Evaluation and Management of Foot and Ankle Disorders: Present Problems and Future Directions

Thomas G. McPoil, PhD, PT, ATC [1]

Gary C. Hunt, MA, PT, OCS [2]

Thomas G. McPoil   Gary C. Hunt

Recent research has raised serious concerns regarding the reliability and validity of the evaluation and treatment scheme proposed by Root et al. Although the Root et al theory is widely referenced in the physical therapy literature and commonly taught in continuing education courses, current issues of concern include: 1) measurement technique reliability, 2) the criteria proposed for normal foot alignment, and 3) the position of the subtalar joint between midstance and heel-off during walking. The intent of this paper is to review these three problem areas which have been identified with the Root et al theory as well as to propose the use of a "tissue stress model" which the authors have found to be an effective alternative for evaluating and treating foot disorders.

Key Words: foot, orthopaedics, management

[1] Associate Professor; Co-Director, Gait Research Laboratory; Department of Physical Therapy, Northern Arizona University, P.O. Box 15105, Flagstaff, AZ 86011
[2] Clinical Faculty, Southwest Baptist University, Bolivar, MO; Senior Therapist, Springfield Physical Therapy and Hand Rehabilitation Center, Springfield, MO

The theory proposed by Root et al for the evaluation and treatment of foot and ankle disorders has gained increased popularity among physical therapists over the past 15 years. This degree of popularity can be illustrated by the fact that of the 21 clinical and research manuscripts regarding foot biomechanics or the utilization of foot orthoses published in *Physical Therapy* or *The Journal of Orthopaedic and Sports Physical Therapy* between 1988 and 1993, 70% directly referenced the writings of Root et al. Furthermore, the Root et al approach has been the basis for numerous physical therapy continuing education courses, focusing on the management of foot and ankle disorders.

The philosophy and theory advocated by Root et al for evaluating and treating foot disorders was a dramatic change from the previous management approaches utilized by the medical community. Up until the time that Root et al presented their management theories to health care prac-

titioners, the medical community tended to look at the foot as a static, nonmoving structure. The primary focus of treatment consisted of evaluating the height of the medial longitudinal arch and using a navicular pad to maintain the arch in a "normal" position, while the patient was standing in a static posture. Root et al emphasized the importance of looking at the foot as a dynamic, moving structure and designed a new paradigm for the management of foot disorders with that philosophy in mind.

The basis for the Root et al approach was the classification of abnormal foot types. In order to classify abnormal foot types, Root et al defined what they termed the ideal or "normal" foot alignment, as well as several variations from this normal foot alignment which could cause abnormal foot function (13,14). They

termed these abnormal variations from normal foot alignment as "intrinsic foot deformities" and classified them as a forefoot varus, forefoot valgus, and rearfoot varus (13,14). Root et al noted that these intrinsic deformities would cause abnormal or excessive foot motion, which could lead to foot and lower extremity disorders (13).

The protocol proposed by Root et al for treating these intrinsic foot deformities included the following steps: *1)* determine if an "intrinsic deformity" is present, *2)* measure the amount of the deformity using a goniometer, *3)* cast the patient's foot to capture the degree of deformity in a plaster model, and *4)* construct a "functional" foot orthoses. The functional foot orthoses, as described by Root et al, was fabricated with wedges or posts, which were positioned in either the forefoot or rearfoot de-

pending on the classification of foot deformity. The functional foot orthoses would act to prevent abnormal or excessive foot motion.

The cornerstone of Root et al's management paradigm was their definition of the typical or "normal" foot alignment, since deviations from this alignment were classified as abnormal. The foot was defined as being in normal alignment when: *1)* the bisector of the calcaneus was in line or parallel with the bisector of the lower one-third of the leg, and *2)* the plane of all five metatarsal heads were perpendicular to the calcaneal bisector

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(14). Root et al specifically noted that this normal foot alignment occurred only when the subtalar joint was positioned in neutral and the midtarsal joint fully locked (13). Thus, normal foot alignment, which was stated to occur between midstance and heel-off during walking, was the criteria for determining forefoot or rearfoot deformities in Root et al's scheme for evaluating and treating the foot (13). The validity of the theory proposed by Root et al was based on their belief that normal foot alignment occurred when the subtalar joint and the foot were in

neutral position between midstance and heel-off during walking.

One can easily see the paradox that can face the clinician when using the Root et al approach. If the clinician suspects that their patient has a foot disorder caused by excessive foot pronation, in order to treat the patient using the model proposed by Root et al, the clinician must find an intrinsic deformity in their examination in order to properly post the foot orthoses. What if the patient had no intrinsic deformity, but has a combined femoral torsion and tibial valgum deformity which is causing the excessive foot pronation? Under the Root et al classification scheme, the therapist could not wedge or post a foot orthoses for these common lower extremity deformities. Moreover, as with any examination procedure, treatment, or modality used by health practitioners, the theory as well as the techniques necessary to implement the theory should be both valid and reliable. If intrinsic deformities were thought to be present during the examination, could the measurement techniques described by Root et al be used by the clinician to provide a reliable assessment of the deformity so that a proper classification could consistently be made? Finally and most importantly, is the basis for the foot classification scheme proposed by Root et al valid?

Recently, the results of several research studies have raised concerns regarding the evaluation and treatment scheme proposed by Root et al. These issues have been focused on: *1)* the reliability of the measurement techniques described by Root et al to measure both normal and abnormal foot alignment; *2)* the criteria for normal foot alignment; and *3)* the proposed fact that the subtalar joint and the foot are in neutral position between midstance and heel-off during walking.

The intent of this paper is to review these three areas of concern with the Root et al method, as well as

to propose the use of a "tissue stress" model for consideration by the reader as a basis for developing an evaluation and management paradigm for treating individuals with foot disorders.

DISCUSSION OF PROBLEM AREAS

Reliability of the Measurement Procedures

Several studies have been conducted by physical therapists which have examined the reliability of the procedures described by Root et al to measure both subtalar joint range of motion as well as the magnitude of foot deformity. Elveru et al studied the issue of interrater and intrarater reliability of measurements of the subtalar joint neutral position, as well as subtalar joint passive range of motion (3). In their study, the involved feet of 43 patients with neurologic and orthopaedic disorders were evaluated by 14 different therapists with a range of clinical experience. The therapists were asked to measure the subtalar joint position and passive range of motion measurements. The findings of their investigation indicated that intratester reliability was fairly high, but that intertester measurement reliability among the 14 therapists was extremely poor. They concluded that with the exception of ankle plantar flexion, measurements of subtalar joint neutral position and passive range of motion could not be considered reliable among therapists.

Lattanza et al (7) evaluated non-weight-bearing and weight-bearing measurements of subtalar eversion position. In their study, a single evaluator performed all measurements on the right lower extremity of 17 healthy subjects, and neutral position of the subtalar joint was determined through the palpation method. The results of this investigation indicated that subtalar joint eversion range of motion was significantly greater in the weight-bearing position as compared with the nonweight-bearing

position. They further concluded that the practitioner needs to evaluate the patient in a weight-bearing position, since this is the functional position in which activities of daily living are carried out.

Smith-Oricchio and Harris (15) evaluated the interrater reliability of positioning the subtalar joint in neutral position as well as measuring calcaneal inversion and eversion range of motion. Three physical therapists with several years of clinical experience performed the measurements and determined the position of subtalar neutral on the involved ankles of 20 patients. Subtalar neutral position was determined by using both the mathematical method and palpation in the prone position. Calcaneal inversion and eversion were measured both weight bearing and nonweight bearing. The results of their study indicated that nonweight-bearing measurements of calcaneal inversion and eversion and subtalar joint neutral position had low to moderate interrater reliability. However, weight-bearing measurements of calcaneal position were found to have a higher interrater reliability. Their results also indicated that while the palpation method of determining subtalar neutral position had a higher reliability value than the mathematical method, neither method achieved a high level of interrater reliability for use with a patient population. The authors also made an interesting clinical observation by noting that although the neutral position of the subtalar joint is thought to be the desired position of the foot, only three of their subjects stood with the subtalar joint in neutral position.

The results of these studies indicate that the physical therapist can expect a low level of interrater reliability when performing measurements of subtalar joint neutral position and calcaneal or subtalar range of motion. This is despite acceptable intrarater reliability. Furthermore, it would appear, based on these studies, that measurements of subtalar joint

position and movement should be taken in a weight-bearing position and not in a nonweight-bearing position. A major problem with weight-bearing measurements of forefoot deformities was noted by McPoil et al (11) when evaluating three different methods of casting the foot in subtalar neutral position. They reported that forefoot varus and valgus deformities could not be replicated when the plaster cast of the foot was obtained in a weight-bearing position in comparison with a nonweight-bearing position.

Based on these studies, it would appear that physical therapists would not be able to agree among themselves on measurements of subtalar joint neutral position as well as passive range of motion of the subtalar joint. Diamond et al (2) did report a relatively high degree of interrater reliability between two therapists measuring subtalar joint range of motion in a group of diabetic patients. However, they noted that to obtain this high interrater reliability, lengthy training sessions were required over an 18-month period with constant discussion between the two therapists "defining and agreeing on common techniques of measurement." While Diamond et al were able to demonstrate that a relatively high level of interrater reliability could be obtained between two therapists who were in constant communication, as well as willing to work together in order to come to an agreement in regard to their measurement techniques, this may not be practical in the typical practice setting for most physical therapists.

Criteria for Normal Foot Alignment

The second issue is whether the normal foot alignment proposed by Root et al is applicable to the general population. In other words, does the Root et al theory have external validity. If an examination of foot alignment, as described by Root et al, was performed on a representative sam-

ple of the general population using the criteria for normal foot structure proposed by Root et al, a normal or Gaussian distribution would be expected. In other words, the middle portion of the standard normal distribution, which is in the shape of a bell-shaped curve, would be composed of individuals who have a normal foot alignment and stand with their subtalar joints in a neutral position. As previously noted, Root et al described that the normal foot alignment occurred when the bisector of the lower leg was in line or parallel with the calcaneal bisector and that the plane of the metatarsal heads was perpendicular to the calcaneal bisector (14). They further noted that normal foot alignment could only occur when the subtalar joint was positioned in neutral and when the midtarsal joint was locked by converging the axes of the midtarsal joint. Based on these criteria, the clinician should expect that 68% of the population (± 1 SD) should fall within the middle portion of the distribution and, thus, have a normal foot alignment. In evaluating the feet of 20 subjects, Smith-Oricchio and Harris (15) found that only 3 or 15% of the subjects actually stood with their feet in the subtalar neutral position. They also discussed the need for further research to determine if the normal population stands with their subtalar joints positioned in neutral. McPoil et al (10) conducted a study in which they determined the degree of forefoot and rearfoot deformity in 58 healthy, young females. Of the 116 feet included in the survey, 8.6% had a forefoot varus deformity, 44.8% had a forefoot valgus deformity, and 14.7% had a plantar flexed first ray. Subtalar varus was present in 83.6% of the sample, while tibiofibular varum was present in 98.3% of the population studied. Only 17% of the 116 feet that were evaluated had a "normal" foot alignment. All of the subjects included in the McPoil et al study had no previous history of orthopaedic or neurological impair

ment of either lower extremity. Another interesting finding of their study was that 18 or 31% of the subjects in the study were found to have a different forefoot and/or rearfoot classification bilaterally. It would appear, based on the results of these studies, that the incidence of a normal foot alignment is extremely small. This leads one to question whether the criteria for normal foot alignment defined by Root et al is too stringent to apply to the general population.

Finally, Root et al (14) noted in their text on evaluation that the distal one-third of the lower leg should be perpendicular to the floor. McPoil et al (12), in evaluating the degree of tibiofibular varum in 58 subjects using both clinical and radiographic measurements, found that all subjects had between 4.6 to 8.7° of tibiofibular varum. These findings would also suggest that the criteria for normal foot alignment proposed by Root et al is too restrictive when applied to the general population.

Position of Subtalar Joint During Walking

The last and most important issue relates to validity of the theory proposed by Root et al, notably, does the subtalar joint attain a neutral position between midstance and heel-off during the walking cycle. Root et al (13) proposed a motion pattern for the foot in which they described movement of the subtalar joint throughout stance. They noted that prior to heel strike, the subtalar joint was inverted secondary to contraction of the pretibial group. From heel strike to foot flat, the subtalar joint underwent the motion of pronation and remained in a pronated position. From the end of foot flat to toe-off, the subtalar joint undergoes the motion of supination. A critical point is that Root et al specifically stated that slightly before heel-off, the subtalar joint would be in a neutral position

(14). They further noted that neutral position of the subtalar joint occurs at approximately 50 and 65% of the stance phase (14). Root et al (13) defined subtalar joint neutral position as when the subtalar joint was neither pronated or supinated.

As previously noted, a major issue of discussion is whether the subtalar joint is in a neutral position during the period of midstance. The theoretical normal foot alignment, which serves as the criteria for determining whether a patient has a normal or abnormal foot alignment, is based on the concept that neutral position of the subtalar joint occurs at or just after midstance during walking. In order for the clinician to even consider evaluating and treating intrinsic foot deformities, the issue of whether the neutral position of the subtalar joint occurs between midstance and heel-off during walking in the general population should be substantiated.

Root et al (14) based their description of normal foot motion on a study conducted by Wright et al (16) in 1964. Wright et al used potentiometers aligned to the subtalar and talocrural joint axes to determine the joint motion pattern in only two subjects. Their results indicated that the two subjects tested reached a "neutral" position at approximately 65 to 70% of the stance phase. While this is in agreement with Root et al, a critical point is the criteria that Wright et al used to defined subtalar joint neutral position in their study. Wright et al defined "neutral" position of the subtalar joint as when their subjects were: 1) standing relaxed with knees fully extended, 2) arms at their sides, 3) feet 6 inches apart, and 4) a comfortable amount of toeing out. This placement of the subject would be more comparable with what Root et al (14) described as relaxed calcaneal stance position rather than neutral calcaneal stance position. Thus, the definition of neutral subtalar joint position described by Wright et al is completely different

from the definition of "neutral subtalar joint position" proposed by Root et al. Wright et al (16), however, are the only objective data referenced by Root et al to substantiate their theory of normal rearfoot motion.

McPoil and Cornwall (9), in an attempt to determine whether neutral position of the subtalar joint did occur between midstance and heel-off in the walking cycle, evaluated the rearfoot motion pattern in both feet of 50 healthy, asymptomatic subjects. Each subject was filmed using two-dimensional videography while they walked over a 12-m walkway three times for each extremity. After the walking trials were completed, each subject was filmed while they stood in their resting calcaneal stance position (standing in a relaxed posture) as well as in their neutral calcaneal stance position (standing with the subtalar joints in neutral position). Rearfoot motion and static positions were then digitized and calculated for both the left and right feet. Each foot was considered as an individual structure, so 100 feet were evaluated. Based on the results of their study, McPoil and Cornwall (9) described the typical pattern of rearfoot motion as follows:

1. The rearfoot was slightly inverted prior to heel strike.
2. From heel strike to foot flat, the rearfoot undergoes the motion of eversion, with the average percent time to maximum rearfoot eversion being approximately 40% of stance phase for the 100 feet.
3. The motion of rearfoot inversion was initiated after 50% of stance phase and continued until toe-off.
4. The "neutral position" for the typical rearfoot motion pattern was resting calcaneal stance position and not neutral calcaneal stance position.

The results of the McPoil and Cornwall study are in agreement with the values reported by Wright et al. Unfortunately, these findings severely

challenge the validity of the theory proposed by Root et al.

These inherent problems with the Root et al approach may be one of the reasons why two recent research papers in *Physical Therapy*, which used the Root et al approach for both evaluating their subjects and fabricating foot orthoses, consistently "undercorrected" the actual amount of forefoot deformity that they measured on their subjects (4,6). On a more important note, why would the clinician even bother to perform the evaluation protocol described by Root et al if it has no validity? The most obvious answer would be to examine the patient's foot structure and classify the alignment as normal or abnormal. Unfortunately, the previous discussion has indicated that severe problems exist in the reliability and validity of the measurement procedures required to classify the patient's foot structure. Another important reason for performing the measurement procedures could be to predict whether the patient has an excessive foot pronation or supination pattern of movement during walking. Investigations, however, by both Hamill et al (5) and McPoil and Cornwall (8) have demonstrated the inability to predict dynamic motion of the rearfoot during walking when using the static foot evaluation procedures as described by Root et al.

The authors strongly believe that, given the present state of health care reform and the need to substantiate the efficacy of treatment, the physical therapist is challenged to develop sound and cost-effective management techniques for the treatment of foot disorders. If the reliability and validity of the Root et al approach is questionable and researchers have determined that static measurements of the foot and ankle have no value in predicting dynamic foot motion, then the physical therapist must begin to question whether they should continue to utilize the evaluation and treatment scheme proposed by Root et al.

TISSUE STRESS MODEL AS A BASIS FOR EVALUATION

In the consideration of the problems noted with the evaluation and treatment scheme proposed by Root et al, the authors have chosen to use a tissue stress model as the basis for developing an examination and the management paradigm for treating individuals with foot disorders. While the tissue stress model is by no means a novel idea, it has permitted the authors to develop an examination and management protocol which is based on the same logic used for other body articulations and to not focus on the use of unreliable measurement techniques.

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surement techniques. Furthermore, the tissue stress model provides the physical therapist with a rationale for the use of nonphysical therapy interventions, such as footwear and foot orthoses, in their management program.

The tissue stress model can be illustrated using the load-deformation curve (1). The load-deformation curve consists of two regions or zones: an elastic region and a plastic region (Figure 1). The area separating the elastic and plastic regions is considered the microfailure zone. The elastic region represents the normal "give-and-take" of soft tissues which prevents excessive joint move-

ment as the foot is loaded and unloaded. As long as the individual maintains the level of tissue stress within the elastic region, tissue irritation and inflammation will most likely be maintained at a tolerable level, with overuse injury avoided. If, however, the individual's level of activity or the magnitude of the load applied to the tissues of the foot are increased, tissues could be deformed beyond the microfailure zone and into the plastic range resulting in an overuse injury. It is important to recognize that individuals will have their own level of tolerance for the amount of tissue stress that can be withstood during walking as well as other activities of daily living.

The examination and management scheme using the tissue stress model would include:

Step 1: Identifying the tissues being excessively stressed based on the history, symptoms, and other subjective information provide by the patient;

Step 2: The application of controlled stresses to tissues identified in Step 1 through the application of weight-bearing and nonweight-bearing tests, as well as palpation, range of motion, and muscle function/strength assessment;

Step 3: Based on the evaluative findings, determine if the etiology of the patient's complaint is secondary to excessive mechanical loading; and

Step 4: Institute a management protocol which emphasizes: A) reducing tissue stress to a tolerable level through rest, footwear, and foot orthoses; B) healing the involved tissues using modalities and soft tissue mobility techniques; and C) the restoration of flexibility and muscle strength to permit the resumption of daily activities.
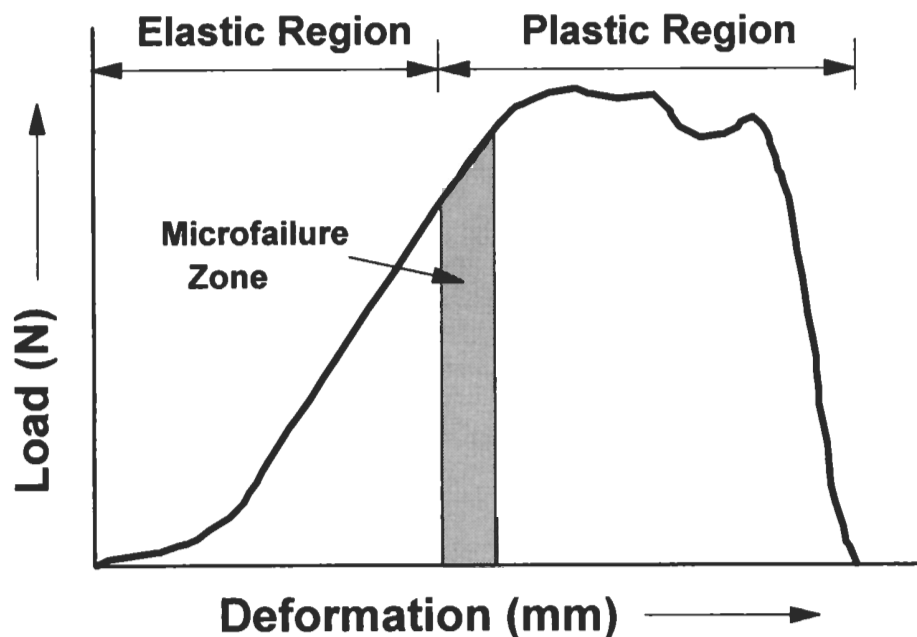
Elastic Region | **Plastic Region**

Microfailure Zone

Load (N)

Deformation (mm)

FIGURE 1. *The load-deformation curve. It should be noted that the divisions illustrated in the graph represent a generalization. The microfailure zone is shown to begin at the end of the elastic region, but can occur before this point on the curve.*

The "tissue stress" model allows the clinician the flexibility to adapt their evaluation and treatment procedures based on the identification of those tissues which are inflamed or injured secondary to excessive mechanical loading. Palpation, special tests to stress soft tissues, the assessment of range of motion, and the determination of muscle strength would be included in a comprehensive evaluation scheme to determine the level and magnitude of tissue inflammation and the resulting limitation in movement. Furthermore, in the proposed tissue stress model, footwear and foot orthoses would be used as a means to rest overstressed tissues. Thus, foot orthoses would be a small part of the entire treatment plan rather than the entire emphasis of treatment. To illustrate the clinical application of the tissue stress model, the following case study of a patient diagnosed with overuse induced plantar fasciitis will be described.

CASE STUDY ILLUSTRATING THE APPLICATION OF THE TISSUE STRESS MODEL

Step 1. History and Identification of Stressed Tissues

The patient was a 29-year-old female college student, referred to physical therapy by her family physician, who stated that she had pain in her left heel region for the past 2 months. The results of the radiographic examination were negative. She stated that the symptoms began approximately 1 week after she started working as a waitress, which required standing on her feet for 10 to 12 hours per day, 5 days a week. Prior to starting her job as a waitress, she stated that she primarily sat at a computer terminal entering data. The patient stated that the pain had become increasingly worse over the past 4 weeks and that she has severe heel pain upon standing first thing in the morning. After 20–30 minutes of activity, the pain begins to resolve

and does not start again until after 3 to 4 hours of constant walking or standing. She further reported that if she sat down to rest, when she stood again, she had the same type of heel pain that occurred first thing in the morning upon rising. When asked to point to the region of the heel that hurts, she did not point directly to the bottom of the heel but to an area anterior and medial to the bottom of the heel. She stated that she had no other problems or symptoms. She was prescribed an oral anti-inflammatory medication by her physician. She stated that this was the first time that she ever had pain in her feet. When the footwear that she used for work was inspected, they were found to be extremely worn as well as poor fitting.

Comment A key point in the history for this patient was the increase in activity associated with the onset of symptoms as well as the reporting of pain upon weight bearing after a period of nonweight bearing. Based on the history provided, it would appear that the patient has overstressed her plantar fascia, resulting in tissue inflammation.

Step 2. Application of Controlled Stresses to Involved Tissues

The patient was first asked to stand so that her lower extremity and foot alignment could be inspected. A moderate genu valgum was noted bilaterally, and the patient was slightly overweight. The combination of the lower leg alignment and the increased body weight caused excessive foot pronation. The patient was then asked to walk approximately 15 feet independently. She demonstrated a slightly antalgic gait with a minimal decrease in weight bearing on the left foot. The patient was then asked to long sit on a plinth with the feet over the edge. Passive range of motion of the subtalar joint and midtarsal articulations were within normal limits and pain free with over-

pressure toward eversion. First metatarsophalangeal joint extension, measured with the talocrural joint in neutral, was within normal limits and pain free with over-pressure. The patient reported marked discomfort when the anterior-medial aspect of the plantar surface of the left calcaneus was palpated with slight to moderate pressure. The patient was then asked to stand and the first metatarsophalangeal joint was passively extended to observe the windlass effect of the plantar fascia. The patient reported only slight discomfort after approximately 45° of extension.

Comment The intent of the above evaluation was to stress those tissues identified in Step 1. In this case, the patient's complaints of discomfort were all associated with increased stress applied to the plantar fascia in both weight-bearing and nonweight-bearing positions. Range of motion of first metatarsophalangeal joint extension was within normal limits, indicating that plantar fascia mobility was not restricted. Restricted first metatarsophalangeal joint extension is often observed in cases of intractable plantar fasciitis.

Step 3. Assessment of Patient's Complaint

Based on the evaluative findings, the etiology of the patient's plantar fasciitis is excessive mechanical loading leading to an inordinate amount of tissue stress to the plantar aponeurosis. The primary cause of the excessive mechanical stress to the plantar aponeurosis is the change in the level of activity associated with the patient's new job with a secondary cause being excessive foot pronation.

Comment It is important to remember that the patient has always had the excessive foot pronation, but no history of foot problems until changing jobs. Thus, while the use of foot orthoses to control her excessive foot pronation is required immediately to reduce the stress to the plan-

tar fascia during the tissue healing stage, the need for prolonged utilization of foot orthoses may not be necessary.

Step 4. Management Program

A. To reduce the level of stress in the plantar fascia to a tolerable level, the patient would be asked to: *1)* possibly modify her existing work schedule to decrease the number of consecutive hours worked so that she can reduce the amount of stress applied to the involved tissues; *2)* purchase footwear with cushioned midsoles, leather uppers with at least 5 to 6 eyelets, and a firm heel counter to assist in controlling excessive foot pronation; and *3)* be fitted with temporary over-the-counter foot orthoses or have her foot strapped with adhesive tape to control the amount of foot pronation.

Comment The use of the foot orthoses or adhesive strapping in the treatment program for this patient should begin immediately, before the start of any other treatment, to reduce the level of stress to the plantar fascia. Hopefully, as the tissue inflammation and associated pain are reduced, the foot orthoses can be removed. As previously mentioned, it is important to issue the patient temporary foot orthoses to control foot motion immediately before the start of any other treatment. It makes no sense to give the patient a series of modalities or other treatments to aid in healing inflamed tissues without limiting the excessive foot motion which is contributing to the increased stress of the plantar fascia.

B. Once the amount of tissue stress is controlled through the use of either temporary foot orthoses or adhesive strapping, then various treatments intended to provide symptomatic relief, including modalities, soft tissue mobilization, and massage, would be initiated.

C. Once symptoms are resolved, the next stage of the management program would be started to prevent

recurrence of the plantar fasciitis. This would include exercises to maintain soft tissue mobility to prevent contracture of the plantar fascia and, thus, restricted extension range of motion of the first metatarsophalangeal joint. In addition, strengthening exercises of the intrinsic and extrinsic muscles of the involved lower leg and foot must be implemented to provide dynamic stabilization of the joints of the foot. Since the patient was somewhat overweight, a recommendation could be made for her to see a dietitian regarding a weight-control program.

While the intent of this hypothetical case presentation is to illustrate the use of the tissue stress model as the basis for planning the evaluation and management of foot disorders, it by no means represents a complete management program. The use of this model would require constant modification based on each patient's complaints and symptoms. It does, however, provide an example of how the physical therapist can treat foot and ankle disorders without having to struggle to classify an individual's foot structure using measurements which are unreliable, quite possibly invalid, and are of no use in predicting functional foot movement.

SUMMARY

It is not the authors' intent to suggest that the "tissue stress" model described is the only method that should be used to examine and manage foot and ankle disorders. That would be whimsical at best. It is, however, the authors' hope that this model will provide the start of a continual dialogue among physical therapists to determine the optimal methods for managing patients referred with foot disorders. Until we as a profession are willing to recognize the problems associated with the current treatment theories utilized in our clinics, we will not be able to leave these unfounded treatment approaches behind us and begin the

process of developing sound and substantiated protocols for the management of foot disorders. Only then can we expect to receive the respect and recognition as legitimate providers of foot and ankle care from not only other health care providers, but also from the health care insurers of our patients.   JOSPT

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