



ORIGINAL ARTICLE

# Open arthrolysis with pie-crusting release of the triceps tendon for treating post-traumatic contracture of the elbow



Wei Wang, MD<sup>a</sup>, Yu-lin Zhan<sup>a</sup>, Shi-yang Yu, MD<sup>b</sup>, Xian-you Zheng, MD<sup>b</sup>, Shen Liu, MD<sup>b</sup>, Cun-yi Fan, MD, PhD<sup>a,b,\*</sup>

<sup>a</sup>Department of Orthopaedics, Shanghai Sixth People's Hospital East Branch, Shanghai, China

<sup>b</sup>Department of Orthopaedics, Shanghai Jiaotong University Affiliated Sixth People's Hospital, Shanghai, China

**Background:** Extensive loss of elbow flexion compromises the performance of daily activities. We examined the clinical outcomes of patients with post-traumatic extension contracture of the elbow treated with open arthrolysis and pie-crusting release of the triceps tendon.

**Methods:** We retrospectively reviewed the records of 7 patients (5 men and 2 women; mean age, 35 years) who underwent open arthrolysis via a combined lateral and medial approach with pie-crusting release of the triceps tendon for the treatment of post-traumatic elbow stiffness. All the patients had heterotopic ossification that restricted elbow motion and underwent removal of the ossified tissue and capsular release. The triceps tendon was gradually stretched by making multiple stab incisions on the tendon by using a No. 11 surgical blade. The range of motion of the elbow was recorded both preoperatively and at the final postoperative follow-up. Elbow function was assessed with the Mayo Elbow Performance Score.

**Results:** The patients were followed up for a mean of 24 months. After treatment, significant improvement was noted in the total arc of motion (from 44° to 116°,  $P < .001$ ), mean flexion (from 80° to 124°,  $P < .001$ ), and mean extension (from 31° to 8°,  $P = .004$ ). The mean Mayo Elbow Performance Score improved significantly from 59 points preoperatively to 92 points at the final evaluation. No major postoperative complications developed in any of the patients.

**Conclusion:** Our findings indicate that open arthrolysis with pie-crusting release of the triceps tendon is an effective and safe treatment approach for post-traumatic extension contracture of the elbow.

**Level of evidence:** Level IV; Case Series; Treatment Study

© 2016 Journal of Shoulder and Elbow Surgery Board of Trustees.

**Keywords:** Pie crusting; triceps; tendon lengthening; elbow stiffness; arthrolysis; extension contracture

Elbow stiffness is a common post-traumatic complication of injury to the elbow joint and can extensively restrict the per-

The study was approved by institutional review board of Shanghai Sixth People's Hospital (East Branch) (No. 20141107).

Wei Wang, Yu-lin Zhan, and Shi-yang Yu contributed equally to this work.

\*Reprint requests: Cun-yi Fan, MD, PhD, Department of Orthopaedics, Shanghai Sixth People's Hospital East Branch, Shanghai 201306, China.

E-mail address: [fancunyi888@hotmail.com](mailto:fancunyi888@hotmail.com) (C. Fan).

formance of daily activities and occupational function.<sup>9,22,25</sup>

Elbow motion of 30° to 130° is required for the execution of most activities of daily living, and a loss of more than 50° of motion compromises elbow function by 80%.<sup>24</sup> The management of post-traumatic contracture of the elbow is challenging; surgical intervention via open or arthroscopic release is indicated only when conservative approaches fail to improve the range of motion (ROM) of the elbow.<sup>3,4,10,12,16</sup>

Elbow flexion is necessary for several activities of daily living. Therefore, the loss of flexion—or extension contracture of the elbow—extensively affects the functioning of the elbow and is a major concern for patients. Contracture of the elbow is commonly caused by osseous impingement in addition to contracture of the soft-tissue elements such as periarticular capsules, collateral ligaments, tendons, and muscles.<sup>19</sup> In some cases, the triceps is involved in the contracture, and lengthening of the triceps tendon has been reported to improve elbow flexion.<sup>13</sup>

The outcome of the lengthening of the triceps tendon has been studied in cases of neglected elbow dislocation<sup>5,11</sup> and arthrogyposis,<sup>31</sup> as both cause extension contracture of the elbow and functional impairment. Although the results were satisfactory, the traditional methods of tendon lengthening, such as Z-plasty, generally disrupt the continuity of the tendon and necessitate the placement of additional sutures.<sup>8</sup> Furthermore, the use of immobilization to protect sutured tendon negatively influences the performance of exercise early after elbow release. Therefore, a technique that lengthens the triceps tendon as well as preserves its longitudinal integrity seems more suitable in treating elbow stiffness. In this study, we examined the effectiveness of open arthrolysis along with pie-crusting release of the triceps tendon, previously applied for quadriceps lengthening,<sup>6,18</sup> in patients with post-traumatic extension contracture of the elbow.

## Patients and methods

This is a retrospective case-series study of patients with extension contracture of the elbow who had undergone open arthrolysis via a combined lateral and medial approach and pie-crusting release of the triceps tendon at our institution between February 2010 and March 2013. Patients were included in the study if they had skeletally mature elbows, post-traumatic elbow stiffness with flexion of less than 90°, and radiographic evidence of union of the fracture and congruent joints. The criteria for exclusion were a history of congenital elbow contracture from a condition such as arthrogyposis; a history of injury from severe burns; a history of injury to the central nervous system; and cubitus varus or valgus, malunion, or loss of joint surfaces that necessitated arthroplasty.

We reviewed the records of 7 patients, including 5 men and 2 women, aged between 23 and 58 years (mean age, 34.6 years). All the operations were performed by the same senior surgeon. The affected side of contracture, primary injury and treatment, and other clinical characteristics of the patients are shown in Table I. Two patients had undergone implant removal before visiting our department. No open or arthroscopic release for elbow stiffness (including triceps release for hardware removed) was performed before our surgical intervention. All the patients had heterotopic ossification (HO), as observed on radiography. One patient presented with ulnar nerve sensory and motor symptoms before surgery

(case 3). The mean time from injury to arthrolysis was 29 months (range, 8–62 months).

In addition to the detailed history of the injury and treatment, data on the following clinical parameters were also recorded: ROM of the elbow, neurologic function, elbow stability and pain, and assessment of elbow function. The severity of pain was graded using a visual analog scale. Moreover, elbow function was assessed with the Mayo Elbow Performance Score (MEPS)<sup>23</sup> both preoperatively and at the final follow-up. This scoring system allowed for a comprehensive evaluation of various factors, namely pain (45 points), motion (20 points), stability (10 points), and function (25 points), with a total of 100 points possible. The extent of elbow flexion and extension was measured using a handheld goniometer. The strength of elbow extension was graded with manual muscle testing (0–5 on MRC grading system). Postoperative measurement was performed by an investigator blinded to preoperative motion measures. Standard anteroposterior and lateral radiographs were obtained to evaluate joint integrity and to assess HO (Hastings-Graham classification) and arthritic changes (arthrosis grade). In addition, the radiographs were assessed by 2 surgeons independently. The medical records of the patients were also reviewed for data on the occurrence of postoperative complications.

## Surgical technique

All operations were performed by the same senior surgeon. The surgical procedure was performed by using a brachial plexus block and placing a sterile tourniquet. A combination of the lateral and medial approaches was used in all patients.

The techniques for contracture release and removal of heterotopic ossified tissue have been described previously.<sup>16,29</sup> A lateral incision was made via the extended Kocher approach, mainly for release of the anterior capsule and the lateral collateral ligament. Subsequently, posterior capsular release was achieved via a medial incision, curving along the ulnar nerve. The ulnar nerve was identified and released, and care was taken to preserve the nerve during the procedure; then, the triceps was raised to expose the posterior aspect of the elbow. This was followed by posterior capsulectomy, release of the posterior and transverse bundles of the medial collateral ligament, and removal of the heterotopic ossified lesions within the olecranon fossa. Meanwhile, distal humeral plates were removed in 1 patient (case 6); in another patient (case 3), the Kirschner wires and cannulated screws in the humeral capitellum were removed before the complete release was carried out by the same senior surgeon. There was no anterior HO needing to be removed that blocked joint flexion in this case series.

The pie-crusting technique for the release of the triceps tendon was adopted if the excision of heterotopic ossified tissues restricting elbow movement and anterior and posterior capsular release did not yield a satisfactory degree of elbow

Download English Version:

<https://daneshyari.com/en/article/4072947>

Download Persian Version:

<https://daneshyari.com/article/4072947>

[Daneshyari.com](https://daneshyari.com)