD)	Group 2 (mean, SD)	*P*-value*
Right	17.95, 2.37	19.1, 2.22	0.084
Left	18.54, 2.32	19.82, 2.54	0.121
P-value[#]	0.302	0.276	–

SD—standard deviation, *VAS*—Visual analog scale

*Independent *T*-test was used, [#]paired *T*-test

contribute to the chronicity of lateral elbow pain symptoms [19].

A previous study by Bhandari et al. highlighted that although patients with workers' compensation claims returned to their previous level of duties, they had a long time to return to full duties and relief from complete pain [16]. Balk et al. also highlighted that most patients from the WC returned to their previous level of work but had a constant complaint of residual pain [20]. The present study cohort of patients did not claim any worker's compensation; hence, the duration to return to their previous level of duties could not be associated and studied further. RTW to the same intensity or a lower level was significantly better in our study group of patients receiving ARD therapy. Patient satisfaction and residual elbow pain among patients with RTE have been largely studied in recent literature, with most of the studies comparing a specific arthroscopic method of management to an open surgical procedure or a different arthroscopic procedure [21–24]. The present retrospective analysis of residual elbow pain and satisfaction level after RTE management by ARD or CIC remains the first of its kind, however, highlighting a comparable result between the two groups of patients.

Conservative management was routinely used for years before surgical management for tennis elbow became routine. It is effective in 90% of cases [25–27]. Corticosteroids and physical therapy remain the mainstay in most cases [28]. 10% may require surgical intervention. Although various studies have compared two different techniques for the arthroscopic management of RTE, there remains a scarcity of literature where conservative management for TE is being compared to arthroscopic management. Studying the RTW outcomes among RTE patients receiving arthroscopic management versus CIC is also omitted, and this needs further evaluation in the long term. A relatively extended follow-up period at mid-term and an adequately powered study to reach clinically significant PROMs remains the strength of the present study. However, our study findings did not report any significant difference in PROMs. The retrospective analysis and a smaller sample size included in this study remains important limitations. Also, a single surgeon operated on all the cases; the study findings lack generalization. Future prospective studies and clinical trials for long-term outcome analysis are needed to report RTW among patients receiving arthroscopic management for RTE.

Conclusion

The use of ARD for RTE indicates a significantly earlier return to work (RTW) at the same or lower intensity level compared to the standard CIC therapy protocol. Objective grip strength was comparable to the non-affected side and among the two groups of patients receiving two different management modalities. Comparable patient-reported satisfaction and residual lateral elbow pain were also noted among both the groups.

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Declarations

Conflict of interest The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval The institutional ethics committee approved the study (AIIMS/IEC/18/136). Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article. The study was conducted in All India Institute of Medical Sciences, Rishikesh, India. Ethics clearance for the study had been taken from the institutional ethics committee before starting the study.

Informed consent Informed consent was obtained from all individual participants included in the study.

Consent to participate Informed consent was taken from all individual participants included in the study.

Consent for publication All authors have read the final prepared draft of the manuscript and approve this version in its current format if considered further for publication.

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