

Study on the effect of extra capsular arthroscopy plus analgesic tincture in the treatment of external humeral epicondylitis

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Abstract: External humeral epicondylitis (EHE) is an inflammation and pain of the lateral tendons of the elbow with poor clinical efficacy. In this study, we aim to observe the effect of extra capsular arthroscopy (ECA) plus Traditional Chinese medicine (TCM) analgesic tincture in the treatment of EHE. A retrospective analysis was performed on the follow-up data of 58 patients with intractable EHE treated by ECA plus TCM analgesic tincture over 2 years from January 2017 to October 2018. All patients were followed up during the operation, with a mean follow-up duration of 17.6 months. There were no complications such as infection, nerve injury, wound nonunion and joint stiffness. The postoperative and pronation angles were statistically different from preoperative. The visual analogue scale (VAS) score during rest and movement of the elbow joint after operation was significantly different from that before operation. Postoperative Mayo elbow joint function score was significantly different from preoperative. Postoperative elbow joint function and brachial and shoulder dysfunction scores were statistically significant compared with those before surgery. Postoperative elbow joint function and brachial and shoulder dysfunction scores were statistically significant compared with those before surgery. The satisfaction rate of patients was 100%, with 52 cases of completely satisfied, 6 cases of basically satisfied and no dissatisfied cases. The curative effect of external capsular arthroscopy plus analgesic tincture in the treatment of external humeral epicondylitis was promising, which was worthy of clinical promotion.

Keywords: Extracapsular method, external humeral epicondylitis, arthroscopy, Chinese medicine analgesic tincture.

INTRODUCTION

External humeral epicondylitis (EHE), known as “bursitis of brachioradial joint” or “tennis elbow”, is a chronic injury disease caused by repeated pulling stimulation of the starting part of the extensor carpal muscles of the forearm, which is one of the important causes of the lateral elbow joint pain. The prevalence rate of EHE is about 1.2%~12.2% and its main clinical manifestations include pain and radiating pain in the lateral condyle of the humerus (Epstein *et al.*, 2018). Its onset is commonly accompanied by apparent tenderness of the lateral epicondyle of the humerus, resulting in poor movement of the elbow and wrist joints, with a positive Mills sign. Previous research has reported that EHE receiving no remission after conservative treatment for over 6 months is considered intractable epicondylitis of the humerus, accounting for about 10% of all EHE and it is also an indication for surgical treatment (Oki *et al.*, 2014). Extra capsular arthroscopy (ECA) is to remove and release the extensor tendon outside of the capsule, to cure intractable EHE, while effectively avoiding intraoperative complications (Lai *et al.*, 2018; Sanders *et al.*, 2015). Arthroscopic debridement alone in intractable EHE has the advantages of less-trauma, less bleeding, quick recovery and good curative effect. TCM analgesic tincture is refined from traditional Chinese herbal medicines such as radix aconite, which relaxes tendons and activates collaterals, eliminates wind and relieves pain, promotes

blood circulation and removes blood stasis (Nesterova *et al.*, 2012). It has been proved to be effective in treating knee osteoarthritis and neck, shoulder, waist and leg pain. The combined application of analgesic tincture with EA would theoretically improve clinical efficacy but with little report. In this study, the clinical data of 58 EHE patients treated by EA plus analgesic tincture was analyzed and the clinical effect was evaluated to provide more evidence-based medical evidence for the treatment of diseases.

MATERIALS AND METHODS

The general information

In this study, there were 58 cases, including 23 males and 35 females, all of whom were athletes or retired athletes. Their ages were 25~40 (32.5±5.6) years old, with a BMI ranging 17.5~31.2 (23.73±3.65). There were symptoms of pain outside the elbow joint and conservative treatment is considered ineffective for 4-60 months, with an average of 19.4±5.4 months. There were 19 cases of left elbow, 39 cases of right elbow and 28 cases of the dominant side. 17 had a history of trauma. 54 patients had a history of 1-10 times of local hormone blocking therapy, on average with 3 times. Preoperative positive signs: Both wrist extension resistance pain and extensor tendon stop tenderness were positive. 14 cases had reduced wrist extension resistance, and 17 cases had positive Mills sign. Magnetic resonance imaging (MRI) examinations were performed before surgery. According to Ma and Wang, (Ma and Wang, 2020), the classification of tennis elbow was as follows.

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There were 11 cases in grade 1, 14 cases in grade 2 and 7 cases in grade 3. The protocol of this study was ethically approved by the Clinical Research Ethics Committee of Jilin University with the Approved No. of CLD2019-411. All enrollments were informed with the protocol and the guidelines for the protection of human subjects of research of *Declaration of Helsinki* was followed (Shrestha and Dunn, 2020).

Diagnostic criteria of EHE

① Pain in the lateral epicondyle of the humerus or radiating pain for more than 6 months; ② The local tenderness of the lateral epicondyle of the humerus was obvious, the pain in the forearm was aggravated by pronation, flexion and elbow extension and Mills sign was positive; ③ MRI of the elbow joint showed that the extensor extra condylar tendon of the humerus is irregular and thickened, there were small dots or patches of high signal shadow inside the tendon and there was no obvious signs of edema in surrounding tissues (Aben *et al.*, 2018).

Inclusion and Exclusion criteria

Inclusion criteria: (1) Patients who Met the diagnostic criteria; (2) The patients with compliance and could cooperate with follow-up. Exclusion criteria: (1) Patients who did not meet the diagnostic criteria, with obvious elbow joint stiffness or bone and joint infections and tuberculosis; (2) Patients with cardiovascular and cerebrovascular diseases that prevent operation; ③ Patients with poor compliance and who could not be followed up after surgery.

Operation method

The patients received brachial plexus anesthesia in a supine position with the affected limb placed on the chest. The lateral epicondyle of the humerus was positioned with a needle and a puncture was performed 3cm proximally and 3cm distally (with a needle body length of 0.5cm) to create subcutaneous access to expose the extensor tendon surface. The arthroscope was inserted in the proximal approach and a planar incision was created in the distal approach. The exposed tendon surface at the insertion of the extensor tendon is irrigated, during which the degenerated, fragile, or ruptured part was located. Cortical thinning was then performed on the bone bed at the termination point after scraping tests in irrigating the lesioned tissue. After irrigation, percutaneous sutures with No. 0 PDS with stitches were performed to clean up the tears formed in the tendons and joint capsule, which were secured using 3-0 absorbable thread. All patients were treated with TCM analgesic tincture (Shanghai Jingfeng Pharmaceutical Co., Ltd.) on the second day after surgery. The specific method was: A spacer infused with analgesia and activating collaterals tincture (2mL) was fixed at the affected area and massaged for 15min, once a day. All patients were treated for 4 weeks.

Observational index

(1) Elbow range of motion. Comparison of elbow range of motion before and after surgery includes elbow flexion angle and forward and backward rotation angle.
(2) Pain level. The visual analogue scale (VAS) score for elbow joint rest and movement before and after operation was used to evaluate the pain degree of the patients. The pain was divided into 10 levels, with 0 points indicating no pain and 10 points indicating severe pain (Tashjian *et al.*, 2017).
(3) Elbow joint function. The Mayo Elbow Function score was used to evaluate the preoperative and postoperative elbow function, including pain (45 points), elbow range of motion (20 points), stability (10 points) and daily skills (25 points). A score ≥ 90 points was considered excellent, 75~89 was considered good, 60~74 was considered acceptable and ≤ 60 was considered poor (Cusick *et al.*, 2014).
(4) Disability of arm, shoulder and hand (DASH) (Reising *et al.*, 2009). DASH referred to a score of 0 points indicating complete normal upper limb function, a score of 100 indicating extremely limited upper extremity function.
(5) Satisfaction. There were three levels of satisfaction, including very satisfied, satisfied and unsatisfied. Satisfaction = (very satisfied + satisfied)/number of cases *100%.

STATISTICAL ANALYSIS

SPSS 23.0 statistical software was used for data analysis. Paired t-test was used for comparison. The measurement data were expressed as mean \pm standard deviation ($\bar{x} \pm s$), $P < 0.05$ means the difference is statistically significant.

RESULTS

Elbow range of motion

All patients were followed up during the operation, the mean follow-up was 17.6 months. There were no complications such as infection, nerve injury, wound nonunion and joint stiffness. The postoperative pronation angle were statistically different from preoperative ($P < 0.05$). Elbow range of motion was shown in table 1.

Pain degree

The VAS pain score during rest and movement of the elbow joint after operation was significantly different from that before operation ($P < 0.05$). Postoperative Mayo elbow joint function score was significantly different from preoperative ($P < 0.05$). Pain degree before and after operation was shown in table 2.

Score for elbow joint function and arm-shoulder dysfunction

Postoperative elbow joint function and brachial and shoulder dysfunction scores were statistically significant

Table 1: Elbow range of motion

Period of time	Buckling angle	Pronation angle	Supination angle
Preoperation	90.5±6.2	60.2±5.4	76.5±4.6
Postoperation	125.9±4.5	76.6±7.3	77.4±4.4
t	-33.249	-25.195	-1.509
P	<0.001	<0.001	0.121

Table 2: Pain degree before and after operation

Period of time	VAS score at rest	VAS score during activity
Preoperation	7.09±0.26	8.69±0.09
Postoperation	1.68±0.21	2.44±0.13
t	25.601	26.942
P	<0.001	<0.001

Table 3: Score for elbow joint function and arm-shoulder dysfunction

Period of time	Mayo elbow function score	DASH score	VAS
Preoperation	54.03±1.39	51.67±25.45	7.30±0.47
Postoperation	71.56±1.57	1.25±0.31	0.00
t	-12.743	-4.001	-4.015
P	<0.001	<0.001	<0.001

compared with those before surgery ($P<0.05$). Postoperative elbow joint function and brachial and shoulder dysfunction scores were statistically significant compared with those before surgery ($P<0.05$). The score for elbow joint function and arm-shoulder dysfunction was shown in table 3.

Treatment Satisfaction

The satisfaction rate of patients was 100%, with 52 cases of completely satisfied, 6 cases of basically satisfied, and no dissatisfied cases.

DISCUSSION

In this study, all EHE patients received ECA plus analgesic tincture treatment with favorable clinical efficacy. The postoperative elbow joint flexion angle, pronation angle, VAS scores, Mayo elbow joint function score, elbow joint function and brachial and shoulder dysfunction score were statistically better than preoperative. Elbow arthroscopic surgery is divided into intra-articular surgery (ECI) and ECA. The ECI method uses the natural space to reach the total extensor tendon, but it will inevitably destroy the joint capsule, while the ECA method requires an artificial subcutaneous space, to complete the loosening of the tendon outside the joint capsule and directly observe the tendon of the extensor carpi radialis brevis (Merolla *et al.*, 2017). Given its low difficulty and low risk, ECA has been increasingly used in clinical practice, which demonstrates great potential in the treatment of intractable tennis elbow in the future. Recent literature in recent years shows that the use of drillings, cortical tubings and tendon sutures aggravates the trauma to the body, which is unfavorable for patients'

postoperative recovery (Kim *et al.*, 2019). A subcutaneous space was artificially created to release the tendon and clean it outside the joint capsule. If joint capsular lesions require simultaneous treatment, a joint capsule could be ruptured or created to allow the instrument to enter the joint cavity for treatment. Solheim *et al* (Soeur *et al.*, 2016) conducted a retrospective study on two methods of denatured tissue cleaning and radial extensor short-carpal tendon release. The results showed that both methods could effectively treat the diseased tissue and obtain a satisfactory curative effect. TCM for osteoarthritis is mainly used to dispel wind and cold, relieve spasmodically and dredge collateral, live blood and silt treatment. TCM analgesic tincture contains aconitine, which has a dose-dependent analgesic effect. It can also improve local blood circulation by stimulating blood vessels and nerves and play the role of activating blood circulation and removing blood stasis. It has a good clinical effect for all kinds of bone and joint diseases.

In this study, after the mean follow-up of 17.6 months, there were no complications such as infection, nerve injury, wound nonunion and joint stiffness. The satisfaction rate of patients was 100%, with 52 cases of completely satisfied, 6 cases of basically satisfied and no dissatisfied cases, indicating that the ECA plus analgesic tincture yields promising curative effects, with a safety profile, reliability and simple operation. It can be seen that ECA plus analgesic tincture has a definite therapeutic effect on refractory tennis elbow. The patient experiences a favorable alleviation of pain and recovery of function, with fewer postoperative complications, which avoids surgical risks such as important vascular and nerve injuries that may be caused by intra-articular operation

(Savoie and O'Brien, 2015). Moreover, there is less damage to the joint capsule, and the joint capsule is less likely to break down and produce exudate, which may reduce edema and the risk of compartment syndrome. The radial extensor brevis tendon can be observed directly, which simplifies the mastery of this technique for physicians.

CONCLUSION

ECA plus TCM analgesic tincture has a satisfactory effect on the treatment of external humeral epicondylitis and is worthy of clinical promotion. However, there were still the following limitations. It is a retrospective study with a small number of participants and short follow-up. A randomized controlled study with a large sample is needed to confirm this conclusion further.

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