Continuing Medical Education

Diagnostic and Therapeutic Management of Heel Pain Via Ultrasound-Guided Injection

This modality is both precise and cost-effective.

Objectives

After reading this continuing education article, the podiatric physician will:

1) Recognize ultrasound images of medial, central and lateral plantar fascia bands.

2) Identify ultrasound images of normal anatomic medial, central and lateral plantar fascia bands.

3) Identify abnormal anatomic ultrasound images of medial, central and lateral plantar fascia bands.

4) Identify painful areas of plantar fascia using ultrasound imaging techniques.

5) Explain how to guide diagnostic and therapeutic injection of painful plantar fascia using ultrasound imaging techniques.

6) Define ultrasound terminology: hypoechoic, hyperechoic.

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*Following this article, an answer sheet and full set of instructions are provided (p. 170).—**Editor***

By Praveen K. Vohra, DPM & Christopher J. Japour, DPM, MS

Musculoskeletal ultrasound is a relatively new modality for podiatrists to aid in the diagnosis and treatment of injury and/or diseases of the foot and ankle. Advances in technology have allowed for the availability of musculoskeletal ultrasound units that are diagnostically cost-effective and appropriate for office practice. In light of evidenced-based medicine becoming more important, the diagnostic and therapeutic use of musculoskeletal ultrasound is becoming a quintessential component of many podiatric practices today.

Indications for the use of muscu-

Continued on page 164

Continuing Medical Education

Ultrasound...

loskeletal ultrasound of the foot and ankle include identifying and treating almost any soft tissue pathology of the foot and ankle including: plantar fasciitis, skin and soft tissue lesions, foreign bodies, blood vessels and nerves, as well as tendon and ligament pathology.

Historically, the first recorded interest in ultrasound occurred in 1793, when Lazzaro Spallanzini observed the functioning of bats in complete darkness. Spallanzini theorized that bats were listening to something because even if blinded they could function effectively. Not until 1938 was his question answered when G. W. Pierce invented a sonic detector that could pick up very high frequency vibrations of bats and convert them into sound. The medical applications of ultrasound on biological organisms were initially discussed by experimenters Robert Wood and Alfred Loomis. They noted the effects of high doses of ultrasound on the body were as injurious as radiation. However, in lower doses, it was noted to be a therapeutic agent.

From 1947 to 1949, George Ludwig, a surgeon working at the Naval Research Institute, collaborated with his colleagues at Massachusetts Institute of Technology and successfully used ultrasound to detect gall stones. The 1950's and 1960's were to become important years for the further development and refinement of ultrasound imaging, both in the United States and Japan. In the 1980's Francis Fry, with his co-worker Elizabeth Kelly, developed a computer-based, low-intensity ultrasound instrument

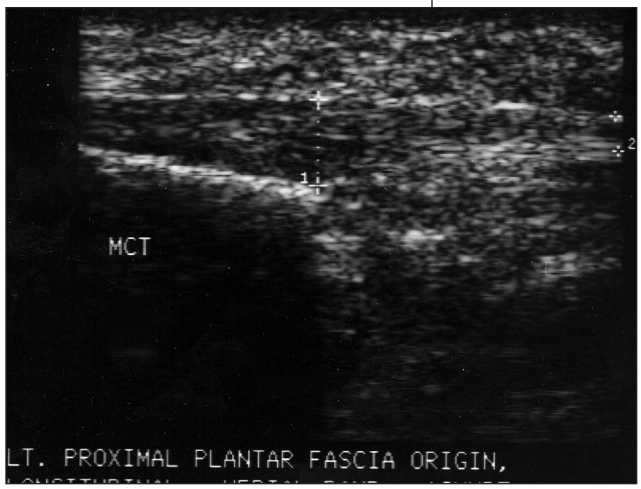

Figure 1A: Normal, asymptomatic, medial band of plantar fascia shows fine blackened parallel echogenic lines with slight variation in thickness or echogenicity: proximal plantar fascia (labeled "1") and distal plantar fascia (labeled "2"). Subcutaneous tissue represented by white stippling above (plantar) the medial band. Acoustic shadowing of the medial calcaneal tubercle blackened labeled as "MCT".

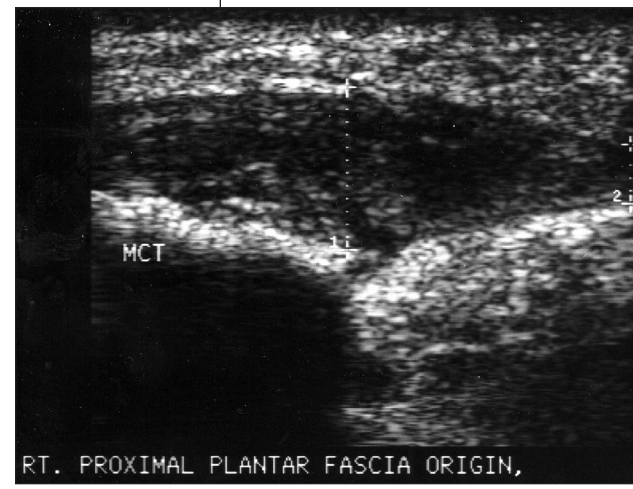

Figure 1B: Symptomatic plantar fascia shows black thickened space (labeled "1") with decreased echogenicity. Distal plantar fascia, less thickened and less symptomatic (labeled "2"). Subcutaneous tissue represented by white stippling above (plantar) the medial band. Acoustic shadowing of the medial calcaneal tubercle blackened labeled as "MCT".

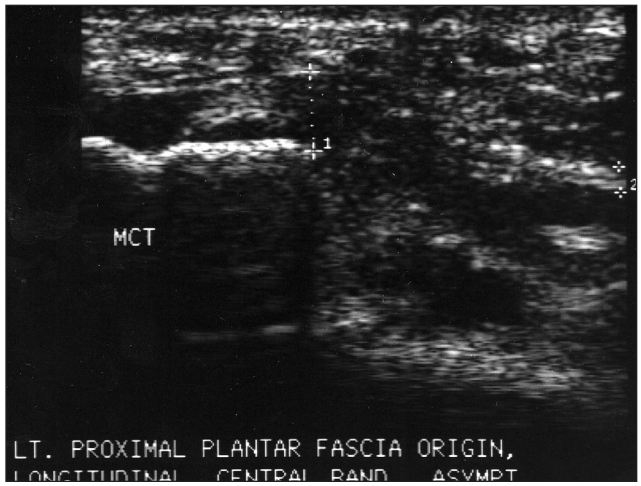

Figure 1C: Asymptomatic central band of plantar fascia shows black less thickened space (labeled "1") at the lateral aspect of the medial calcaneal tubercle with decreased echogenicity. Distal plantar fascia, less thickened and less symptomatic (labeled "2"). Subcutaneous tissue represented by white stippling above (plantar) to the central band. Acoustic shadowing of the medial calcaneal tubercle is blackened labeled as "MCT".

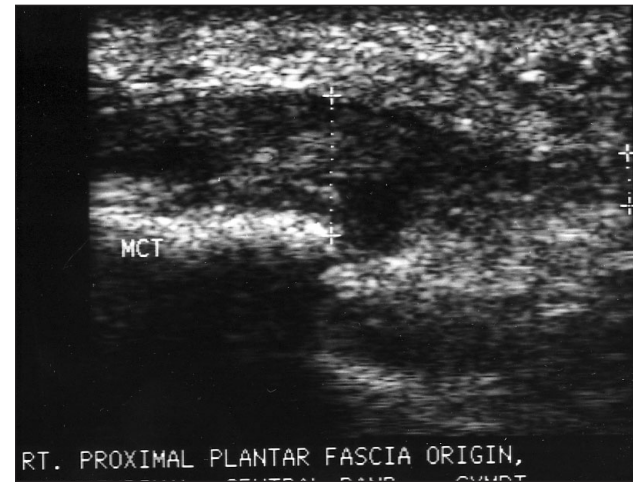

Figure 1D: Symptomatic central band of plantar fascia shows black thickened space (labeled "1") at the lateral aspect of the medial calcaneal tubercle with decreased echogenicity. Distal plantar fascia, less thickened and less symptomatic (labeled "2"). Subcutaneous tissue represented by white stippling above (plantar) to the central band. Acoustic shadowing of the medial calcaneal tubercle is blackened labeled as "MCT".

for visualization of soft tissue that was used for detecting breast cancer.

The foot receives a tremendous amount of stress in the form of either microtrauma, daily wear and tear, or overt gross trauma such as sprains, strains or tears. Like other parts of our body, these excessive amounts of stress cause pain and swelling. The resulting trauma and inflammation then causes edema which presents as a collection of fluid to the affected area. Trauma and associated inflammation is the predominant pathological condition that affects ligaments and tendons. Athletic activity commonly predisposes tendons to rupture from abrupt starts and stops. Chronic repetitive motion from the home gym and tread mills commonly predisposes the foot and ankle to trauma and inflammation. Metabolic factors that predispose the tendon to rupture include: aging, presence of calcifications, general or local steroid therapy and metabolic conditions such as rheumatoid arthritis, SLE, Diabetes, gout, syphilis, and arthritis.

For the foot and ankle, some of the more frequent applications of musculoskeletal ultrasound for the foot and ankle are to detect:[1] plantar fascia for inflammation and or tears;[2] Achilles tendon tears or tendonitis;[3] pedal ligament ruptures or sprains;[3] capsulitis[4] painful neuromas and[5] foreign bodies and fractures. Because partial ruptures are more difficult to diagnose and treat by the physical exam, the musculoskletal ultrasound has become a valuable instrument in visualizing partial tears and directing the proper course of therapy to prevent a complete rupture. Partial tears or complete ruptures when scanned by diagnostic musculoskeletal ultrasound will appear darker because they are passing through a more fluid-filled area of trauma.

Ultrasound has become a valuable instrument in visualizing partial tears.

Identification of soft-tissue masses is yet another capability of diagnostic musculoskeletal ultrasound. A solid lesion will be hyperechoic or have reflections inside it. Fluid-filled masses, on the other hand, will have no reflections within and be hypoechoic. In a similar fashion, ligaments, which are mostly solid tissue by nature, will be hyperechoic, as will blood vessel walls.

Conversely, The lumens of blood vessels will be hypoechoic. Nerves on longitudinal and transverse sections will be hyperechoic. Foreign bodies, usually solid structures, will usually scan as hyperechoic bodies with surrounding areas of inflamed tissue that appear hypoechoic.

Given the ability of ultrasound to directly examine foot pathology and to interact with the patient's feedback of pain, treatment with injections and aspirations can be a more exact science. For non-foot pathology, musculoskeletal ultrasound is routinely used to examine knees, hips, spine, and wrists. Common diagnoses established from an examination might include carpal tunnel syndrome, rotator cuff injury, as well as tendon and ligament injury of the hips and knees.

Heel Pain

Heel pain is a routine diagnosis presenting to many podiatric offices and clinics. The authors have found musculoskeletal ultrasound to be a valuable instrument to successfully diagnose and treat plantar fasciitis. The syndrome of plantar fasciitis has been referred to as heel spur syndrome, medial arch sprain, calcaneal periostitis and calcaneodynia. Plantar fasciitis is a clinical syndrome with

Continued on page 166

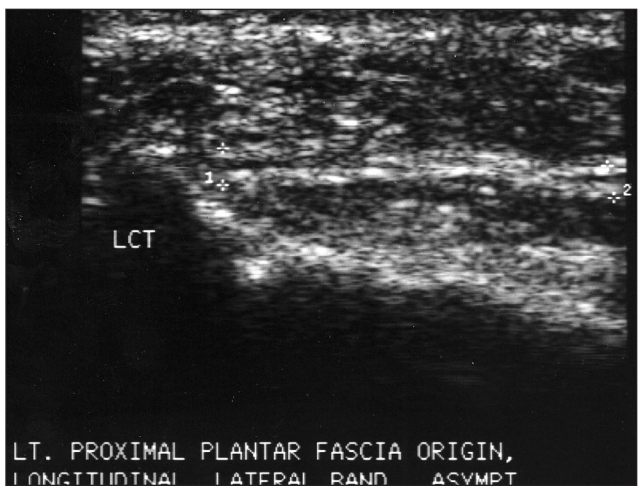

Figure 1E: Asymptomatic lateral band of plantar fascia shows black less thickened space (labeled "1") at the lateral calcaneal tubercle with decreased echogenicity. Distal plantar fascia, less thickened and less symptomatic (labeled "2"). Subcutaneous tissue represented by white stippling above (plantar) to the central band. Acoustic shadowing of the lateral calcaneal tubercle is blackened labeled as "LCT".

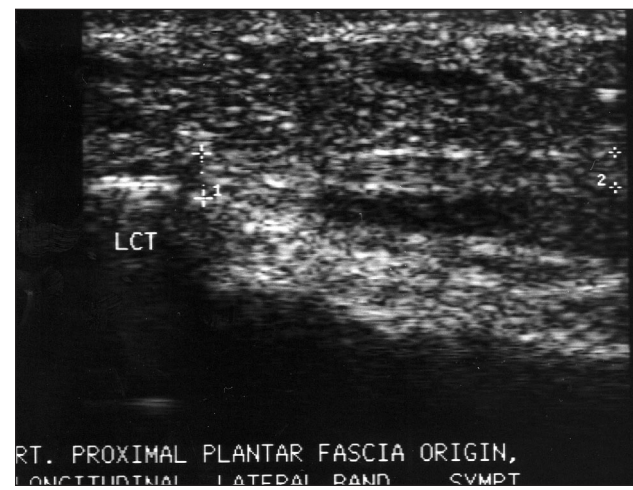

Figure 1F: Symptomatic lateral band of plantar fascia shows black thickened space (labeled "1") at the lateral calcaneal tubercle with decreased echogenicity. Distal plantar fascia, less thickened and less symptomatic (labeled "2"). Subcutaneous tissue represented by white stippling above (plantar) to the central band. Acoustic shadowing of the lateral calcaneal tubercle is blackened labeled as "LCT".

Ultrasound...

common unilateral tenderness at the attachment of the plantar-fascia to the medial calcaneal tubercle.

Occasionally patients may have radiating pain to the medial malleolus, and when this occurs there may be involvement of the medial calcaneal nerve. Most patients have exquisite morning pain when they get out of bed and take their initial steps or when they stand after getting out of a chair. The pain is often severe enough to alter gait and the patient will often stop walking or hold the foot in an inverted or supinated position to alleviate the pain. For both groups, the pain gradually decreases to a reasonably tolerable level after a few minutes of walking.

Plantar fasciitis on physical examination demonstrates tenderness upon palpation at the insertion of the plantar fascia into the calcaneal tubercles or along the medial, central or lateral bands of the plantar fascia. There may also be soft tissue swelling along the medial arch or a palpable nodule within the plantar fascia. The palpable nodule in the band of the plantar fascia usually represents an old tear and can be reasonably differentiated from other soft tissue tumors or foreign bodies by using diagnostic ultrasound. Additionally, using musculoskletal ultrasound, plantar fasciitis can be differentiated from tarsal tunnel syndrome and heel fat pad atrophy pain, otherwise known as achillodynia. The aforementioned are syndromes that occur in the same general location of the heel.

Performing an initial ultrasound study could avoid the need for other costly diagnostic exams.

Figure 2: Longitudinal placement of the ultrasound transducer on the plantar surface of the foot. Notice that the ultrasound transducer is parallel to the long axis of the foot.

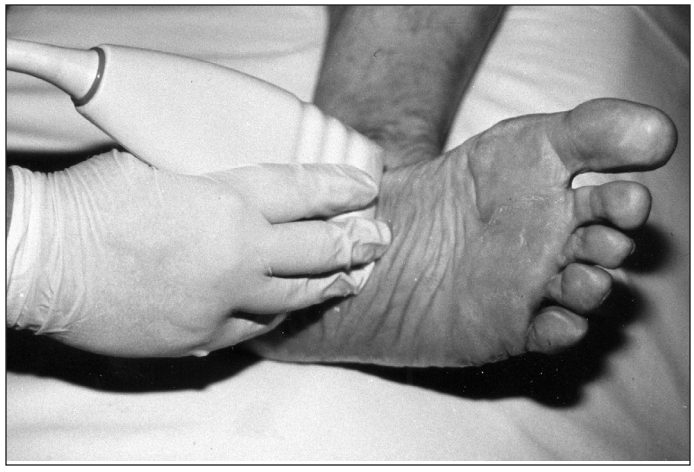

Figure 3: Transverse placement of the ultrasound transducer on the plantar surface of the foot plantar to the medial and lateral calcaneal tubercles. Notice that the ultrasound transducer is perpendicular to the long axis of the foot.

The cause of plantar fascia pain can be biomechanical in nature caused by microtears of either the periostium or microtears of the plantar fascia from repetitive trauma. There has been association between plantar fasciitis and obese woman, male runners, and occupations that require long periods of standing. Flat feet can be a predisposing cause of plantar fasciitis as the weakened ligamentous supports of the feet cause increased stress to the plantar fascia, resulting in overuse and tears of the plantar fascia.

In a similar manner, high-arched feet are less able to absorb the ground reactive forces, stressing the plantar fascia. The inflammation at the heel area, visualized on ultrasound examination as a thickened band of plantar fascia, represents the body's attempt to repair its damaged tissue (Figures 1A,1B,1C,1D,1E,1F). Keep in mind that there are patients with metabolic causes of plantar fasciitis/heel pain, such as those with the seronegative arthridities. These patients can present with bilateral symptoms as well as have other constitutional symptoms.

Many non-surgical treatments during the natural course of plantar fasciitis have been advocated; they include: stretching exercises, ice, foot strappings/paddings; orthotic devices; non-steroid anti-inflammatory medications; iontophoresis, and phonophoresis. For the severe debilitating cases injection therapy and cast immobilization are often recommended. With recalcitrant heel pain, musculoskletal ultrasonography becomes helpful because it enables the physician to directly observe on a monitor plantar pedal soft tissue anatomy, and to formulate both a diagnosis and treatment plan.[1-4]

Performing an initial ultrasound study could avoid the need for other costly diagnostic exams. Compared to MRI and CAT scans, musculoskletal ultrasound is cost-effective and does not use high fields of magnetic energy or radiation. For the claustrophobic patient it could be the diagnostic modality of choice. X-ray, MRI, and CAT scans do not allow for motion studies while ultrasound does. When used properly musculoskeletal ultrasound can establish the exact location and dimensions of a pathology such as a tendon or ligament tear, neuroma or foreign body.

Continued on page 167

Ultrasound...

In addition, because of the interactive nature of musculoskeletal ultrasound the soft tissue pathology can be visualized at multiple tissue planes so that artifact can be eliminated. The MRI and CT scans, on the other hand, are dependent on the one-time position of the foot for each plane scanned, so that if the foot is not in the best possible position, the soft tissue pathology may be poorly visualized or completely missed. Of course, there are drawbacks to musculoskeletal ultrasound. The major disadvantage is that it is operator and machine-dependent. For the novice musculoskeletal ultrasound operator, there is a learning curve to consider. From the machine standpoint, a low-resolution transducer may produce a false reading. Similarly, if a high-resolution transducer is used and the wrong anatomical region is scanned, a false negative can occur because of the small focal area of the transducer.

Because there is direct patient interaction with musculoskeletal ultrasound, establishing a diagnosis and treatment can be done as with ankle arthroscopy and the EPF procedures. Ultrasonography, with its digital imaging processing and linear array high-frequency transducers, not only allows the examiner to visualize plantar fascia band thickness, but can also guide injection therapy for treatment of plantar fasciitis. Additionally, this modality can be used in the treatment of other adjacent anatomical soft tissue structures. When a given band of plantar fascia is palpated, the patient can directly verbalize to the examiner the absence or presence of pain while the patient's plantar fascia is visualized on the ultrasound monitor.

Ultrasound has previously been used to measure the thickness of the plantar fascia in patients with painful heels, with researchers focusing upon the medial band's contribution to the patients' symptoms.[5-7] Studies of the effectiveness of conservative modalities such as padding, strapping, injections, foot orthotic devices for the treatment of heel pain show that between 65% to 95% of patients obtain relief with time from a variety of conservative therapies.[8]

Ultrasonography allows for the exact placement and continuous monitoring of the needle.

Traditionally, the generalized area of plantar fascia discomfort is palpated, before injection, without knowing exactly the location of the pathology. This is of clinical concern because the potentially affected area receiving the injection could be partially or entirely missed because it is not visualized. Ultrasonography allows for the exact placement and continuous monitoring of the needle because the pedal anatomy is visualized. Hence, the diagnosis and treatment of plantar fasciitis becomes effective because the needle is placed at the appropriate site. Ultrasound facilitates visualization of asymptomatic and symptomatic plantar fascia, helping to establish a diagnosis of plantar fasciitis.[9-11] Results of previous ultrasound studies demonstrate the average thickness of symptomatic plantar fascia to be 5.6 millimeters[6,7] and 3.6 millimeters for asymptomatic plantar fascia.[6] An anatomic study of 200 fresh frozen cadaver specimens showed a mean thickness of the medial, central and lateral bands of the plantar fascia measured and were reported to be respectively 4.5 mm., 1.6 mm., and 2.5 mm.[12]

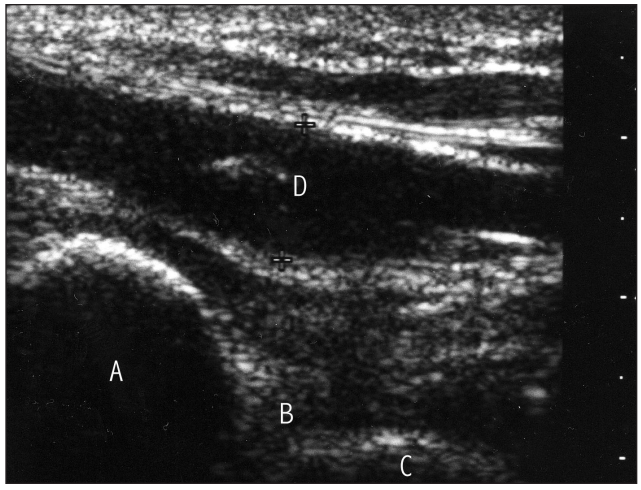

Figure 4: Transverse ultrasound imaging plane of the calcaneus. Region marked "A" is the medial calcaneal tubercle. Region marked "B" is the calcaneal sulcus. Region marked "C" is the lateral calcaneal tubercle. Region marked "D" is a band of plantar fascia.

Ultrasound Imaging Principles

Ultrasonographic imaging is based on the recorded echo of transmitted sound waves from a given object, e.g., tendon, bone, parenchyma, or foreign material. The sound wave is then reflected back to a transducer. The echoes that create the image arise from acoustic impedance mismatches at the interface between objects. When the sound waves encounter an object of high mass density (e.g., bone), a high acoustic impedance mismatch is produced.[5] Objects will appear hyperechoic or brighter on the ultrasound. An object with lower mass density (e.g., air, blood, abscess, inflammation) will produce a low acoustic impedance mismatch. Such an object will appear hypoechoic or black on the ultrasound image.

For example, the acoustic impedance of bone is 7.80 x 106, whereas that of air is 4.0 x 102. Objects that produce a high acoustic impedance mismatch typically have a signal void beyond the object, called an acoustic shadow. An acoustic shadow is caused by highly attenuating structures, where a gross acoustic mismatch is created at the interface of the object. The object interferes with the transmission of sound energy and leaves an acoustic void.[13-15]

Plantar fasciitis or tendonitis denotes a local vascular proliferation, edema and increased tendon vol-

Continued on page 168

Ultrasound...

ume. Musculoskeletal ultrasound in acute plantar fasciitis or tendonitis demonstrate a decreased echogenicity, hypoechoic, with blurred anatomy.

Musculoskeletal Ultrasound Techniques For The Foot

Patients are positioned with their feet placed at the edge of the examination table. The medial, central, and lateral aspect of the heel at the insertion of the plantar fascia were palpated to determine the location of the medial, central, and lateral bands of the plantar fascia. Acoustic gel is applied to cover the head of the transducer. The transducer is then placed on the plantar surface of the foot and the focus is adjusted to the depth of the plantar fascia at its attachment to the calcaneus. Ultrasound scanning during dynamic dorsiflexion of the toes is performed to stretch the plantar fascia, allowing its margins to be delineated. Images are then recorded on both VHS video and emulsion film using a multi-image camera. Longitudinal placement of the transducer head on the plantar aspect of the foot (Figure 2) allows for lateral view of the plantar fascia. Transverse placement of the ultrasound transducer (Figure 3) is also obtained to assist/confirm the location of the plantar fascia medial, central and lateral bands (Figure 4).

Once the inflamed thickened band(s) are isolated the injection is administered at the symptomatic area. The plantar fascia injection consists of lidocaine plain(2%), 1cc; Marcaine plain (0.5%),1cc; and Dexamethasone 4mg./ml.,0.25cc. An Unna boot is then applied to the foot and the patient is asked to remove it after 5 to 7 days. Patient response to this treatment is positive with reduction in pain.

Summary

Ultrasound evaluation of the plantar fascia followed by guided injection should be used when plantar fascia symptoms persist or when clinical presentation is atypical.[4,16-18]

By knowing the location of the symptomatic plantar fascia band, the practitioner will be better able to guide injections and manage therapy. The non invasive nature of musculoskeletal ultrasound also makes it ideal for follow-up studies. These follow-up musculoskeletal ultrasound exams can monitor the healing of a tendon or ligament after a given treatment or therapy. It can also be used to evaluate the progression of a lesion. In the case of plantar fasciitis or tendonitis it could be used to evaluate the effectiveness of anti inflammatory treatments because there is usually a related decrease in the thickness or volume of the associated structure.

There are many ultrasound devices on the market today. Therefore, it is important to select an ultrasound device that provides ample resolution to allow visualization of intra substance tears of tendon, ligament or fascia that could easily be missed with devices that have lower resolution. In selecting a machine to provide ample resolution one must consider not only the frequency (MHz) of the transducer but also the number of processing channels and the programming sophistication. ■

Acknowledgements

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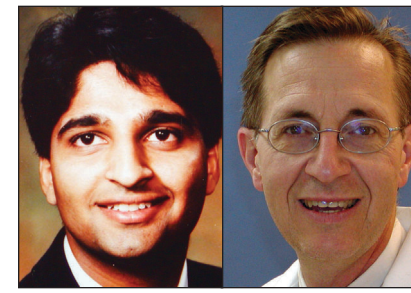

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EXAMINATION

Continuing Medical Education

See answer sheet on page 171.

1) Ultrasound imaging uses _____ to create an image.
- A) radio waves
- B) microwaves
- C) sound waves
- D) water waves

2) Acoustic impedance or _____ mismatches received by the transducer are analyzed by the computer's microprocessor and produce images on the screen.
- A) electrical
- B) light
- C) sound
- D) all of the above

3) Dense anatomical material such as _____ will produce a _____ acoustic mismatch.
- A) bone, low
- B) bone, high
- C) abcess, high
- D) abcess, low

4) Low density anatomical material such as _____ will produce a _____ acoustic mismatch.
- A) bone, low
- B) bone, high
- C) blood, high
- D) blood, low

5) Hypoechoic images have a _____ impedance (acoustic mismatch) and appear _____
- A) low, dark
- B) low, bright
- C) high, dark
- D) high, bright

6) Hyperechoic images have a _____ impedance (acoustic mismatch) and appear _____
- A) low, dark
- B) low, bright
- C) high, dark
- D) high, bright

7) A signal _____ behind an object of _____ density produces an acoustic shadow.
- A) void, low
- B) void, high
- C) echo, low
- D) echo, high

8) Selection of the proper ultrasound machine is very important: to provide ample resolution one must consider:
- A) The frequency of the transducer
- B) The number of processing channels of the ultrasound device
- C) The programming sophistication of the ultrasound device
- D) All of the above

9) Selecting the appropriate ultrasound device to be used is an important consideration for assuring ample resolution. Ample resolution is a must allowing clear detection of:
- A) plantar fascia
- B) bone
- C) intra substance tears of tendon, ligament, fascia
- D) a and b

10) Symptomatic plantar fascia usually appears _____ on the screen.
- A) thickened and hypoechoic
- B) thickened and hyperechoic
- C) thin and hypoechoic
- D) thin and hyperechoic

11) To locate the bands of the plantar fascia the transducer should be positioned _____ along the plantar aspect of the foot:
- A) transverse only
- B) longitudinally only
- C) obliquely only
- D) a and b

12) Dorsiflexion of the toes during ultrasound evaluation of the plantar fascia is important :
- A) to delineate the plantar fascia
- B) to prevent foot cramping during the exam
- C) to identify the calcaneus
- D) a and b

13) The best approach to simultaneously image both the medial calcaneal tubercle and lateral plantar calcaneal tubercle is:
- A) placement of the ultrasound transducer longitudinally
- B) placement of the ultrasound transducer transversely
- C) placement of the ultrasound transducer obliquely
- D) all of the above

14) At the medial aspect of the medial calcaneal tubercle, one can expect to find:
- A) medial plantar fascia band
- B) central plantar fascia band
- C) lateral plantar fascia band
- D) a and c

15) At the lateral aspect of the medial calcaneal tubercle, one can expect to find:
- A) medial plantar fascia band

Continued on page 170

Continuing Medical Education

EXAMINATION

(cont'd)

B) central plantar fascia band
C) lateral plantar fascia band
D) a and c

16) At the lateral calcaneal tubercle, one can expect to find:
A) medial plantar fascia band
B) central plantar fascia band
C) lateral plantar fascia band
D) a and c

17) The important osseous anatomic "land mark" transversely viewed on ultrasound and located between the medial calcaneal tubercle and the lateral calcaneal tubercle is the:
A) anterior process of the calcaneus
B) posterior calcaneal facet
C) calcaneal sulcus
D) os trigonum

18) Ultrasonography allows for the exact placement and continuous monitoring of the needle for plantar fasciitis. How will the needle appear on the screen?
A) hypo-echoic and dark
B) hyper-echoic and bright
C) hypo-echoic and bright
D) hyper-echoic and dark

19) Ultrasonic evaluation of symptomatic plantar fascia confirms the diagnosis of plantar fasciitis. The average reported thickness of symptomatic plantar fascia is :
A) 3.6 millimeters
B) 5.6 millimeters
C) 7.6 millimeters
D) 9.6 millimeters

20) The average reported thickness of asymptomatic plantar fascia is:
A) 3.6 millimeters
B) 5.6 millimeters
C) 7.6 millimeters
D) 9.6 millimeters

See answer sheet on page 171.

PM's CPME Program

Welcome to the innovative Continuing Education Program brought to you by *Podiatry Management Magazine*. Our journal has been approved as a sponsor of Continuing Medical Education by the Council on Podiatric Medical Education.

Now it's even easier and more convenient to enroll in PM's CE program!

You can now enroll at any time during the year and submit eligible exams at any time during your enrollment period.

PM enrollees are entitled to submit ten exams published during their consecutive, twelve–month enrollment period. Your enrollment period begins with the month payment is received. For example, if your payment is received on September 1, 2001, your enrollment is valid through August 31, 2002.

If you're not enrolled, you may also submit any exam(s) published in PM magazine within the past twelve months. **CME articles and examination questions from past issues of *Podiatry Management* can be found on the Internet at http://www.podiatrym.com/cme.** All lessons are approved for 1.5 hours of CE credit. Please read the testing, grading and payment instructions to decide which method of participation is best for you.

Please call (631) 563-1604 if you have any questions. A personal operator will be happy to assist you.

Each of the 10 lessons will count as 1.5 credits; thus a maximum of 15 CME credits may be earned during any 12-month period. You may select any 10 in a 24-month period.

The* Podiatry Management Magazine *CME program is approved by the Council on Podiatric Education in all states where credits in instructional media are accepted. This article is approved for 1.5 Continuing Education Contact Hours (or 0.15 CEU's) for each examination successfully completed.

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Enrollment/Testing Information and Answer Sheet

Continuing Medical Education

Note: If you are mailing your answer sheet, you must complete all info. on the front and back of this page and mail with your check to: ***Podiatry Management*, P.O. Box 490, East Islip, NY 11730.** Credit cards may be used only if you are faxing or phoning in your test answers.

TESTING, GRADING AND PAYMENT INSTRUCTIONS

(1) Each participant achieving a passing grade of 70% or higher on any examination will receive an official computer form stating the number of CE credits earned. This form should be safeguarded and may be used as documentation of credits earned.

(2) Participants receiving a failing grade on any exam will be notified and permitted to take one re-examination at no extra cost.

(3) All answers should be recorded on the answer form below. For each question, decide which choice is the best answer, and circle the letter representing your choice.

(4) Complete all other information on the front and back of this page.

(5) Choose one out of the 3 options for testgrading: mail-in, fax, or phone. To select the type of service that best suits your needs, please read the following section, "Test Grading Options".

TEST GRADING OPTIONS

Mail-In Grading

To receive your CME certificate, complete all information and mail with your check to:

Podiatry Management
P.O. Box 490, East Islip, NY 11730

There is **no charge** for the mail-in service if you have already enrolled in the annual exam CPME program, and we receive this exam during your current enrollment period. If you are not enrolled, please send $17.50 per exam, or $99 to cover all 10 exams (thus saving $76 over the cost of 10 individual exam fees).

Facsimile Grading

To receive your CPME certificate, complete all information and fax 24 hours a day to 1-631-563-1907. Your CPME certificate will be dated and mailed within 48 hours. This service is available for $2.50 per exam if you are currently enrolled in the annual 10-exam CPME program (and this exam falls within your enrollment period), and can be charged to your Visa, MasterCard, or American Express.

If you are *not* enrolled in the annual 10-exam CPME program, the fee is $20 per exam.

Phone-In Grading

You may also complete your exam by using the toll-free service. Call 1-800-232-4422 from 10 a.m. to 5 p.m. EST, Monday through Friday. Your CPME certificate will be dated the same day you call and mailed within 48 hours. There is a $2.50 charge for this service if you are currently enrolled in the annual 10-exam CPME program (and this exam falls within your enrollment period), and this fee can be charged to your Visa, Mastercard, or American Express. If you are not currently enrolled, the fee is $20 per exam. When you call, please have ready:

1. Program number (Month and Year)
2. The answers to the test
3. Your social security number
4. Credit card information

In the event you require additional CPME information, please contact PMS, Inc., at **1-631-563-1604**.

ENROLLMENT FORM & ANSWER SHEET

Please print clearly...Certificate will be issued from information below.

Name _____ Soc. Sec. #_____
Please Print: FIRST MI LAST

Address_____

City_____State_____Zip_____

Charge to: _____Visa _____ MasterCard _____ American Express

Card #_____Exp. Date_____

Note: Credit card payment may be used for fax or phone-in grading only.

Signature_____Soc. Sec.#_____Daytime Phone_____

State License(s)_____Is this a new address? Yes_____ No_____

Check one: _____ I am currently enrolled. (If faxing or phoning in your answer form please note that $2.50 will be charged to your credit card.)

_____ I am not enrolled. Enclosed is a $17.50 check payable to Podiatry Management Magazine for each exam submitted. (plus $2.50 for each exam if submitting by fax or phone).

_____ I am not enrolled and I wish to enroll for 10 courses at $99.00 (thus saving me $76 over the cost of 10 individual exam fees). I understand there will be an additional fee of $2.50 for any exam I wish to submit via fax or phone.

Over, please

Continuing Medical Education

ENROLLMENT FORM & ANSWER SHEET (cont'd)

EXAM #4/03
Down Syndrome
(Caselli)

Circle:

1.	A	B	C	D	11.	A	B	C	D
2.	A	B	C	D	12.	A	B	C	D
3.	A	B	C	D	13.	A	B	C	D
4.	A	B	C	D	14.	A	B	C	D
5.	A	B	C	D	15.	A	B	C	D
6.	A	B	C	D	16.	A	B	C	D
7.	A	B	C	D	17.	A	B	C	D
8.	A	B	C	D	18.	A	B	C	D
9.	A	B	C	D	19.	A	B	C	D
10.	A	B	C	D	20.	A	B	C	D

LESSON EVALUATION

Please indicate the date you completed this exam

_____

How much time did it take you to complete the lesson?

_____ hours _____minutes

How well did this lesson achieve its educational objectives?

_____Very well _____Well

_____Somewhat _____Not at all

What overall grade would you assign this lesson?

A B C D

Degree_____

Additional comments and suggestions for future exams:

_____

_____

_____

_____

_____

_____

EXAM #5/03
Ultrasound
(Vohra/Japour)

Circle:

1.	A	B	C	D	11.	A	B	C	D
2.	A	B	C	D	12.	A	B	C	D
3.	A	B	C	D	13.	A	B	C	D
4.	A	B	C	D	14.	A	B	C	D
5.	A	B	C	D	15.	A	B	C	D
6.	A	B	C	D	16.	A	B	C	D
7.	A	B	C	D	17.	A	B	C	D
8.	A	B	C	D	18.	A	B	C	D
9.	A	B	C	D	19.	A	B	C	D
10.	A	B	C	D	20.	A	B	C	D

LESSON EVALUATION

Please indicate the date you completed this exam

_____

How much time did it take you to complete the lesson?

_____ hours _____minutes

How well did this lesson achieve its educational objectives?

_____Very well _____Well

_____Somewhat _____Not at all

What overall grade would you assign this lesson?

A B C D

Degree_____

Additional comments and suggestions for future exams:

_____

_____

_____

_____

_____

_____