



Analytical Review

Percutaneous Needle Tenotomy for the Treatment of Lateral Epicondylitis: A Systematic Review of the Literature

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Abstract

Objective: To analyze the literature to determine whether controlled studies on percutaneous tenotomy have been published, and if so, to systematically assess the efficacy of percutaneous tenotomy for the treatment of tendinosis at the lateral epicondyle of the elbow.

Design: Systematic review of the available literature.

Methods: Cochrane Controlled Trials Register (CENTRAL), MEDLINE, EMBASE, CINAHL, and Web of Science databases were searched in November 2015, unrestricted by date. After the initial search, we excluded conference proceedings, theses, reviews, expert opinions, and publications written in languages other than English. Next, 2 independent reviewers screened all of the remaining records with regard to their titles and abstracts, and subsequently, the full texts of identified publications potentially relevant to the present study.

Results: Six articles focused on percutaneous tenotomy, none of which were controlled against a placebo or conservative treatment group. The absence of true randomized controlled trials created a great deal of heterogeneity between the studies; thus we could not include any of our studies in the intended final quantitative analysis with meta-analysis tools. We describe all 6 studies identified by this systematic review with a detailed analysis of the procedural methods, outcome measures, and conclusions of each study.

Conclusions: Percutaneous tenotomy presents an alternative to surgical release of the common extensor tendon for the treatment of chronic tendinosis at the lateral epicondyle of the elbow. Current research supporting the efficacy of this procedure, however, is of low quality (level II to level IV).

Level of Evidence: III

Introduction

Lateral epicondylitis, also known as “tennis elbow,” is a painful condition that affects the common extensor tendon at its insertion at the lateral epicondyle. As one of the most common upper extremity musculoskeletal disorders, it affects 1%-3% of adults each year [1,2]. The natural history of lateral epicondylitis is usually self-limiting, with up to 90% of cases resolving within 12-18 months; however, refractory tendinosis can also result in long-term morbidity and reduced workplace productivity [3].

The pathophysiology of lateral epicondylitis is not totally clear, although it has been associated with repetitive wrist extension and supination. Studies suggest a degenerative process secondary to microtrauma,

leading to scar formation and malalignment of collagen fibers in the extensor carpi radialis brevis. Local injury, aging, overuse, and hypovascularity have been implicated as possible causes of lateral epicondylitis [4]. At the microscopic level, angiofibroblastic hyperplasia after extensor carpi radialis brevis tendon overuse and failed healing has been demonstrated [4]. In chronic epicondylitis, histopathology reveals tendon degeneration with replacement by disorganized collagen; there is a lack of evidence for an acute or chronic inflammatory process [5,6]. Given the distinct pathology from acute inflammation, there has been a shift in terminology from chronic epicondylitis to chronic epicondylosis or tendinosis.

This condition is first managed conservatively, and may include nonsteroidal anti-inflammatory drugs

(NSAIDs), physical therapy, and bracing, but it is unclear whether conservative treatment alters the natural history of this condition [7]. Corticosteroid injection is also commonly used in the treatment of chronic tendinosis, but studies on the efficacy of this treatment have been inconclusive [8-10]. In addition, steroid injections into the tendon may lead to weakening of the tendon, reduction in collagen fascicle strength, and reduction of inflammation that assists in the healing process [11]. There is also the risk of tendon rupture, although the incidence is low [11]. Corticosteroids also have systemic effects on the adrenal axis and may cause increased blood glucose levels in individuals with diabetes. Studies have demonstrated that the benefits of steroid injections are often short lived [12,13]. A reasonable explanation is that corticosteroids do not address the underlying tendon pathology, which is unrelated to inflammation [5,6].

Surgical release and repair of the common extensor tendon is typically reserved for chronic tendinosis that is recalcitrant to conservative or injection therapy. The number of patients with chronic lateral epicondylitis undergoing surgical release has increased from an estimated 1.1% in 2000 to 3.2% in 2009 [14].

Percutaneous tenotomy is a minimally invasive alternative to surgical release for the treatment of chronic tendinosis. Also referred to as "tendon fenestration" or "dry needling," the procedure involves passing a needle through the abnormal tendon multiple times. It is thought that percutaneous tenotomy stimulates tendon healing and remodeling through a controlled acute inflammatory response. This has been demonstrated by the release of local angiogenic factors and new vessel formation following this procedure [15]. Theoretically, there is also risk of tendon rupture, and it has been proposed that tendon fenestration should be avoided in tears greater than 50% of tendon thickness [16]. However, it is important to evaluate the effectiveness of percutaneous tenotomy as a less invasive alternative to surgical release.

The aim of this systematic review was to analyze currently available controlled studies on percutaneous tenotomy and its efficacy for the treatment of lateral epicondylitis.

Methods

Search Methods for Identification of Studies

Cochrane Controlled Trials Register (CENTRAL), MEDLINE, EMBASE, CINAHL and Web of Science databases were searched in November 2015, unrestricted by date. The search clauses are presented in Table 1. To avoid missing relevant studies, use of limits was restricted and further selection was conducted manually. The references of identified articles and reviews were also checked for relevance.

Table 1

Search strategy with keywords, restrictions, and limitations

Database	Search Clauses
CENTRAL	(MeSH descriptor: [Tennis Elbow] explode all trees OR (#11:tennis OR lateral OR radiohumeral OR humer*:ti,ab,kw)) AND (elbow OR epicondyl* OR tendino*:ti,ab,kw) AND (tenotom* OR needli* OR percutane*:ti,ab,kw) IN TRIALS N 36
MEDLINE	("tennis elbow"[MESH] OR (tennis[TIAB] OR lateral* [TIAB] OR radiohumer*[TIAB] OR humer*[TIAB])) AND (elbow[TIAB] OR epicondyl*[TIAB] OR tendino* [TIAB])) AND (tenotom*[TIAB] OR needli*[TIAB] OR percutane*[TIAB]) AND (hasabstract[text] AND English[lang]) N221
EMBASE	(tenotom* OR needli* OR percutane*) AND (elbow OR tendino* OR epicondyl*) AND ('tennis'/exp OR tennis AND ('elbow'/exp OR elbow)) OR (lateral OR radiohumer* OR humer* OR tennis) AND [english]/lim AND [abstracts]/lim N367
CINAHL	((MH "Tennis Elbow") OR (AB Tennis) OR (AB Lateral) OR (AB radiohumer*) OR (humer*)) AND ((AB elbow) OR (AB epicondyl*) OR (AB tendino*)) AND ((AB tenotom*) OR (AB needli*) OR (AB percutane*)) N39

The following "PICOS" criteria were used: P: Adults with lateral epicondylitis; I: Percutaneous tenotomy; C: ANY other treatment or no treatment; O: PAIN; S: RCT or CT.

Exclusion criteria were conference proceedings, age less than 17 years, specific reason for epicondylitis (such as trauma or specific disease), previous operative treatment of lateral epicondylitis, language other than English, and no abstract.

Study Selection and Methodological Quality Assessment

The identified records were saved to Endnote software (X7.2, Thomson Reuters, New York, NY) and crude exclusion of irrelevant records was performed (Figure 1). In the systematic review process, crude exclusion is independent of the number of assessors because it is dependent only on search clauses and the inclusion and exclusion criteria decided on before the search was undertaken. Aside from the initial database search, which was performed by 1 author, all remaining stages had 2 reviewers. After the initial search, we excluded conference proceedings, theses, reviews, expert opinions, and publications written in languages other than English. Next, 2 independent reviewers screened all of the remaining records with regard to their titles and abstracts, and subsequently the full texts of identified publications potentially relevant to the present study. The reviewers also rated the methodological quality of the included trials (Table 2). A third reviewer resolved any disagreements between reviewers.

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