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Review Article

Fluoroscopy-Guided Infiltration of the Long Head of the Biceps: Diagnostic Precision and Therapeutic Value

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Abstract

This article explores the diagnostic and therapeutic utility of fluoroscopy-guided infiltration of the long head of the biceps tendon. By highlighting key anatomical, histological, and clinical features of biceps tendonitis, and comparing it to other common shoulder conditions, it emphasizes the importance of precise localization of the pain generator. Technical considerations and challenges, especially in stiff shoulders, are also discussed. The procedure is presented as an effective alternative to surgical intervention in selected patients.

Keywords: Biceps Tendonitis; Fluoroscopy-Guided Injection; Shoulder Pain; Diagnostic Infiltration; Long Head Biceps

Introduction

Shoulder pain is a prevalent musculoskeletal complaint that affects a wide demographic, ranging from athletes to the elderly. Among the various etiologies, biceps tendonitis, particularly involving the long head of the biceps tendon (LHBT), is a frequently overlooked yet significant source of anterior shoulder pain and functional limitation. Timely identification and targeted treatment of this condition are crucial in preventing chronic disability and avoiding unnecessary surgical intervention.

Anatomy and histology of the bicep's tendon

The biceps brachii muscle has two proximal tendinous origins: the short head, which attaches to the coracoid process, and the long head, which originates from the supraglenoid tubercle of the scapula. The long head of the biceps tendon (LHBT) travels intra-articularly through the glenohumeral joint, then passes through the bicipital (intertubercular) groove of the humerus, stabilized by the transverse humeral ligament and the surrounding rotator cuff fibers, especially the subscapularis and supraspinatus. Histologically, the LHBT is composed of dense regular connective tissue with parallel collagen fibers. In cases of tendinopathy, the tendon undergoes mucoid degeneration, collagen disorganization, and neovascularization. Importantly, nociceptive fibers (C and Aδ fibers) are abundant in the tendon sheath and peritendinous tissue-making the region highly sensitive to inflammation and mechanical irritation.

Pain characteristics and clinical relevance

Patients with biceps tendonitis typically report: - Deep, aching pain localized to the anterior shoulder

- Pain aggravated by shoulder flexion, abduction, or resisted supination - Discomfort during overhead activities or lifting objects - Night pain and difficulty sleeping on the affected side These symptoms often overlap with other shoulder pathologies, necessitating accurate differentiation and targeted diagnosis.

Differentiating biceps tendonitis from other shoulder pathologies

Differentiating biceps tendonitis from other causes of shoulder pain is essential: - Rotator Cuff Tendinopathy: Lateral pain, weakness, and positive impingement tests. - Subacromial Bursitis: Diffuse pain on elevation, not focal. - Glenohumeral Osteoarthritis: Global stiffness and joint crepitus. - Adhesive Capsulitis: Marked restriction in passive range of motion, especially external rotation. - AC Joint Pathology: Local tenderness and pain on cross-arm adduction. - SLAP Lesions: Mechanical symptoms like clicking or catching, deep joint pain. In contrast, biceps tendonitis presents with point tenderness over the bicipital groove and positive Speed's and Yergason's tests.

Prevalence and clinical significance

Biceps tendonitis accounts for up to 10% of shoulder pain cases. It is especially common in individuals performing repetitive overhead activities. Without proper management, it may progress to tendon tears, instability, or necessitate surgery.

Diagnostic challenges

MRI and ultrasound may show signs of tendinopathy, but these findings do not always correlate with clinical symptoms. Fluoroscopy-guided injection offers a definitive method to identify the pain generator.

Fluoroscopy-guided infiltration: Technique and value

Under sterile conditions, a C-arm is positioned to visualize the bicipital groove. A spinal or 22G needle is introduced under fluoroscopic guidance. A small amount of contrast confirms positioning, followed by injection of local anesthetic and corticosteroid. Dual role: - Diagnostic: Immediate relief confirms the LHBT as pain generator. - Therapeutic: Reduces inflammation and may delay or avoid surgery.

Technical considerations

In our center, the procedure is performed in the prone position, which provides optimal access to the bicipital groove and allows stable positioning of the arm in slight external rotation. This facilitates accurate needle trajectory under fluoroscopic control. In general, patient positioning varies across practices, with some centers preferring the supine or semi-seated position. However, in our experience, the prone position offers excellent visualization and ergonomic access for intervention.

Why fluoroscopy over ultrasound guidance?

Ultrasound is operator-dependent and less reliable in obese patients or those with distorted anatomy. Probe angulation can mislead positioning, and reproducibility is limited. Fluoroscopy offers: - Clear, reproducible imaging - Use of contrast for accurate localization - Reliable documentation for academic or legal purposes

Avoiding surgery through precision management

In selected patients with isolated LHBT tendinopathy and no mechanical instability, image-guided infiltration often precludes the need for surgical tenotomy or tenodesis. When paired with rehabilitation, over 70% of patients show significant improvement.

Materials and Methods

This descriptive article is based on clinical experience at a tertiary care center specializing in orthopaedic surgery. Patients presenting with anterior shoulder pain and signs of LHBT tendinopathy were evaluated clinically, and those with isolated bicipital groove tenderness underwent fluoroscopy-guided injection. The procedural approach, outcomes, and challenges form the basis of this observational review.

Case Example

A 52-year-old manual laborer presented with chronic anterior shoulder pain unresponsive to NSAIDs. Physical examination revealed tenderness over the bicipital groove and a positive Speed's test. MRI was inconclusive. Fluoroscopy-guided LHBT injection yielded immediate pain relief. At 3-month follow-up, the patient reported full return to function without surgical intervention [1-4].

Conclusion

Fluoroscopy-guided biceps tendon infiltration provides a precise, effective, and minimally invasive approach to the diagnosis and management of anterior shoulder pain. It allows clinicians to confirm the pain source, deliver targeted therapy, and often avoid surgery. Though challenges may exist in patients with limited mobility, fluoroscopic guidance remains the gold standard for accurate, reproducible, and documented intervention-especially in complex or academic settings.

This technique not only guides diagnosis but reinforces the clinical decision-making process-providing a bridge between symptom resolution and the avoidance of unnecessary surgical procedures.

Conflict of Interest

The author declares no conflict of interest related to the content of this article.

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