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Comparative Study: Arthroscopic Versus Open Tennis Elbow Release

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ABSTRACT

Background: Tennis elbow is a very common elbow pathology caused by repetitive trauma over the tendon of Extensor Carpi Radialis Brevis (ECRB) at the common extensor origin. Most cases respond to conservative treatment while resistant cases may need arthroscopic or open surgical release. This study aimed to compare the clinical and functional outcomes of arthroscopic and open release for resistant tennis elbow in selected patients.

Patients and Methods: This was a prospective study that was conducted over three years (between 2015 and 2018) and included 30 patients with resistant tennis elbow. The patients were randomized into two equal groups with fifteen patients in each group. The first group (A) had undergone an arthroscopic release while the second group (B) had undergone an open release. All patients were evaluated preoperatively, 3 weeks postoperatively, and 1 year postoperatively using MEPS, DASH Score, and VAS.

Results: One year postoperatively, the mean MPES, DASH score, and VAS were improved significantly in both groups. There was no significant difference in the outcome scores between both groups. The average time for return to work was 5.8 ± 2.07 (4-12) weeks for group-A and 8.8 ± 1.97 (7-14) weeks for group-B. There were no significant complications in both groups.

Conclusion: Both arthroscopic and open release are similar and effective in the treatment of resistant tennis elbow as noticed by improvement in MEPS, DASH score, and VAS at the end of follow up. The arthroscopic release permits earlier recovery and return to work.

Keywords: Tennis elbow; Lateral epicondylitis, Arthroscopy; Open release.

INTRODUCTION

One of the most common elbow pathology is the tennis elbow or lateral epicondylitis that commonly affects middle-aged individuals and can cause major discomfort and disability.[1] This condition usually affects persons between 35 and 50 years old and 1-3% of the population may complain of lateral side elbow pain throughout their lifetime. The recorded incidence of tennis elbow is 4-7 per 1000 per year.[2-4] Tennis elbow is characterized by pain and tenderness over the lateral epicondyle and increased with resisted wrist extension.[5]

Although it is historically called tennis elbow it can occur due to repetitive maneuvers not related to sports. The underlying pathology is not fully understood but it is suggested to be a degenerative disorder that affects the tendon of the Extensor Carpi Radialis Brevis muscle (ECRB) resulting from repetitive activities and overuse.[6,7]

It was considered that tennis elbow is a self-limiting disease but the most recent literature reported that persistent pain and disability may persist in the majority of cases for more than one year.[8,9]

Conservative treatment including, activity modifications, NSAIDs, physical therapy, bracing, and local injections is the first line of treatment and gives good results in most cases and it is the recommended treatment option by many authors.[10-14]

Persistent pain and disability after failed adequate conservative measures for at least 6 months are the main indications for surgical treatment of resistant tennis elbow.[15]

There are a lot of surgical procedures that have been reported in the literature including, open, mini-open, percutaneous, and arthroscopic release. Arthroscopic tennis elbow release gained popularity in the last few years with promising results since firstly described by Baker et al in 2000.[5,16-20]

In the current study, we will compare the clinical and functional outcomes of arthroscopic and open release for resistant tennis elbow in selected patients.

PATIENTS AND METHODS

This prospective study was conducted over three years (between 2015 and 2018) and included 30 patients with resistant lateral epicondylitis (tennis elbow). Inclusion criteria were: patients suffering from a resistant lateral side elbow pain, lasting for more than 6 months, and not responding to all conservative measures including rest, anti-inflammatory medications, physiotherapy, and local injections. Exclusion criteria were: 1- a history of elbow trauma or fracture, 2- lateral compartment arthritis, 3- osteochondritis dissecans, 4- posterior interosseous nerve syndrome, 5- elbow instability, and 5- previous elbow surgery.

The patients were randomized into two equal groups with fifteen patients in each group. The first group (Group-A) had undergone an arthroscopic release while the second group (Group-B) had undergone an open release. Randomization was done using a computer sheet. Clinical assessment for all patients was done including local tenderness, Cozen's test, Chair test, Maudsley's test (figure 1: a, b, c). Plain radiography and MRI were done for all patients to exclude other pathology. All patients were evaluated preoperatively, 3 weeks postoperatively, and 1 year postoperatively using Mayo Elbow Performance Score (MEPS), The Disabilities of the Arm, Shoulder and Hand (DASH) Score, and Visual Analogue Scale (VAS). [13,14,15] The average follow up time was 13.46 ± 2.19 (12-18) months for group-A and 13.8 ± 2.21 (12-18) months for group-B. The average time to return to work was 5.8 ± 2.07 (4-12) weeks for group-A and 8.8 ± 1.97 (7-14) weeks for group-B.

Fig. 1: Clinical tests for tennis elbow (a- Cozen's test, b- Chair test, c- Maudsley's test)

Surgical technique:

All patients were operated under general anaesthesia in the lateral decubitus position with the affected side up and a pneumatic tourniquet applied over the proximal arm and the limb was supported over elbow support (figure 2: a). All landmarks were identified and marked with a marking pen, and the elbow was examined for range of motion and instability. Sterilization and draping of the limb were done in a routine manner.

Arthroscopic release: Sterile elastic bandage was used around the forearm to decrease fluid extravasation. We used a standard arthroscopy set as in knee arthroscopy including 4mm, 30- degree scope with a blunt trocar, 4mm motorized shaver, radiofrequency electrode, and irrigation pump to keep pressure less than 30 mmHg. Palpation and identification of the ulnar nerve before establishing any portal is essential. Injection of about 20-25ml sterile saline into the joint using an 18 ml gauge needle through the posterior soft spot located between the radial head, lateral humeral condyle, and olecranon process to create a space and shift the neurovascular structures away from the portal sites (figure 2: b). Then, starting our procedure by establishing the proximal anteromedial portal first which is located 2 cm proximal to the medial epicondyle and just anterior to the medial intermuscular septum by a sharp scalpel to create a small snip in the skin and continue dissection using nick and spread technique by a hemostat. After that, a blunt trocar and sheath were inserted through the proximal anteromedial portal while the elbow was flexed 90 degrees aiming the direction of the radial head and keeping contact with the anterior humeral shaft (figure 2: c). Once the joint capsule was penetrated with the trocar, we were able to see the backflow of saline indicating the proper placement of the trocar and sheath. By introducing the scope through the proximal anteromedial portal, we were able to identify the radial head, radiocapitellar articulation, and anterolateral capsule (figure 2: d). Then the proximal anterolateral working portal was established under direct vision from outside in by introducing a needle at the point 2 cm above and 1 cm anterior to the lateral humeral condyle. A sharp No.11 blade was introduced parallel to the needle to cut the skin and open the anterolateral capsule under direct vision. A motorized shaver was introduced through the proximal anterolateral portal to make partial capsulotomy and synovectomy of the anterolateral elbow capsule. After exposure of the ECRB tendon and the common extensor origin, we started our standard release using a monopolar radiofrequency probe to release completely the tendon of ECRB until the fibers of the healthy and fleshy overlying extensor carpi radialis longus (ECRL) appear (figure 3: a,b). We did not extend the release either beyond the radial head equator to avoid injury to the lateral ligament, or below the radial head to avoid injury to the posterior interosseous nerve. After the complete release of the tendon of ECRB, light decortication of the anterolateral capitellum was done in all cases. Then we completed a full diagnostic elbow arthroscopy by switching the scope into the proximal anterolateral portal and then into the posterior portal. Skin closure was done with a simple suture without suction drain just crepe bandage was applied.

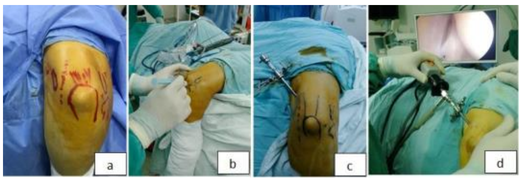

Fig. 2: a- Marking landmarks, b- Joint inflation with saline, c- Blunt trocar in proximal anteromedial portal, d- Radiocapitellar articulation and anterolateral capsule

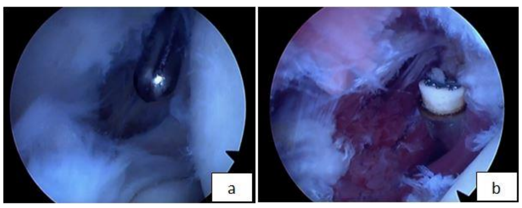

Fig. 3: a- Partial synovectomy and capsulotomy to view ECRB, b- Fleshy ECRL after complete release of ECRB

Open release: While the elbow is slightly flexed over the elbow support in the lateral decubitus position, a small longitudinal incision 3-5 cm was created and centered laterally over the radicapitellar joint (figure 4) with identification and incision of the aponeurosis of the common extensor origin along its fibers (figure 5). The tendon of the ECRB which is located deep to the fleshy ECRL was identified and completely released with excision of the unhealthy and degenerated tissue (figure 6). Slight decortication and drilling of the condyle and closure of the remaining aponeurosis of the common extensor origin was done followed by subcuticular skin closure (figure 7).

Postoperatively, all patients were kept in an arm sling for 4 weeks in cases of arthroscopic release and 6 weeks in cases of open release. All patients started a gentle range of motion immediate postoperative and started strengthening exercises after 6 weeks after arthroscopic release and 8 weeks after open release.

Fig. 4: Skin incision over radiocapitellar joint

Fig. 5: Identification of the aponeurosis of the common extensor origin

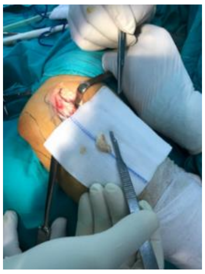

Fig. 6: Excision of the unhealthy and degenerated tissue

Fig. 7: Closure of aponeurosis of the common extensor origin

Statistical analysis:

Statistical analysis was performed using the IBM SPSS Statistics 26 for Windows. Results are expressed as mean ± SD for quantitative variables, and $p < 0.05$ was considered statistically significant with a confidence interval of 95%. The independent t-test was used to compare clinical data of both groups preoperative and postoperative. The Chi-square test was used to compare the demographic data of both groups, while the paired t-test was used to compare the clinical and functional outcomes for both groups.

RESULTS

This study included 30 patients (n=30) who were presented with lateral epicondylitis after failure of conservative measures for at least 6 months. The patients were randomized into two groups: group-A: Patients treated with arthroscopic release (n=15) and group-B: Patients treated with open release (n=15). No significant differences were found between the arthroscopic release group and the open release group concerning age, sex, side affected, dominant arm, occupation, preoperative clinical parameters, or intraoperative time (Table 1). The mean MPES improved from 60.33 ± 6.37 (45-75) for group-A and 59.66 ± 8.12 (50-70) for group-B preoperative to 82.27 ± 3.93 (70-86) for group-A and 77.47 ± 4.47 (70-85) for group-B at 3 weeks postoperatively and to 93.27 ± 4.79 (82-100) for group-A and 92.33 ± 5.18 (80-100) for group-B at the last follow up 1 year postoperative. The mean DASH score improved from 25.13 ± 4.94 (16-34) for group-A and 25.67 ± 5.02 (18-33) for group-B preoperative to 10.40 ± 3.92 (4-18) for group-A and 14.87 ± 3.83 (8-20) for group-B at 3 weeks postoperatively and to 3.27 ± 2.65 (0-10) for group-A and 3.40 ± 2.72 (0-11) for group-B at the last follow up 1 year postoperative. The mean VAS improved from 6.4 ± 1.55 (5-10) for group-A and 6.53 ± 1.46 (5-10) for group-B preoperative to 1.93 ± 1.28 (0-4) for group-A and 3.73 ± 1.03 (2-6) for group-B at 3 weeks postoperatively and to 1.2 ± 1.15 (0-4) for group-A and 1.27 ± 1.22 (0-4) for group-B at the last follow up 1 year postoperative. The average time for return to work was 5.8 ± 2.07 (4-12) weeks for group-A and 8.8 ± 1.97 (7-14) weeks for group-B. One patient from group-A developed postoperative transient ulnar nerve palsy and he was improved completely 3 months postoperatively without any residual affection. One patient from group-B developed postoperative superficial wound infection and he was improved completely 3 weeks postoperatively. Tables 2 and 3 show the postoperative data of all patients.

	Age/ years	Sex M/F	Side Rt/Lt	Dominant arm Rt/Lt	Duration of symptoms/months	Number of injections
Group-A	37.47	9/6	11/4	12/3	11.2	3 (2-4)
Group-B	34.6	8/7	10/5	13/2	11.4	3 (2-5)
Test	t	Chi-sq.	Chi-sq.	Chi-sq.	t	Chi-sq.
test statistic	1.23	0.136	0.159	0.24	-0.204	1.733
p-value	0.229	0.713	0.690	0.624	0.840	0.63

Table 1: Preoperative data.

Parameter	Group	Preoperative	3 weeks Postoperative	1 year postoperative	P-value*
MEPS	Group A	60.33 ± 6.37	82.27 ± 3.93	93.27 ± 4.79	0.000
	Group B	59.67 ± 8.12	77.47 4.47	92.33 ± 5.18	0.000
	P-value	.808	.004	.612	0.000
DASH	Group A	25.13 ± 4.94	10.40 ± 3.92	3.27 ± 2.65	0.000
	Group B	25.67 ± 5.02	14.87 ± 3.83	3.40 ± 2.72	0.000
	P-value	.772	.004	.893	0.000
VAS	Group A	6.40 ± 1.55	1.93 ± 1.28	1.20 ± 1.15	0.000
	Group B	6.53 ± 1.46	3.73 1.03	1.27 ± 1.22	0.000
	P-value	.810	.000	.879	0.000

Table 2: Postoperative scores. * Preoperative vs 1-year post-operative.

	Operative time/minutes	Return to work	Complications
Group A	36 ± 6.22 (25-50)	5.8 ± 2.07 (4-12) weeks	Transient ulnar nerve palsy in one patient
Group B	34.67 ± 5.81 (20-45)	8.8 ± 1.97 (7-14) weeks	Superficial wound infection in one patient
P-value	0.553	0.000	

Table 3: Comparison between both groups regarding operative time, return to work, and complications.

DISCUSSION

Resection of the degenerated tissue of the ECRB tendon and stimulation of neovascularization producing a new healthy scar are the main goals of any surgery addressing the treatment of the resistant tennis elbow.[1,15] These goals can be achieved either by open or arthroscopic procedures. The classic technique for open tennis elbow release as firstly clarified by Nirschl in 1979 was recommended by many surgeons with satisfactory results in most cases.[5,9,18,20] Since demonstrated by Baker et al in 2000, arthroscopic tennis elbow release gained popularity and has been recommended by many surgeons.[5,16-23]

In the current study, we compared the results of arthroscopic and open release for resistant tennis elbow in 30 patients (n=30) who were randomly classified into two equal groups (n=15 for each group). No significant differences were found between the arthroscopic release group and the open release group with respect to age, sex, side affected, dominant arm, preoperative clinical parameters, or intraoperative time. The mean MEPS, DASH score, and VAS for both groups improved significantly at the last follow up 1 year postoperative without significant differences between both groups. While, there were significant differences between both groups in all previous scores at 3 weeks postoperative with higher scores for the arthroscopic release group. This means that arthroscopic release gave earlier recovery than open release but on the long term follow up there was no significant difference. In a very recent systematic review by Moradi et al, a review of 34 studies (15 open, 13 arthroscopic, and 6 comparative) was done and they concluded that there were no significant differences between arthroscopic or open release for resistant tennis elbow as regarding pain, functions, and outcome scores but they reported less complications with the arthroscopic release.[9] In the current study no significant complications were reported in both groups only one patient from group-A developed postoperative transient ulnar nerve palsy and he was improved completely 3 months postoperatively without any residual affection and one patient from group-B developed postoperative superficial wound infection and he was improved completely 3 weeks postoperatively. Klark et al and Kim et al reported that there was no significant difference in DASH score between groups of patients treated with either arthroscopic or open release at 1-2 years follow up.[24,25] As regarding returning to work, the patients after arthroscopic release returned to work earlier than those with open release (5.8 weeks for group-A and 8.8 weeks for group-B) and this was comparable with the results reported by many surgeons.[9,22,26-30] Care must be taken during arthroscopic tennis elbow release to avoid neurological injuries due to the proximity of important neurological structures especially the ulnar nerve.[31]

CONCLUSION

Both arthroscopic and open release are similar and effective in the treatment of resistant tennis elbow as noticed by improvement in MEPS, DASH score, and VAS at the end of follow up. The arthroscopic release permits earlier recovery and return to work.

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