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ORIGINAL ARTICLE

Ulnar neuropathy and medial elbow pain in women's fastpitch softball pitchers: a report of 6 cases

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Background:: Elite-level women's fastpitch softball players place substantial biomechanical strains on the elbow that can result in medial elbow pain and ulnar neuropathic symptoms. There is scant literature reporting the expected outcomes of the treatment of these injuries. This study examined the results of treatment in a series of these patients.

Methods:: We identified 6 female softball pitchers (4 high school and 2 collegiate) with medial elbow pain and ulnar neuropathic symptoms. Trials of conservative care failed in all 6, and they underwent surgical treatment with subcutaneous ulnar nerve transposition. These patients were subsequently monitored postoperatively to determine outcome.

Results:: All 6 female pitchers had early resolution of elbow pain and neuropathic symptoms after surgical treatment. Long-term follow-up demonstrated that 1 patient quit playing softball because of other injuries but no longer reported elbow pain or paresthesias. One player was able to return to pitching at the high school level but had recurrent forearm pain and neuritis 1 year later while playing a different sport and subsequently stopped playing competitive sports. Four patients continued to play at the collegiate level without further symptoms.

Conclusions:: Medial elbow pain in women's softball pitchers caused by ulnar neuropathy can be treated effectively with subcutaneous ulnar nerve transposition if nonsurgical options fail. Further study is necessary to examine the role of overuse, proper training techniques, and whether pitching limits may be necessary to avoid these injuries.

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

Keywords: Ulnar neuropathy; softball; pitcher; windmill; medial elbow pain; ulnar neuritis; ulnar nerve subluxation

The literature examining elbow injury in women's softball pitchers is sparse. The underhand windmill-style pitching technique has been presumed to cause less stress on the medial collateral ligament of the elbow, thus resulting in less chronic ligamentous wear. However, although different, the stresses across the elbow and medial forearm flexors during a windmill softball pitch are significant and approach or surpass those in an overhead throw, depending on the type of pitch thrown.[11]

Medial elbow pain in the overhead throwing baseball athlete has been examined extensively and can be related to injury of multiple structures that lie close to the medial epicondyle.[9] Medial elbow pain in the overhead throwing baseball athlete

The Jackson Madison County General Hospital Institutional Review Board approved this study (study #643) on November 10, 2016.

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is usually related to injury to the medial collateral ligament (MCL), medial forearm flexors, ulnar nerve (neuritis or subluxation), medial triceps, or to osteophyte formation. These pain generators can occur as an isolated injury or in combination with each other. However, injuries in softball pitchers seem to fall into a different spectrum, and the frequency, diagnostic criteria, or treatment outcomes have not been well described.

Injury to the medial forearm flexors and ulnar nerve has been documented in only 2 injury survey-type studies in collegiate-level women's softball pitchers.[3,7] However, the preferred treatment and subsequent recovery expectation of these injuries in a female softball pitcher is not well documented. This study examined the results of operative treatment in 6 competitive women's softball pitchers who developed recalcitrant medial elbow pain with ulnar neuropathy.

Materials and methods

A retrospective review of female softball pitchers from the orthopedic surgical practice of 1 of the authors (A.M.S.) from 2009 to 2015 was performed. These patients underwent operative intervention after conservative treatment for medial elbow pain and distal ulnar nerve paresthesias failed. Data on the preoperative treatment, operative procedures performed, and the postoperative course, including physical examinations, imaging, nerve studies, and time to return to play were collected.

All patients eventually underwent surgical subcutaneous anterior ulnar nerve transposition, which was performed similarly in all patients. One patient also underwent diagnostic arthroscopy.

Patient population

Six pitchers were identified and monitored for at least 1 year postoperatively (Table I). Their average age at the time of surgery was 18 years (range, 16-20 years). All patients were right-hand dominant and primarily played pitcher. At the time of their first visit when the symptoms developed, 4 of the 6 patients were in high school and 2 were collegiate players. All of the patients expressed a desire to return to their sport and play at the collegiate level. All patients complained of medial elbow pain with ulnar digit paresthesias with symptoms present for at least 3 months (range, 3 months-1 year) before being evaluated. All patients described a slow progression of increasing pain and distal paresthesias rather than an acute type of injury.

All patients underwent standard radiographic examination of the elbow with assessment of the carrying angle as defined by the angle formed by the long axis of the humerus and the long axis of the ulna. The average carrying angle was 19° (range, 14°-29°). The carrying angle was 20° or less in 5 of the 6 patients and was 29° in 1 (patient E). The contralateral elbow in this patient measured 16°. The cause of the significant side-to-side difference was felt to be an elbow supracondylar fracture treated nonoperatively at 6 years old. This patient had otherwise full function with range of motion with flexion and extension of 150° to 0° and full pronation and supination to 90° in each direction. This patient had pitched competitively since the age of 6 without any recognition of a side-to-side difference or problem until presenting with elbow pain and paresthesias in the beginning of her freshman year of college.

None of the 6 patients demonstrated physical examination findings that would suggest ligament injury, with negative results on the moving valgus stress test[9] and the milking test.

All patients underwent magnetic resonance imaging (MRI) of the elbow without arthrogram. The MRI was reviewed by the primary surgeon and a musculoskeletal radiologist. The elbow appeared normal on the MRI in 3 of the 6. Two had findings of ulnar nerve edema. Two showed edema along the flexor carpi ulnaris (FCU) and MCL. None of the 6 demonstrated a partial or complete MCL tear.

All 6 patients had a positive Tinel sign in the region of the cubital tunnel with exquisite medial forearm pain at the flexor insertion. Two patients had ulnar nerve subluxation over the medial epicondyle with flexion past 90°, and the subluxation in both patients was bilateral. Neither patient had medial elbow pain or paresthesias before episode of injury.

All patients underwent electromyography and peripheral nerve conduction studies performed by a subspecialist in neurology. The results of the studies in 4 of the 6 patients were normal, with no evidence of neuropathy. Two patients had ulnar sensory slowing only with no motor slowing. Interestingly, both of the patients with ulnar sensory slowing also had ulnar nerve subluxation at baseline.

Nonoperative management failed in all patients, including throwing and hitting rest, oral nonsteroidal medications, oral corticosteroids, physical therapy, and extension night splinting. All patients eventually underwent operative anterior subcutaneous ulnar nerve transposition. One patient also underwent diagnostic arthroscopy, including arthroscopic valgus stress testing to assess competency of the MCL, which was found to be normal at the time of the operation.

All patients were started in physical therapy 2 weeks after the operation for range of motion and gentle forearm strengthening. A throwing program was initiated from 7 weeks to 3 months. Throwing was initiated after patients had painless range of motion, absence of paresthesias, painless palpation of the medial forearm flexors, and comparable grip strength to the nonthrowing arm.

Surgical technique

A longitudinal incision was made over the medial epicondyle, and blunt dissection was carried down through the subcutaneous tissues. The incision was carried distally and proximally to maximize visualization of the ulnar nerve. Soft tissues were elevated up to the superior margin of the medial flexor mass. The medial antebrachial cutaneous nerve branches were identified and protected. Once adequate visualization was achieved, the ulnar nerve was identified proximally and the elbow examined dynamically with flexion and extension to observe the relationship of the ulnar nerve to the medial triceps and to assess whether there was any subluxation of the nerve or medial triceps over the bony medial epicondyle. The ulnar nerve was released from proximal to distal, including the cubital tunnel and overlying fascia of the FCU. The intermuscular septum was excised.

As dissection was carried distally, the first dorsal branch of the ulnar nerve was identified and preserved. Once the ulnar nerve was adequately dissected from the surrounding tissue, the nerve was transposed anteriorly. The elbow was taken through the full arc of flexion-extension to ensure that the nerve was inherently stable in the anterior located position. A single Vicryl suture (Ethicon, Somerville, NJ, USA) was placed in a mattress fashion in the subcutaneous fat to ensure that the nerve was maintained in the transposed position, with care taken to avoid any pressure or tethering of the nerve in the surrounding soft tissue.