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Original research article

Role of Sonography in Tendoachilles Pain and Classification of its Pathologies

[1] Dr. Jayesh Shah, [2] Dr Sudhir Paija, [3]Dr. Nirmala Chudasama, [4*]Dr. Dushyant Makwana.

[1]Associate Professor, Department of Radiodiagnosis, CU Shah and Medical College, Surendranagar. Gujarat
[2] Senior Resident, Department of Radiodiagnosis, CU Shah and Medical College, Surendranagar. Gujarat
[3] Professor and HOD, Department of Radiodiagnosis, CU Shah and Medical College, Surendranagar. Gujarat
[4]1st year Resident, Department of Radiodiagnosis, CU Shah and Medical College, Surendranagar. Gujarat

Corresponding author: Dr. Dushyant Makwana

Email : drdushyantmakwana@gmail.com

Abstract
Today the Achilles tendinopathies can be diagnosed early by means of sonography, which is non invasive, easy to perform, practically ubiquitous, economic, precise, repeatable, specific and sensitive. The aim of the present study was to evaluate sonographic findings in the painful Achilles tendon.The present hospital based prospective observational study was performed at CU Shah and Medical College, Surendranagar. 50 patients from March-2022 to July- 2022 were studied for pain in lower leg region. This study shows the lesions in the Achilles tendon and the peritendinous structures noted on clinical examination of the patients reviewed were better characterized with the use of ultrasound(Phillips Affinity 70G).Assessment of painful condition in the Achilles tendon patients with radiographic finding features in ultrasonography and classification of various pathology will help in further management. Ultrasound imaging has proven to be an important tool that can help in localizing more precisely the source of symptoms in the hind foot and posterior ankle.
Key words: Tendoachilles, Sonography , Pathologies

Introduction

Tendons are connective tissues that transmit the force produced by muscle to bone and also prevent muscle damage by acting as shock absorbers. The Achilles tendon is the single largest, thickest and strongest tendon in the human body that transmit the force of powerful calf muscles to foot facilitating walking and running [1]. Achilles tendon disorders are among the more frequent maladies encountered in sports medicine. They are not only common but has shown enormous rise in incidence over the past three decades. They are commonly associated with overuse injuries and can affect quality of movement leading to thickening, vascularisation and hypoechogenicity of the diseased tendon [2]. The various types of overuse tendon injuries include tendinopathies, peritendinitis and tendon rupture. Increased tendon thickness is the most commonly mentioned indicator of tendinopathies [1]. Ultrasound performed with high-resolution linear-array probes has become increasingly important in the assessment of ligaments and tendons around the ankle because it is low cost, fast, readily available, and free

of ionizing radiation [3]. US can provide a detailed depiction of normal anatomic structures and is effective for evaluating ligament integrity. In addition, US allows the performance of dynamic maneuvers, which may contribute to increased visibility of normal ligaments and improved detection of tears. It can facilitate accurate identification, localization and differentiation between synovial, tendinous and entheseal inflammation as well as joint, bursal and soft tissue fluid collection [2,3]. The Achilles tendon is the strongest tendon in the human body and tendon forces equaling 12 times the body weight have been recorded.US is a non-invasive and harmless method to examine the human body. The method was invented at the beginning of the last century.This development has made the US technique sensitive and usable for different diagnostic procedures, i.e. it is now possible to examine muscle fibers, tendons, and even ligaments, with good reliability.

Aims & Objectives

Assessment of painful condition in the Achilles tendon patients with radiographic finding features in ultrasonography and classification of various pathology which will help in further management. Grey-scale US was performed and the thickness and the structure of the tendons were evaluated.

Material and Methods

In this hospital based prospective observational study 50 Achilles tendons in patients with a long duration of pain symptoms from the mid-portion of the Achilles tendon were included in the investigation at CU Shah and Medical College, Surendranagar. 50 patients from March-2022 to July- 2022 were studied. All the 50 patients in the sample were referred from the Orthopedic OPD and wards for US. Patients were subjected to US of Tendo-achilles using Phillips affinity 70G were reviewed. The patients were explained about the study in their language.Grey-scale US and color doppler was performed and the thickness and the structure of the tendons were evaluated.

Results

In this study it was found Enthesopathy 4(8%) in patients, tendinopathy 24(48%) in patients, paratendinopathy in patients 3(6%), bursitis 6(12%) in patients and tendon tear(partial/complete) in (11)(22%) patients. The results confirm that sonography is a rapid, safe and accurate means of verifying the extension and location of tendinous lesions, as well as the severity of intratendinous degeneration. During the acute phase of inflammatory achilles tendinopathy, sonography reveals early peritendinous alterations; in chronic forms with intratendinous degeneration, it shows the loss of the normal anatomy of the tendon, which increases in volume, takes on a spindle-like and rounded appearance, and loses its normal oval shape in transversal sections. Sonography also consents to follow the evolution of tendinopathies during treatment, allowing the therapy to be modified in the absence of improvement and providing instrumental confirmation of treatment.

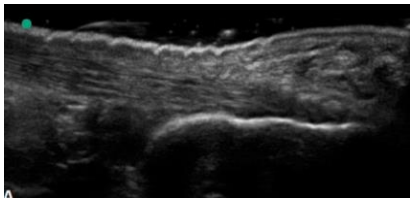
Table 1: Ultrasound findings for Achilles tendon pathologies.

Pathology	Findings on USG
Enthesopathy	Decreased echogenicity of the enthesis Increased dimensions of the enthesis Structural lesions (such as enthesophytes) Erosions Increased vascularity seen on color power Doppler
Tendinopathy	Echogenicity may be decreased

	Tendon dimensions may be increased from secondary hypertrophy Neovascularization seen on color power Doppler Structural lesions(such as calcifications)
Paratendinopathy	Thickened paratendon Neovascularization on color power Doppler Increased echogenicity of pre-Achilles fat pad
Bursitis	Anechoic structure Hyperechoic lining
Tendon tear	Margined defect within the tendon itself Fluid may be visualized separating the torn margins of the tendon fibers, which may exhibit edge artifact

Table 2 : Distribution of Tendon abnormalities

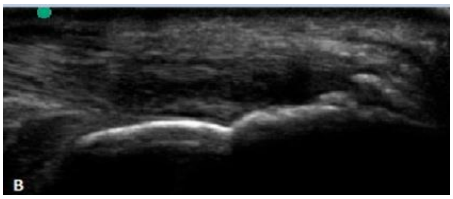
Abnormality	**No. of Abnormalities** (50)
Enthesopathy	04
Tendinopathy	24
Paratendinopathy	03
Bursitis	06
Tendon tear	11
None	02



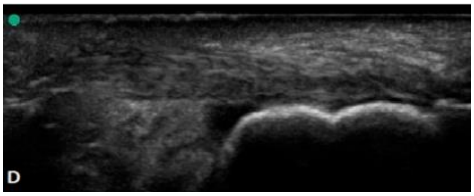
Normal Tendo-Achilles

Bulky Tendoachilles

Calcified foci in partially ruptured tendoachilles.

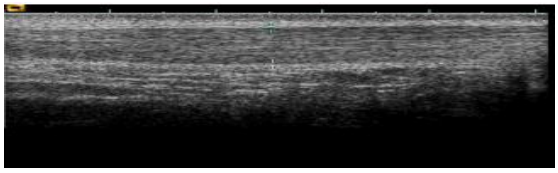


Insertional Achilles calcific tendonopathy.

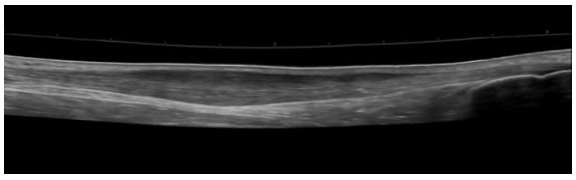


Retrocalcaneal Bursitis.

Figures : USG findings of Tendon abnormalities



Normal Tendo-Achilles(mid portion)



Mid portion Achilles Tendinosis

Enthesopathy of Achilles

Achilles Tendinitis

Discussion

Ultrasonography is commonly employed to examine tendon disorders, being readily available, quick, safe and inexpensive. It has been reported by Jacobson (2009) [4] that it has high significance in assessing soft tissue lesions . Despite the improvement in CT and MRI , US proved to be ideal in this entity . The Achilles tendon is the strongest, largest and thickest tendon in the body, but all literature agreed that it is the most commonly injured ankle tendon. Most of the Achilles tendon sport injuries occur in males, mainly due to higher male participation in males. In agreement with Kvist (1994) [5] who reported that males are more affected when it comes to ankle injuries. The spectrum of Achilles tendinopathy varies between tendinosis, tendinitis, peritendinitis, and partial or complete tendon tears. MSK US plays a vital role in differentiating these underlying causes from each other. In our study, US succeeded to classify Achilles injuries similar to MRI regarding tendinosis, partial tear, and complete tear as well as insertional and peritendinious paythology Similarly, Liffen [6] and Margetic et al., [7] reported that ultrasound has been used as a first-line approach for assessing Achilles tendon disorders and stated that it has 100% sensitive in detecting Achilles tendon injuries in 26 cases.

In our study it was found Enthesopathy 4(8%) in patients, tendinopathy 24(48%) in patients, paratendinopathy in patients 3(6%), bursitis 6(12%) in patients and tendon tear(partial/complete) in (11)(22%) patients. The results confirm that sonography is a rapid, safe and accurate means of verifying the extension and location of tendinous lesions, as well as the severity of intratendinous degeneration.

Sonography is being increasingly used to study diseases of the musculoskeletal apparatus, particularly those affecting the tendons, because it is a rapid, safe and accurate means of verifying the extent and localisation of tendinous lesions, and evaluating their severity [8]. The well known disadvantages of sonography include its operator dependence and the fact that it is less clear than magnetic resonance imaging [9], although it is certainly cheaper and faster to perform than the latter.

In the acute phases of inflammatory Achilles tendinopathies, sonography reveals early peritendinous alterations. In chronic forms with intratendinous degeneration, the tendon loses its normal anatomic shape: its volume increases, and it takes on a rounded spindle-like appearance, with the loss of the normal oval shape in transversal sections. The sonographic picture exactly corresponds to the clinical picture. In chronic forms, sonography during dynamic testing reveals that the peritendinous adherences impeding the sliding of the tendon over surrounding tissue, causes poorly defined tendinous borders, increased tendinous volume, and the presence of a dishomogeneous echo-structure with hypoechoic intratendinous areas, calcifications and microcalcifications. A clinical evaluation is not capable of revealing the majority of these alterations, and it is above all in such cases that sonography provides further diagnostic and prognostic data. It is therefore clear that sonography accurately reveals pathological-anatomical damage and therefore allows an equally precise diagnosis. This considerably aids the clinical diagnosis and consequent therapy, as well as the formulation of a more precise prognosis even though aetiology, pathogenesis and natural history of Achilles tendinopathies are still largely unknown [10].

Sonography proved to be an indispensable clinical aid in diagnosing Achilles tendinopathies not only in terms of diagnostic confirmation, but also by allowing a correct differential diagnosis between pertendinitis and tendinosis, and an evaluation of the extent and severity of

the disease. Sonography also permits precocius diagnosis, every patient affected by achillodynia should undergo an early sonographic examination. If this shows the absence of pathological-anatomical alterations, it should be repeated at periodic intervals in order to reveal any change in the echogenicity of the tendon as an index of worsening regardless of clinical findings. Finally, but not least in terms of importance, sonography also consent to follow the evolution of tendinopathies during treatment allowing the therapy to be modified in the absence of improvement and providing instrumental confirmation of cure.

Conclusion

Ultrasound imaging has proven to be an important tool that can help in localizing more precisely the source of symptoms in the hindfoot and posterior ankle. Pain and/or swelling in this region has a broad differential, focused largely on the Achilles tendon or its adjacent structures. With US, it is possible to visualize these areas. With regard to the enthesis organ, US can further help identify substructures and determine the extent of their involvement. This may help further characterize and classify individuals with enthesopathies. Use of color Doppler may help further identify features more consistent with inflammatory conditions, including enthesitis.

References

1. KHARATE P. and CHANCE LARSEN K.: Ultrasound evaluation of Achilles tendon thickness in asymptomatics: A reliability study. International Journal of Physiotherapy and Rehabilitation, 2. pp. 111, 2012.
2. BASHAEB M.O., MUTALA T.M. and MURIITHI I.M.: Pattern of ultrasonographic findings of disorders of the ankle joint complex in patients presenting with ankle pain at the Department of Diagnostic Imaging, University of Nairobi. Pan African Medical Journal, 17-31, 2018.
3. LUCA S.M., DAVIDE O., FRANCESCA L., GIOVANNI S. and ENZO S.: Dynamic high-resolution US of ankle and midfoot ligaments: Normal anatomic structure and imaging technique. Radio Graphics, 35: 164-78, 2015.
4. JACOBSON J.: Musculoskeletal ultrasound: Focused impact on MRI. A.J.R., 193: 619-27, 2009.
5. BERQUIST T.H.: Radiology of foot and ankle, 2nd ed Philadelphia, London: Lippincott Williams & Wilkins C., pp. 264-9, 2000.
6. LIFFEN N.: Achilles tendon diagnostic ultrasound examination: A locally designed protocol and audit. Int. Musculoskelet. Med., 36 (1): 1-12, 2014.
7. MARGETIC P., SALAJ M. and LUBINA I.Z.: The value of ultrasound in acute ankle injury: Comparison with MR. Eur. J. Trauma Emerg. Surg., 35 (2): 141-6, 2009.
8. Peers KH, Brys PPM, Lysens RJJ (2003) Correlation between power Doppler ultrasonography and clinical severity in Achilles tendinopathy. Int Orthop 27(3):180–183
9. Khan KM, Foster BB, Robinson J, Cheong Y, Louis L, Maclean L, Tauton JE (2003) Are ultrasound and magnetic resonance imaging of value in assessement of Achilles tendon disorders? Br J Sports Med 37(2):149–153
10. Paavola M, Kannus P, Jarvinen T, Khan K, Josza L, Jarvinen M (2002) Achilles tendinopathy. J Bone Joint Surg Am 84:2062–2076