

좌장 : 윤여승·최창혁 / 연자 : 신상진

Epicondylitis

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신 상 진

- The term "tennis elbow" was first introduced to the literature in the 1883 as lawn tennis elbow.
- · According to pathology and histologic findings, an alternative term "angifibroblastic tendinosis" was introduced.

Incidence

- 2% of population
- Half of tennis players older than 30 years old had experienced symptoms of tennis elbow one time or another.
- Sports and occupational activities that require stressful use of forearm are related to the occurrence of tennis elbow (baseball, fencing, carpentry, plumbing...)
- Age: 35~50 yrs old (median 41 yrs old).
- Gender: male/female ratio equal.

Classification

- 1) Lateral tendinosis
- commonly involved tissue: ECRB(97%, 35% rupture), anterior edge of EDC (35%), occasionally underside of the ECRL
- 2) Medial tendinosis
- commonly involved tissue: origin of the pronator teres, palmaris longus, and FCR
 - close to their attachment to the medial epicondyle, occasionally FCU, rare occasion flexor sublimis
- 3) Posterior tendinosis: primary-triceps

Associated abnormalities

- Medial tendinosis: ulnar nerve neurapraxia (40%), MCL strain and/or rupture.

Type I: isolated medial tendinosis.

Type II: medial tendinosis with an associated ulnar neuropathy.

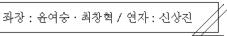
- Medial and/or lateral tendinosis: intra-articular pathology(5~20%) ex)chondromalacia, synovitis, osteophytes, loose bodies.
- Posterior tendinosis: olecranon fossa synovitis, chondromalacia, osteophytes, loose bodies.
- Mesenchymal syndrome (multiple sites of tendon pain)
 - : rotator cuff tendinosis, carpal tunnel syndrome(10%), bilateral tennis elbow, DeQuervain s syndrome, trigger finger.

Etiology

- Overuse: epicondylitis is currently thought to be caused by tendon overuse and failed tendon healing.
- Trauma: acute onset may be associated with direct blow to epicondylar area.
- * Risk factors for tendon overuse
 - Age older than 35 years
 - High activity level (sports and occupational)
 - Demanding activity technique
 - Inadequate fitness level

Pathology

- Tendonitis (inflammatory changes) <<< Tendinosis (degenerative changes)
- · Gross appearances
 - dull, gray, friable, and often edematous tissue (angiofibroblastic tendinosis)
- · Microscopic appearances
 - normally ordered tendon fibers are disrupted by the invasion of fibroblasts and vascular, atypical, granulation-like tissue
 - adjacent tendon appears to be hypercellular, degenerated, and microfragmented
 - inflammatory cells may be noted in the tendon and supportive tissue ; from traumatic repair (early and old scar tissue) rather than tendinosis itself
 - in cases treated with corticosteroid injection, nonpolarizable amorphous eosinophilic material can be identified.



 the degree of angiofibroblastic infiltration correlates with the clinical phases of pain and the duration of symptoms

Diagnostic evaluation

- Pain: activity related to rest pain
- Tenderness over epicondylar area
- Provocation manual test.
- ROM: within normal limit, occasional loss of terminal extension (up to 15°)
- Radiographs: tendon calcification (20%) or reactive exostosis
- MRI: tendon thickening with increased T1 and T2 signal near its origin of epicondyle

Clinical correlations of pathology

1) Category I

- Pathology: acute, reversible inflammation, no angiofibroblastic invasion
- Clinical signs: minor aching pain, usually after heavy activity
- Treatment: NSAIDS, rehabilitative exercise, avoidance of overuse

2) Category II

- Pathology: partial angiofibroblastic invasion, some healing response, permanent
- Clinical signs: pain with activity and rest, most routine activities possible after rest
- Treatment: promote healing nonoperatively, occasionally operation

3) Category III

- Pathology: extensive angiofibroblastic invasion with/without partial or complete rupture of the tendon
- Clinical signs: significant functional deficit, pain at rest and night, routine activities impossible, the complete lesion is observed arthroscopically
- Treatment: operation

Differential diagnosis

- Lateral tendinosis: posterior interosseous nerve entrapment, synovitis, plica,

chondromalacia, adolescent osteochondritis dissecans, cervical osteoarthritis and nerve root compression

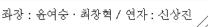
- Medial tendinosis: ulnar nerve compression, MCL degeneration and/or rupture,
- Posterior tendinosis: extra-articular olecranon exostosis, intra-articular abnormalities (olecranon synovitis, chondromalacia, loose bodies)

Treatment.

The treatment should enhance the natural biologic healing response after injury
; (1) inflammatory exudation (2) infiltration of neovascular and fibroblastic
elements (3) collagen and ground substance production (4) maturation and
strengthening

Nonopeative treatment

- 1) Relief of pain and control of inflammatory exudation and/or hemorrhage
- rest (refrain from abuse), ice, elevation, protection, medication, cortisone injection, physical therapy (ultrasound, heat/cold)
- ESWT (extracorporeal shock wave therapy): controversial effect
- abstinence of abuse
- alteration of training technique
- alteration of equipment
- counterforce brace
 - : multiple tension straps, wide dimensions, curved contours, solid material or air cells produce local pressure points and resultant muscle imbalances are avoided
 - constrain full muscular expansion, decrease intrinsic muscle force to vulnerable area
- 2) Promotion of specific tissue healing
- after adverse inflammation and pain are controlled $(1\sim2~\text{weeks})$
- $\mbox{-}$ rehabilitative exercises (multiple resistance system), high-voltage electrical stimulation, refraining from abuse
- 3) Control of force loads
- excessive loading of the tendon should be minimized during rehabilitation, at the time of return to sports activity, and during ADL
- counterforce brace



- 4) Improved performance technique
- control of intensity and duration of activity
- * Cortisone injection and brace might be useful as initial therapy
- Physical therapy and wait-and-see policy show good results in long-term follow-up.

Surgical treatment

- * Selection factors for surgery
 - 1) chronic symptoms exceed a duration of 1 year
 - 2) fail to respond to a good quality rehabilitation program
 - 3) persistent pain without activity
 - 4) multiple cortisone injection: three or more failed cortisone injections, iatrogenic cortisone atrophy
 - 5) quality of life is unacceptable by the patient
 - 6) tendon calcification, bony exostosis, intra-articular pathology: relative indication
- * Methods
- Mini-open technique
- Percutaneous extensor tenotomy
- Arthroscopy: arthroscopic findings are classified by Baker et al.
 - Type I: fraying of the ECRB tendon undersurface without a distinct tear
 - Type II: linear tear along the undersurface of the ECRB tendon
 - Type III: minimally retracted partial avulsion or complete avulsion of the tendon

A) Lateral tendinosis surgery

- bony exostosis of the lateral condyle is not absolute indication for tendon surgery per se, however, if the exostosis is prominent or tender to palpation, removal of exostosis is recommended
- because the origin of the ECRB is extensive, the tendon does not retract more than 1 to 2 mm even when the majority of the tendon is excised
- care is taken to spare the origin of the other tendons
- the focus of surgery is the ECRB tendon attachment to the anteromedial aspect of the extensor aponeurosis
- the cortex of the lateral condylar triangular recess is drilled
 - ; enhance vascular supply
 - ; improve biologic environment

- ; stimulate healing and formation of healthy fibrotendinous scar to replace the resected tendinous tissue
- · Surgical failure
- the most common reason for continued pain after operation is failure to adequately address the tendinosis pathoanatomy.
- an aggressive release of the common tendon from epicondyle can result in a release of the collateral ligament and resulting joint instability

B) Medial tendinosis surgery

- if ulnar nerve dysfunction may be associated (60%), decompression may be required (ulnar nerve transfer is not indicated)
- · Surgical failure
- the surgeon fails to identify and resect the pathologic tissue
- release of common flexor origin leads to iatrogenic instability
- medial antebrachial cutaneous neuropathy

C) Triceps tendinosis surgery

- arthroscopic approach may be considered

Surgical result

A) Lateral tendinosis

- 85% complete pain relief and return to full strength
- 12% significant pain relief and strength return
- 3% no pain relief or strength improvement

B) Medial tendinosis

- 5% no pain relief or strength improvement

Postoperative management

- light, adaptable elbow immobilizer (elbow 90°) for 48 hours
- active motion exercises are started 48 hours postoperatively
- elbow immobilizer is used intermittently for protection for another 3~5 days
- ADL initiates within 7 days
- active wrist exercises without resistance are started within 5~6 days
- wrist resistance exercises with 1 lb weight are started at 3 weeks
- counterforce brace is used during resistance exercises over the next 2 months

V. Update of Elbow Problem

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- sports activities: chipping and putting- 3-4 weeks

tennis - 6~8 weeks

full, unrestricted competitive sports - 4~6 months

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