Surgical Management of Symptomatic Olecranon Traction Spurs

Hasham M. Alvi,* MD, David M. Kalainov,*† MD, Debdut Biswas,‡ MD,
Alexander P. Soneru,* MD, and Mark S. Cohen,‡ MD

Investigation performed at Northwestern Center for Surgery of the Hand, Chicago, Illinois, USA

Background: There is a paucity of information pertaining to the pathoanatomy and treatment of symptomatic olecranon traction spurs.

Purpose: To describe the pathoanatomy of olecranon traction spur formation, a technique for spur resection, and a series of patients who failed conservative care and underwent operative treatment.

Study Design: Case series; Level of evidence, 4.

Methods: Eleven patients (12 elbows) with a mean age of 42 years (range, 27-62 years) underwent excision of a painful olecranon traction spur after failing conservative care. Charts and imaging studies were reviewed. All patients returned for evaluation and new elbow radiographs at an average of 34 months (range, 10-78 months). Outcome measures included the Quick-Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire; the Mayo Elbow Performance Score (MEPS); visual analog scales (VAS) for pain and patient satisfaction; elbow motion; elbow strength; and elbow stability.

Results: The traction spur was found in the superficial fibers of the distal triceps tendon in all cases. The mean QuickDASH score was 3 (range, 0-23), the mean MEPS score was 96 (range, 80-100), the mean VAS pain score was 0.8 (range, 0-3), and the mean VAS satisfaction score was 9.6 (range, 7-10). Average elbow motion measured 3° to 138° (preoperative average, 5°-139°). All patients exhibited normal elbow flexion and extension strength, and all elbows were deemed stable. Early postoperative complications involved a wound seroma in 1 case and olecranon bursitis in 1 case: both problems resolved without additional surgery. Two patients eventually developed a recurrent traction spur, 1 of whom underwent successful repeat spur excision 48 months after the index operation.

Conclusion: Short- to mid-term patient and examiner-determined outcomes after olecranon traction spur resection were acceptable in our experience. Early postoperative complications and recurrent enthesophyte formation were uncommon.

Clinical Relevance: This study provides the treating physician with an improved understanding of the pathoanatomy of olecranon traction spur formation, a technique for spur resection, and information to review with patients regarding the outcome of surgical management.

Keywords: olecranon traction spurs; enthesophytes; triceps tendinosis; olecranon bursitis; weight lifting

Olecranon traction spurs are enthesophytes found in the distal triceps tendon at the point of insertion into the olecranon process. They are thought to arise as a result of mechanical loading (ie, repetitive traction stress) and have been found to grow by a unique combination of endochondral, intramembranous, and chondroidal ossification.[2,6]

An olecranon traction spur may be a source of substantial elbow pain, alone or in combination with triceps tendinopathy and olecranon bursitis.[3,4,10,12] There are few reports of surgical treatment to address a painful enthesophyte at this site, and sparse outcome data.[4,12] The purposes of this study were to report the pathoanatomy of olecranon traction spur formation, a technique of spur resection, and the clinical and radiographic results at short- to mid-term follow-up.

MATERIALS AND METHODS

Study Population

The records of 12 patients who were treated surgically for a painful olecranon traction spur by 4 attending orthopaedic

†Address correspondence to David M. Kalainov, MD, Northwestern Center for Surgery of the Hand, 737 North Michigan Avenue, Suite 700, Chicago, IL 60611, USA (e-mail: dkalainov@comcast.net).

*Department of Orthopaedic Surgery, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA.

‡Midwest Orthopaedics, Rush University Medical Center, Chicago, Illinois, USA.

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surgeons between March 2004 and March 2012 were reviewed. Eleven patients (12 elbows) were contacted and agreed to participate in this study, whereas 1 patient could not be located and was excluded from analysis. The 11 patients who constituted this study were male, with an average age of 42 years (range, 27-62 years). The dominant extremity was involved in 7 cases, the nondominant extremity in 3 cases, and both elbows were affected in 1 patient. Institutional review board approvals were obtained from our separate academic centers.

Posterior elbow pain developed in relationship to weight lifting exercises in 4 cases and elbow trauma in 8 cases (new pain or exacerbation of preexisting pain). At initial presentation, there was point tenderness over the tip of the olecranon process and distal triceps tendon and/or posterior elbow pain with resisted elbow extension in all cases. Five patients had concomitant olecranon bursitis (1 with gouty tophi), and 1 patient had lateral elbow pain compatible with lateral epicondylitis. An elbow flexion contracture of 10° to 20° was measured in 4 cases. There were no motor or sensory deficits in the involved extremities.

Preoperative radiographs of the affected elbows were retrieved in 9 cases, and a preoperative ultrasound study was retrieved in 1 case for assessment of triceps enthesophytes. The preoperative radiology and surgical reports were used to confirm olecranon traction spur existence in the remaining 2 cases. The available images showed bone spurs projecting posteriorly or posterocephalad from the dorsal extra-articular margin of the olecranon process. A fracture through the spur was noted in 8 cases: 6 cases through the base of the spur and 2 cases through the mid to distal portion of the bony excrescence. Seven elbows had a small exostosis and/or calcifications in the common extensor tendon origin at the lateral epicondyle (all asymptomatic), and 4 elbows had osteophytes around the perimeter of the posterior ulnohumeral joint. Additional preoperative elbow imaging included magnetic resonance imaging (MRI) in 5 cases and a computed tomography (CT) scan in 1 case. The MR images and the aforementioned ultrasound study revealed concomitant distal triceps tendinosis.

All patients were managed conservatively for a minimum of 3 months with various measures, including elbow immobilization, elbow padding, anti-inflammatory medication, rest, activity modifications, and supervised therapy modalities. Surgery was undertaken when these measures failed to provide acceptable pain relief.

Surgical Technique and Postoperative Care

The procedures were performed under regional or general anesthesia. A longitudinal incision was made over the olecranon process and extended through the subcutaneous fat and bursa. The incision was positioned lateral to the tip of the olecranon process or curved gently around the process to avoid scar sensitivity. Full-thickness skin flaps were raised to expose the distal triceps tendon and bone attachment. A limited bursectomy was completed in 3 cases, and a complete bursectomy was completed in 4 cases (including all 5 elbows with olecranon bursitis). Two patients underwent concurrent resection of a symptomatic osteophyte from the tip of the olecranon process, and 1 patient underwent combined debridement of the common extensor tendon origin for treatment of lateral epicondylitis and elbow arthroscopy for removal of a loose body.

A thin layer of triceps tendon tissue was found to overlie the traction spur in each case and was incised longitudinally. There were no patients with a gross tear of the triceps tendon by operative report, including the 1 patient who was excluded from the study. The tendon tissue was elevated from the dorsal, radial, and ulnar margins of the spur (Figure 1A). The intact or fractured bony excrescence was then excised using an osteotome and/or rongeur to the level of the dorsal cortex, taking care to preserve deep triceps tendon attachments to bone (Figure 1B). Sharp bone edges were smoothened with a rasp, and the adequacy of resection was assessed with intraoperative fluoroscopy. The thin layer of reflected triceps tendon was either resected (7 cases) (Figure 1C) or repaired with absorbable sutures (5 cases).

The elbow was temporarily immobilized with a splint in flexion in all but 1 case. Elbow motion was permitted within the first week after surgery, and a self-directed program of elbow motion and strengthening was encouraged. Unrestricted activities were permitted between 3 and 6 weeks postoperatively.

Outcome

All patients agreed to return specifically for the purposes of this study at an average of 34 months (range, 10-78 months) after primary (11 cases) or recurrent (1 case) spur excision. A physician or a physician assistant evaluated each patient with help from an occupational therapist in most cases. Outcome assessments included the Quick-Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire; the Mayo Elbow Performance Score (MEPS); visual analog scales (VAS) of patient pain and satisfaction; measurements of elbow motion and strength; and an assessment of elbow stability.

The QuickDash questionnaire includes 11 items that gauge function applicable to upper extremity musculoskeletal disorders. The score is based on a scale of 0 to 100 points, with a lower score reflective of a better outcome. The MEPS includes 5 patient and examiner-determined categories and is also based on a scale of 0 to 100 points, but with a higher score reflective of a better outcome. The VASs include numeric responses on a scale from 0 to 10, with 0 representing no pain and poor satisfaction and 10 representing severe pain and high satisfaction.

Active elbow joint motion measurements were obtained with a handheld goniometer. Elbow strength was assessed with manual muscle testing and categorized using the Medical Research Council of Great Britain grading system. Elbow stability was gauged by applying varus and valgus stresses and by comparing with laxity in the contralateral elbow.

Early postoperative radiographs of the elbow were retrieved in 9 cases, and new follow-up radiographs of the elbow were completed in all 12 cases. Adequate spur resection was confirmed by reviewing the early postoperative radiographs and radiograph reports. Spur dimensions in the sagittal plane were measured on the available preoperative

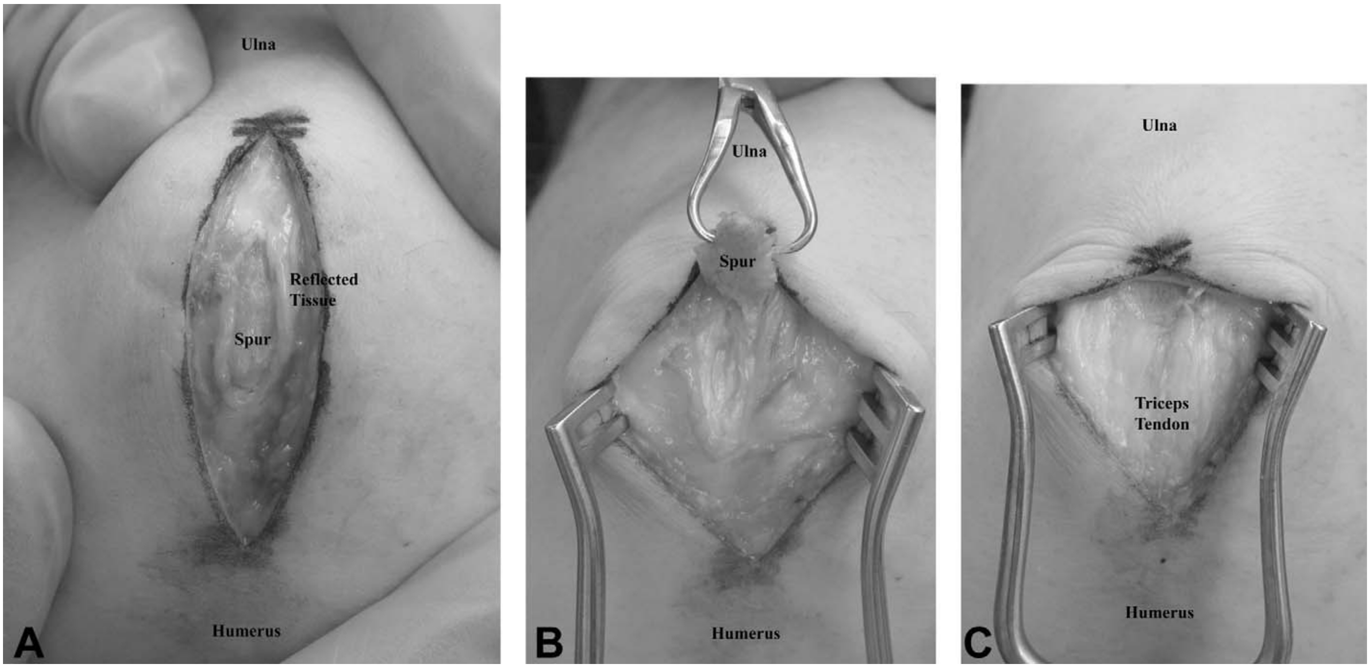

Figure 1. Spur resection technique. (A) A longitudinal incision is made over the olecranon process, and full-thickness skin flaps are raised to expose the distal triceps tendon attachment. A thin layer of triceps tendon tissue overlying the spur is incised longitudinally, and the tissue is reflected from the dorsal, radial, and ulnar margins of the spur. (B) The spur is elevated and excised, exposing the deeper triceps tendon attachment to bone. (C) The reflected layer of tendon tissue is debrided to healthy-appearing tissue.

digitized radiographs (9 cases) and the new follow-up digitized radiographs (12 cases). The preoperative spur dimensions in 1 additional case were obtained from digitized ultrasound images of the elbow. Spur length was measured from the base to the tip of the intact or fractured excrescence, and spur width was measured across the base of the excrescence, as depicted in Figure 2.

RESULTS

One patient developed a wound seroma 4 days after enthesophyte resection and concomitant bursectomy. The fluid was aspirated twice, and swelling resolved after 3 weeks. One patient developed olecranon bursitis 7 weeks postoperatively that resolved with a compressive sleeve, and 1 other patient returned to surgery after 6 months for removal of prominent suture material from the distal triceps tendon.

At the latest follow-up assessment, all patients stated that pain in the operative elbow(s) had improved. The mean QuickDASH was 3 (range, 0-23), the mean MEPS was 96 (range, 80-100), the mean VAS pain score was 0.8 (range, 0-3), and the mean VAS satisfaction score was 9.6 (range, 7-10). The patient with the lowest VAS satisfaction score attributed the initial onset of elbow pain to an injury that occurred at work.

Elbow motion was nearly equivalent before and after treatment in each patient. Mean active elbow motion measured 5° (range, −5° to 20°) to 139° (range, 125°-145°) of flexion preoperatively and 3° (range, 0°-10°) to 138° (range, 125°-149°) of flexion at final evaluation. Normal elbow flexion and extension power were demonstrated, and all elbows were deemed stable by stress examination.

Figure 2. Lateral radiographic image of an elbow depicting the technique for measuring spur dimensions. A straight line is drawn along the posterior margin of the olecranon process and through the base of the spur. Spur length is measured from points A to B, and spur width is measured from points A to C.

Mean spur length before the index operation was 14 mm (range, 7-23 mm), and mean spur width was 6 mm (range, 3-9 mm). At the latest follow-up assessment, radiographs

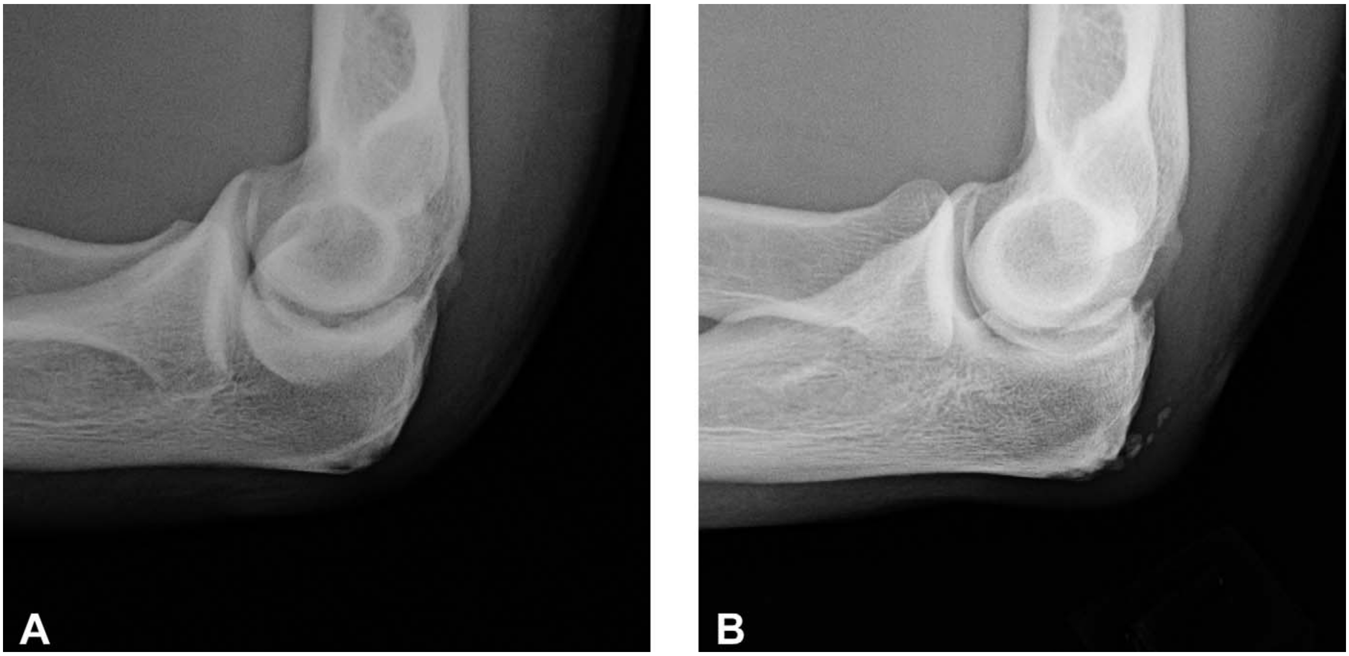

Figure 3. Lateral radiographic images of the same elbow in Figure 2. (A) Three weeks after spur excision and (B) 17 months after spur excision showing spotty calcifications corresponding to the distal triceps tendon.

showed well-circumscribed calcifications corresponding to the distal triceps tendon in 4 cases (Figure 3).

Two patients developed a recurrent olecranon traction spur. The bony excrescence in 1 case was detected in radiographs that were completed specifically for this study 78 months postoperatively. The spur was not tender and measured 10 mm in length and 8 mm in width. In the other case, posterior elbow pain recurred, and a spur was detected by radiographs 38 months after the index procedure (these images were not available for review). This patient elected to undergo additional surgery 10 months later, and his pain resolved. Final radiographs 53 months later showed no new spur formation.

DISCUSSION

Pain attributable to an olecranon traction spur may develop spontaneously, after a traumatic event, or in association with sport activities.[1,3,8,15] In agreement with other authors, distal triceps tendinosis as discerned by ancillary imaging and/or clinical examination and a fracture through the spur were common findings in our series.[3,4,10,12] In contrast, olecranon bursitis was detected in less than half of our patients.[1,3,9,12-14]

An asymptomatic exostosis and/or asymptomatic calcifications were seen at the lateral epicondyle in slightly more than 50% of cases, but of uncertain relationship to the distal triceps tendon enthesophytes. Posterior compartment degenerative arthritis was seen in only 4 elbows, suggestive of disparate pathophysiologic processes.[5]

The olecranon traction spur was located in the superficial portion of the distal triceps tendon in each case, consistent with growth of traction spurs at other tendon insertion sites.[2] Debridement of the thin covering of triceps tendon tissue and spur resection did not adversely affect elbow motion or extension power, presumably due to preservation of deep tendon attachments to bone.[7] A recent cadaveric study revealed a fairly large triceps tendon footprint on the olecranon process that averaged 466 mm^2.[16] Mair et al[8] found that nonoperative treatment was possible with a traumatic triceps tendon tear involving 75% of the tendon by MRI, and Vidal et al[15] proposed that a triceps tendon tear of less than 50% could be treated nonsurgically with satisfactory results.

Patient and examiner-determined outcomes were favorable at the latest evaluation in nearly all of our cases. Early postoperative complications were limited to a transient wound seroma in 1 elbow and temporary olecranon bursitis in 1 elbow. One patient underwent removal of a prominent suture in the triceps tendon 6 months after surgery, and 2 patients developed a recurrent distal triceps tendon enthesophyte, 1 of whom was symptomatic and underwent additional surgery 4 years later. There was no recurrence of a spur in this case at final evaluation approximately 4.5 years after the second operation.

Limitations of this study include the retrospective design and the small number of patients. There were insufficient case numbers to compare potential differences in outcomes between triceps tendon debridement and repair, or between patients with and without a fracture of the enthesophyte. Preindex surgery radiographs were missing in 3 cases, recurrent spur formation radiographs were missing in 1 case, subjective scores of elbow pain and function before surgery were not obtained, and postoperative rehabilitation measures were not standardized.

Furthermore, clinical evaluations were completed by the treating surgeon in several cases with the potential for introducing bias.[11]

Excision of painful olecranon traction spurs was found to provide improvement in pain and a generally high patient satisfaction at short- to mid-term follow-up. Although long-term outcome data are necessary, our experience supports excision of persistently symptomatic olecranon traction spurs to be a reasonably safe and effective treatment.

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