Continuing Medical Education

Prescription Shoes for Foot Pathology

Using footwear properly adds to your treatment armamentarium.

BY MARK A. CASELLI, DPM

Goals & Objectives

After reading this article, the physician should be able to:

1) Recognize the indications for prescription shoes and shoe modifications.

2) Properly measure a patient's foot for prescription footwear.

3) Select appropriate footwear for various types of foot pathologies.

4) Understand the proper method of taking an impression cast for the fabrication of custom-made molded shoes.

5) Prescribe shoe modifications for a wide variety of foot disorders.

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*Following this article, an answer sheet and full set of instructions are provided (pg. 176).—**Editor***

Humans have worn some form of foot covering over their feet for thousands of years. This has been demonstrated by the intact pair of fur moccasins worn by a hunter who lived 5,300 years ago and was recently discovered frozen in the mountains separating Italy and Austria. People have long worn foot coverings for a number of obvious reasons, including to serve as protection from the environment, as an aspect of fashion or status, as an aid to functioning in various sports and work endeavors, and to assist in ambulation when there is an impairment to normal gait. While shoes are generally worn to protect the foot, recent studies performed to determine the causes of lower extremity amputations have identified that for nearly half of the amputees

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in the various study groups, the initial event that lead to the amputation was either shoe-related or might have been averted by wearing appropriate shoes.

Most of the shoe-related amputations occurred in older individuals with multiple pathomechanical and pathophysiologic problems, such as foot deformities accompanied by diabetes and poor lower extremity circulation. In order to utilize footwear to protect the foot from injury and improve ambulation, the podiatric practitioner must be thoroughly familiar with the many functions that shoes can serve, the proper method of fitting shoes, the factors that go into determining the patient's footwear needs, and the types of specialized shoes and shoe modifications that are available to fill these needs.

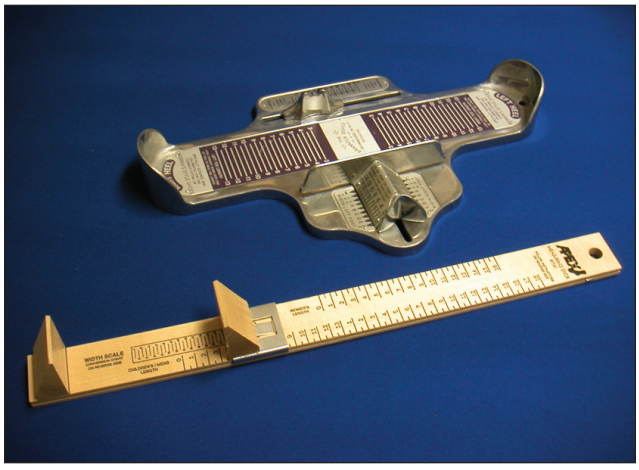

Figure 1: The Brannock device (top) and Ritz stick are used to determine shoe size.

Figure 2: A tongue pad is placed in the shoe (right) of the shorter foot to ensure snug fit

The Function of Shoes

The basic functions of a shoe are foot protection, support, and pain relief. Protection includes shielding the foot from the harmful external environment of sharp objects, caustic chemicals, insect and animal bites and extremes of temperature. Protection must also be provided from the internal stresses placed upon the tissues of the foot by the enclosed shoe. A shoe should provide support for the foot and increase lower extremity stability, especially in the presence of weak and sensitive feet. Finally, a shoe should provide pain relief by transferring weight-bearing stresses away from painful areas, shielding painful lesions from external irritations, guarding against skin breakdown of the hypo-esthetic and poorly vascular foot, and separating painful structures from physical contact.

Figure 3: Open and closed-toed post-operative shoes

Further considerations for the use of shoes and shoe modifications in the management of foot pathology should include the following specific functions that shoes can serve:

1) Accommodate for fixed or rigid foot deformities such as severe hallux abductovalgus, hammer or claw toes, and tailor's bunions;

2) Diminish pressure on dorsal and plantar aspects of the feet;

3) Redistribute weight bearing from areas of excessive pressure or pain;

4) Support the foot and leg in the presence of neuromuscular weakness as present in systemic diseases such as advanced rheumatoid arthritis, polio, neuromuscular disorders, and diabetes;

In order for a shoe to achieve its desired function and not be harmful to the foot, it must first and foremost fit properly.

5) Improve foot function by reducing excessive pronation or supination;

6) Incorporate partial foot prostheses;

7) Limit painful joint movement;

8) Equalize limb length discrepancy;

9) Provide cosmetic and function improvement for poorly matched feet;

10) Accommodate for edema; and

11) Serve as an alternative to foot surgery.

Fitting of Shoes

In order for a shoe to achieve its desired function and not be harmful to the foot, it must first and foremost

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fit properly. Three essential measurements are required to determine shoe size: the overall foot length (heel to toe), arch or ball length (heel to 1st metatarsophalangeal joint), and width. The proper shoe size is the one that accommodates the head of the 1st metatarsal (i.e., the widest part of the foot) in the widest part of the shoe. It is for this reason that shoes must be fit by arch length rather than by overall foot length. Both the Brannock device, which is available in three types, for men, women, and children, and the Ritz stick give the ball width, the heel to ball length, and the heel to toe length, and are commonly used in determining the shoe size (Figure 1).

Figure 4: Post-operative shoe with weight-dispersing insole

Foot measurements should be taken with the patient standing, since the foot tends to spread on full weight bearing. Because these shoe-measuring devices give only two-dimensional measurements, and feet are three-dimensional, these devices give only a rough estimate of the proper shoe size to fit the pair of measured feet. Shoe sizes also vary considerably with their style, construction, brand, heel height, last type, and shoe materials. Good shoe fitting should therefore include proper fit to the foot's overall length, ball width, heel to ball length, arch height, heel width, instep width, and great toe joint height.

Figure 5: Healing shoe with Velcro closure

Allowances should also be made for the increases in foot volume that often occur under varying circumstances. There can be as much as a five percent increase in foot volume in a normal foot from the morning to the evening as well as increase in foot volume after completing a rigorous activity, such as jogging, walking, or even a long day of shopping. Feet should be measured for shoes at the end of the day or after frequently performed physical activities. Foot volume also tends to increase during warm and humid weather and in the presence of pathological edema.

If one foot measures slightly longer, the patient should always be fit for the longer foot. A tongue pad can be used in the shoe for the shorter foot to ensure a snug fit. A tongue pad can be made of adhesive backed felt and placed on the underside of the tongue. The thickness of the pad is determined by the amount of space that is available when the shoe is examined, but generally 1/8 to 1/4

Prescriptions often include modifications to shoes which can reduce the motion of specific painful or arthritic joints.

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Figure 6: Depth inlay shoe with removable insole to accommodate a foot orthosis

Figure 7: Plastizote toe filler to be used in the depth inlay shoe

inch is adequate. It functions by holding the foot farther back in the shoe, thereby keeping the ball of the foot in the widest part of the shoe and the heel snug against the counter of the shoe (Figure 2).

Figure 8: Athletic style depth inlay shoe

Foot Evaluation for Prescription Footwear

When considering the use of prescription footwear for the management of foot pathology, the clinician must perform a thorough foot evaluation and list all of the patient's pedal abnormalities since the eventual shoe and shoe modifications must address all these issues. A careful inspection of the patient's current footwear is also useful in determining the most appropriate prescription.

Skin color and temperature of the patient's foot should be assessed with special attention to areas that are erythematous since they may identify locations of increased friction or pressure that must be relieved. Cyanotic, cool areas are of equal importance as they may indicate locations of poor circulation and potential areas for tissue breakdown from minimally applied stress from the shoe. Joint ranges of motion must also be assessed as to their degree of motion and whether or not there is pain with movement of the joint. The most important joints to evaluate include the ankle, subtalar and midtarsal, and the metatarsophalangeal joints, with special attention to the 1st metatarsophalangeal joint.

Prescriptions often include modifications to shoes which can reduce the motion of specific painful or arthritic joints. The presence of lesions, ulcers, or callosities and their specific location as well as any biomechanical deformities such as bunions or hammertoes should be recorded and added to the shoe prescription. Foot size discrepancy is an important consideration in determining what type of shoe might be necessary. A small difference in length can be easily accommodated as described earlier, while a significant variation in foot size resulting from a congenital abnormality, partial foot amputation, or unilateral edema would require an entirely different approach to footwear.

Figure 9: Women's dress style depth-inlay shoe

Gait abnormalities such as a dropfoot, limp, abducted, adducted, circumducted, or shuffling, apropulsive gait will determine many aspects of the shoe prescription, especially if the shoe must accommodate a brace. A leg-length difference must be assessed as to its duration (recent or existing for many years) as well as to the exact measurement of the difference, as these factors will determine the degree of correction indicated and thus the type of shoe required.

A careful examination of the patient's current footwear can give the practitioner a wealth of information in determining what type of shoe and shoe modifications might be needed.

Figure 10: Bunion last shoe offering extra-wide toe-box

Figure 11: Custom-made molded shoes for varying degrees of foot deformities

The presence and severity of edema of the foot must also be evaluated. It is important to determine if the edema is a recent occurrence and temporary, as might occur after lower extremity surgery, or a chronic problem. For temporary swelling, shoe fitting should be postponed until the edema resolves. In the case of chronic edema, shoe fit should be checked frequently, since the edema may get

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Figure 12: Custom-made shoes for marked limb-length difference

Figure 13: Bivalve impression cast with plaster positive and resulting custom-made molded shoe

worse or improve, and the shoe may have to be changed frequently. This may be a major factor in selecting a shoe, especially if the patient reports a history of varying edema.

Complicating Factors

In addition to the specific pedal problems that may direct a clinician to consider utilizing prescription footwear, the following conditions tend to add complicating factors to the patient's pedal condition and must be considered when selecting shoes and shoe modifications. These conditions also tend to be most severe in the geriatric population, which is the population that most often requires prescription footwear.

1) Loss of elasticity of fibrous tissue in the skin, ligaments, and fascia. Severe forms of mechanical correction with a shoe should be avoided. No attempt should be made to force the foot into any new or different position wherever resistance is met.

2) Atrophy of adipose tissue in the sole of the foot. This results in little or no shock absorbing cushioning to protect the sensitive osteoporotic bones or the fragile plantar skin from the trauma of ordinary weight-bearing.

3) Reduction of muscle potential decreases the efficiency of the locomotor apparatus.

4) Peripheral vascular disease results in guarded viability of tissues and pretrophic areas around biomechanical faults.

5) Peripheral neuropathy results in loss of protective sensation, common in diabetes, greatly increasing the chance of infection and ulceration at areas experiencing even only a slight increase in pressure.

6) The arthridities, especially osteoarthritis and rheumatoid arthritis. The degenerative articular changes in osteoarthritis are greatly increased when there is a biomechanical pathology such as a hallux valgus deformity, a condition for which prescription footwear is often utilized. It must be therefore recognized that this condition may deteriorate even when appropriate shoes are worn. Rheumatoid arthritis does not only complicate the already existing biomechanical pathology but produces further soft tissue atrophy and lateral deviation and overlapping of the toes.

7) Osteoporosis can result in fractures from comparatively minor injuries.

Finally, a careful examination of the patient's current footwear can give the practitioner a wealth of information in determining what type of shoe and shoe modifications might be needed. Both the interior and exterior of the shoe should be examined for wear. The insole should be assessed for both location and depth of depressions. The interior of the toe box should also be examined for elevated areas, as well as wear, both indicating pressure points created by bony prominences. Heel and sole wear should also be noted. A detailed history of custom shoe use and shoe modifications can be most helpful.

Selecting a Shoe

When being presented with a patient requiring prescription footwear, there are some initial concerns that should be taken into account before proceeding on to the shoe prescription, since they may alter the type of shoe selected.

1) Immediacy of need—When does the patient require the shoe and how soon can one be obtained? The use of the "ideal" shoe may have to be postponed in order to get the patient into footwear now.

2) Cost—The perfect shoe has no value if it cannot be provided to the

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Figure 14: Hoke ball-and-ring stretcher

Figure 15: Standard shoe stretcher

patient. An affordable shoe that meets the patient's most critical needs will do the most good.

3) Style—A prescription shoe is of no benefit if the patient refuses to wear it because of the way it looks. This aspect of using prescription footwear should always be discussed with all patients, both men and women. The need for the prescription footwear and its importance to the foot health, even foot survival, must be stressed. A compromise on style, if appropriate, should also be presented. If possible, both spouses should be included in this consultation session. The patient's spouse may serve as an advocate or an antagonist to the patient wearing the "orthopedic" shoes. It is not uncommon to have a wife complain that a prescribed shoe makes her husband look an old man, even if the husband is over 80 years old!

A depth-inlay shoe is usually one size longer (1/3 inch longer) and two sizes wider (1/2 inch wider in circumference at the level of the metatarsophalangeal joints) than the corresponding regular shoe.

Figure 16: Splitting upper of shoe to accommodate for foot deformity

Figure 17: Cut-out of shoe upper to reduce pressure on bony prominence

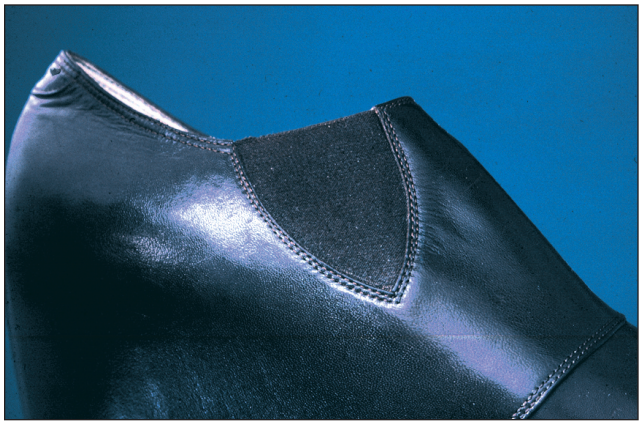

Figure 18: Elastic band closure for easy insertion of foot in shoe

4) Patient's ability to put on and remove shoes—If the patient cannot perform this task due to a medical condition or mental status, it must be determined whether or not there is someone else available to take on this responsibility before a custom prescription shoe is ordered.

Basic Types of Prescription Shoes

There are three basic types of prescription shoes used for patients with various forms of foot pathology: 1) post-operative shoes; 2) depth inlay shoes; and 3) custom-made molded shoes.

Post-Operative Shoe

Post-operative shoes were initially designed to be used following surgery in order to accommodate extreme swelling and bulky dressings. They are constructed with a wide forefoot and are available as either open or closed toe models (Figure 3). The uppers are made of canvas or more commonly nylon mesh with either Velcro straps or lace closures. Most come with a rigid rocker sole to allow the patient to walk while limiting joint motion. One of the major advantages of this type of shoe is its very low cost, making it possible for the clinician to keep them on hand in the office, providing immediate availability to the patient.

In addition to being used in accommodating for swelling, edema, or dressings, the post-operative shoe can be used to relieve both dorsal and plantar foot pressure on bony prominences from rigid foot deformities. To relieve plantar pressure, a weight-dispersing insole can be added due to the abundance of space available (Figure 4).

The post-operative shoe can be used as the primary footwear for patients who are engaged in minimal ambulation or are non-ambulatory. They can also be used as interim footwear while waiting for another type of prescription shoe. The major disadvantage of the post-operative shoe is the limited size selection, most being available in women's small, medium, and large, and men's small, medium, large, and extra large.

A sturdier modification of the post-operative shoe is the healing shoe. This is a closed-toe, extra-wide shoe made from a nylon-covered moldable polyethylene foam and can be molded directly to the patient's foot (Figure 5). Its indications are the same as the post-operative shoe. Un-

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like post-operative shoes, healing shoes come in a wide range of sizes, providing a better fit. They are much more expensive than post-operative shoes so they are not practical to keep in stock in an office. They are indicated when this type of footwear is required for a longer period of time in an ambulating patient.

Depth-Inlay Shoe

The depth-inlay shoe, often referred to as an added-depth or in-depth shoe, is the most common type of prescription footwear utilized in the management of numerous foot pathologies. The depth-inlay shoe is a roomy shoe with a removable insole measuring 1/4 inch to 3/8 inch in thickness. Commercially available or custom-made orthoses and other foot appliances can be easily inserted into this kind of shoe after removing the original insole (Figures 6 and 7).

As a rule, a depth-inlay shoe is usually one size longer (1/3 inch longer) and two sizes wider (1/2 inch wider in circumference at the level of the metatarsophalangeal joints) than the corresponding regular shoe. The depth inlay shoe usually comes in a basic oxford style, but is more recently available as both an athletic and dress shoe (Figures 8 and 9). They are available in a wide range of shapes and sizes for both men and women and can be used for all but the most severely deformed feet.

Figure 19: Surgical lace-to-toe closure

The two most common shapes, or last modifications, ordered are the bunion last and the combination last. In the bunion last shoe, the forepart of the last swings medially to accommodate the bunion deformity and then swings outwardly to accommodate the fifth metatarsal head. A bunion last oxford shoe is a low heel, laced or Velcro closured shoe with a broad toe box made of soft leather to provide ample room for a severe bunion deformity (Figure 10). A combination last shoe combines a narrow heel and a wider ball. The heel measurement is often two widths narrower than the ball. This type of shoe is indicated for a patient with a wide forefoot, but a small narrow heel, in order to prevent heel slippage. Depth inlay shoes can be ordered with a Plastizote liner to accommodate for pressure points as well as with a variety of heel and sole modifications.

A custom-made shoe is needed only in cases where a depth-inlay shoe cannot be modified to meet the patient's needs.

Custom-Made Molded Shoes

A custom-made shoe is a shoe constructed from a model made from a cast of the patient's foot. This type of footwear is needed only in cases where a depth-inlay shoe cannot be modified to meet the patient's needs. Indications for custom-made molded shoes include:

1) Severe foot deformities such as talipes equinovarus, equinovalgus, extreme hallux valgus, rigid hammertoes, and Charcot foot (Figure 11).

2) Marked leg-length discrepancy (Figure 12)

3) Marked foot size discrepancy, congenital absence of various parts of the foot, or foot amputations often require the combination of molded shoes and various foot fillers so that these patients can wear matching shoes.

4) Feet with peripheral neuropathies resulting in loss of protective sensation may require a molded shoe for protection from repeated trauma that can produce skin necrosis.

5) Feet with severe peripheral vascular disease that heal very slowly from even minor injuries.

6) Feet with severe arthritis, such as rheumatoid arthritis, which involves numerous joints producing synovitis, deformities, exostoses, instability, subluxations, and dislocations that make them prone to injuries.

The shoe upper of custom-made molded shoes can be ordered with a high toe-box and is usually constructed of soft leather with the whole lining also made of leather. When a bony prominence is present on the dorsum of the foot, a 1/8 inch thick, soft density, Plastizote lining can be built into the shoe's upper. The insole is usually ordered with 1/2 inch thick Plastizote, the top 1/4

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Figure 20: Flare heel increases rearfoot stability

inch made of a medium-density Plastizote for cushioning, and the bottom 1/4 inch made of firm-density Plastizote for support.

The insole extends from the heel to the toes and provides total contact for the entire plantar surface of the foot. The molded shoe usually has a flat sole that permits maximum ground contact and support. Since the relatively thick rubber sole is not too flexible, and both the insole and outsole cradle the foot, there is minimum amount of dorsi-flexion, plantar-flexion, and medial and lateral rotation of the foot during ambulation, resulting in minimum stress on the foot. This stiffness can sometimes present the problem of heel slippage in the more active patient with a propulsive gait. A rocker sole can be added if this occurs.

Figure 21: Stabilizer (or buttress) adds support to shoe

Figure 22: Sole lift for leg-length discrepancy

A foot cast is required for the fabrication of a custom-made molded shoe. The cast must capture the contours of the foot exactly and be removed without damaging it or the foot. The foot cast is taken with patients seated with their feet on a foam-covered platform. The cast should be taken in a semi-weight bearing position encompassing both the foot and ankle with the knee at 90 degrees flexion and the ankle also at 90 degrees if possible. Casts are commonly taken in a bivalve, two piece form (Figure 13).

A full weight-bearing tracing of each foot should also be taken to accompany the cast to the laboratory.

The main disadvantage of the custom-made molded shoe is its expense, a pair usually costing the patient between $400 dollars to over $1,000 dollars. Because these shoes are hand-crafted from a cast of the patient's foot and follow its contours, they may have an unusual shape and are often considered cosmetically unacceptable by many patients.

One of the advantages of using leather for shoe construction is that leather not only conforms to the foot through the course of normal wear, but can also be forced-conformed by stretching.

Shoe Modifications

The various parts of the shoe upper can be enlarged or made roomier to accommodate for bony prominences, ulcers, or pre-trophic areas. One of the advantages of using leather for shoe construction is that leather not only conforms to the foot through the course of normal wear, but can also be forced-conformed by stretching. Spot stretching can be accomplished with the use of a Hoke ball-and-ring stretcher (Figure 14) or a shoemaker's swan. These devices are used in conjunction with the application of a stretching fluid, which is a fifty-fifty mix of rubbing alcohol and water.

Another type of stretching is used to increase the width, and to a lesser degree, the length of a patient's footwear. There are two types of devices used for this purpose. One is the traditional shoe stretcher, which is available in various configurations and can easily be used in the office (Figure 15). The other, the Eupidus device, is used for general stretching and is found in shoe repair, pedorthic, and orthotic facilities. This device has the advantage of greater leverage in stretching the shoe and is needed for shoes that are constructed of thick leather.

Splitting or making cruciate cuts through the shoe leather and its underlining (Figure 16), or by simply cutting out the impinging portion of the shoe upper (Figure 17), can offer immediate reduction in pressure. A more permanent method of accommodating for an isolated bony prominence is applying a balloon patch to the shoe. A balloon patch involves the cutting of the upper of the shoe

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Figure 23: Metatarsal bar modification

Figure 24: Basic rocker-sole modification

away from the area of the affected toes or joints. Once the leather has been removed, a patch of deerskin or other soft material is applied loosely over the cut-out and dyed to match the shoe.

Shoe closures can also be customized and should be selected to match each patient's needs. Common closures include eyelets and shoe laces, elastic bands, Velcro straps, and zippers. Elastic bands allow for easy insertion of the foot into the shoe while keeping the shoe on the foot (Figure 18). Velcro and zipper closures are beneficial for patients who have difficulty in tying laces, such as those with severe arthritis or paralysis of their hands. A surgical lace-to-toe closure has lace stays or Velcro straps that extend all the way to the toe (Figure 19). This closure is useful for patients who have difficulty getting their foot into a shoe. It is commonly used with ankle orthoses, for an edematous foot and ankle, for a flaccid or obese foot, or for feet affected by neurological disorders, such as cerebral palsy and myelomeningocele.

Medial or lateral heel, or heel and sole wedging, is added to footwear to accommodate for excessive pronation or supination and to improve stability.

Modifications of the Heel and Outer Sole

Medial or lateral heel, or heel and sole wedging, is added to

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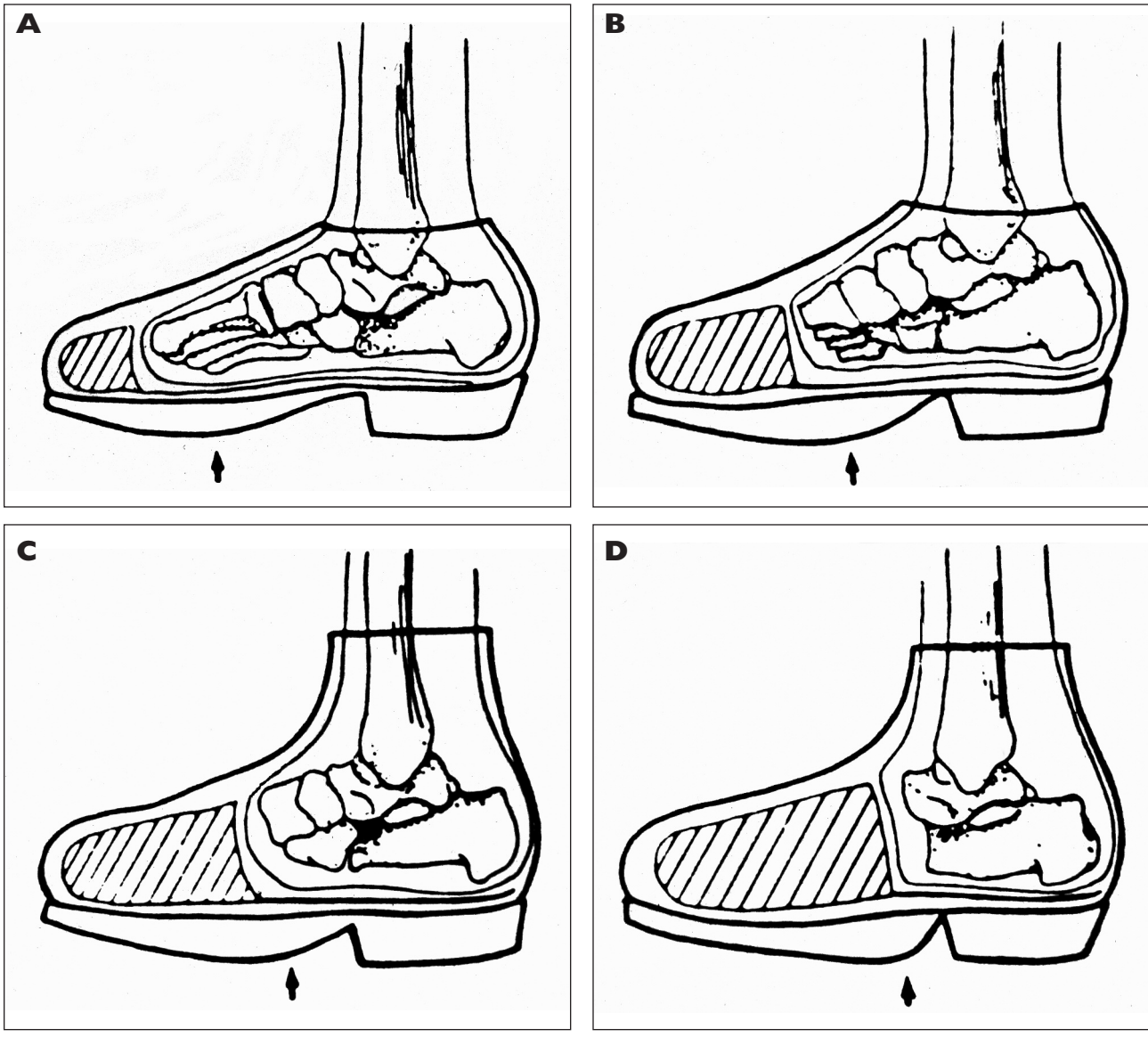

Figure 25: a,b,c,and d. Rocker-sole modifications for varying levels of foot amputations. The position of the apex of the rocker is noted by the arrow.

footwear to accommodate for excessive pronation or supination and to improve stability. The wedge can be inserted between the upper and the sole or placed directly to the bottom of the shoe. A medial wedge might be used for posterior tibial tendon dysfunction, severe flexible flatfoot, or plantar fasciitis problems. A lateral wedge may be indicated for peroneal tendinitis.

A flare heel is used to increase rearfoot stability. The bottom of the heel in contact with the ground is wider than the top of the heel (Figure 20). The extension of the flare is usually equal to the widest part of the shoe counter. The flare heel increases the base of support, keeping the heel from turning over. It also decreases stress on the heel and ankle.

The solid ankle cushion heel (SACH) consists of a wedge of shock-absorbing material that is inserted into the posterior midsole of the heel. Its purpose is to provide a maximum amount of shock absorption at heel contact and rebound immediately for the next heel strike. The SACH heel is often used in conjunction with short-leg braces or leg prostheses, after a calcaneal fracture, or for synovitis of the ankle.

If a shoe's upper shows signs of breaking down medially or laterally because of severe pronation or supination, a medial or lateral stabilizer (or buttress) may be added to the shoe. The stabilizer is an extension placed on the side of the shoe, including the sole and upper (Figure 21). The stabilizer is made from rigid foam or crepe and provides greater support than the flare heel.

The sole lift is mainly used to treat leg length discrepancy (Figure 22). The thickness of the sole depends on the amount of shortening present, the length of time the discrepancy has been present, and the degree of compensation that has already taken place. The sole lift is always accompanied with a rocker sole.

Metatarsal Bars

Metatarsal bars are often placed on shoes to provide pressure relief for symptomatic metatarsal heads and their adjacent structures. A typical metatarsal bar is approximately 1/8-inch to 3/8-inch high, made of leather or soling rubber, and is fixed transversely across the bottom of the outsole with its apex immediately proximal to the metatarsal heads (Figure 23). It is often used for the treatment of sesimoiditis, hallux rigidus, plantar callosities, and fractures of the metatarsals.

Figure 26: Long (heel-to-toe) spring steel shank placed between layers of sole.

The rocker-sole provides a smooth rocking motion from heel to toe to imitate the heel rise and push-off sequence of normal gait.

Rocker-Soles

A rockersole modification is used for any type of pathologic or pathomechanical condition that either limits normal movement of the ankle, tarsal, or metatarsophalangial joints or in situations where it is desirable to limit such motion. The rocker-sole provides a smooth rocking motion from heel to toe to imitate the heel rise and push-off sequence of normal gait. It allows for very little motion to occur at the metatasophalangial joints with a significant reduction of motion at the ankle, subtalar, talonavicular, calcaneocuboid, and tarsometatarsal joints.

The rocker-sole can be used in the treatment of metatarsalgia; fractures of the metatarsals and phalanges; insensitive feet; arthritis, fusions, and subluxations of the ankle and joints of the rearfoot; and after partial foot amputations. The rocker sole commonly extends from the midshank area to just proximal to the anterior tip of the shoe, with its highest point at the ball of the shoe (Figure 24). When used for partial foot amputations, placement of the rocker is governed by the level of amputation. As the foot becomes shorter, the apex of the rocker must be placed more proximal (Figures 25 a,b,c and d).

A long (heel-to-toe) spring steel shank is a strip of steel or carbon fiber that is placed between the layers of the sole from the heel to the toe box to provide rigidity for the entire outsole (Figure 26). It is most commonly used with a rocker-sole. It prevents the shoe from bending and thus limits toe and midfoot motion. It is often used after transmetatarsal amputations and in the treatment of painful hallux limitus. **PM**

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SEE ANSWER SHEET ON PAGE 177.

1) The most important criteria for the use of a shoe in the management of foot pathology is that the shoe must:
A) Address all of the foot pathologies present
B) Reduce foot pronation
C) Fit properly
D) Be custom made

2) Which one of the following is not a commonly used measurement when fitting a shoe?
A) Overall foot length
B) Arch height
C) Arch or ball length
D) Width

3) The main problem with relying solely on the measurement obtained with a Brannock device for proper shoe fit is that:
A) A Brannock device only measures adult sizes.
B) A Brannock device cannot measure ball width.
C) A Brannock device only gives a rough estimate of size.
D) A Brannock device must be used with a Ritz stick for a proper measurement.

4) How should a patient be fit for a shoe if one foot measures slightly longer than the other?
A) Fit for the shorter foot and stretch the shoe for the longer foot.
B) Fit for the longer foot and add a tongue pad to the shoe for the shorter foot.
C) Fit for the longer foot and add a heel pad to the shoe for the shorter foot.
D) Fit for the longer foot and add a toe filler to the shoe for the shorter foot.

5) When arthritis results in severe joint stiffness, mechanical corrections in a shoe should:
A) Strive to maintain subtalar neutral position.
B) Reposition deformed foot segments.
C) Maintain and protect the foot in its presenting position.
D) Align the heel so that it is vertical to the ground.

6) Which one of the following is not an advantage of a post-operative shoe?
A) Affords excellent foot protection from the external environment
B) Is inexpensive
C) Immediate availability
D) Easily accommodates severe edema

7) What type of shoe might be used when a sturdier version of a post-operative shoe is required as in the treatment of a condition that requires foot bandaging for a long period of time?
A) Custom-made molded shoe
B) Orthopedic oxford shoe
C) Added-depth shoe
D) Healing shoe

8) The most common type of prescription footwear used in the management of foot pathology and ulcer prevention is:
A) Depth-inlay shoe
B) Tarso-supinator shoe
C) Custom-made shoe
D) Molded polyethylene foam shoe

9) The key feature of the depth inlay is:
A) A soft leather upper
B) A Velcro closure
C) An ample removable insole
D) A rocker-sole

10) What would be the best shoe to prescribe for a patient with a wide forefoot and a narrow heel?
A) Custom-made molded shoe
B) Combination last shoe
C) Healing shoe
D) Depth-inlay shoe

11) An eighty five year old patient with a severe talipes equinovarus foot deformity would best be fitted with which one of the following shoes?
A) Custom-made molded
B) Bunion last depth-inlay
C) Combination last depth-inlay
D) Healing shoe with custom orthosis

12) Custom-made molded shoes are usually prescribed with removable insoles made of what materials?
A) 1/4 inch medium Plastizote top with 1/4 inch firm Plastizote bottom
B) 1/2 inch firm Plastizote
C) 1/2 inch neoprene rubber
D) 1/4 inch Poron top with 1/4 inch medium Plastizote bottom

13) What modification can be added to a custom-made molded shoe to reduce heel slippage?
A) More rigid sole
B) High heel counter
C) Rocker-sole
D) Metatarsal bar

14) What type of cast is required for the fabrication of a custom-made molded shoe?
A) Off-weight-bearing slipper cast
B) Semi-weight-bearing slipper cast
C) Off-weight-bearing foot and ankle impression cast
D) Semi-weight-bearing foot and ankle impression cast

15) A patient presents with a new pair of depth inlay shoes. He complains that his 3rd toe is rubbing on the top shoe. You find he has a rigid 3rd hammertoe. What is the best shoe modification in this situation?
A) Cut a hole in the shoe over the hammertoe.
B) Make a linear cut in the upper of the shoe over the hammertoe.
C) Spot stretch the upper of the shoe over the hammertoe.
D) Add a rocker bar to the shoe.

Continued on page 176

Continuing Medical Education

CME EXAMINATION

16) What type of shoe modification can be prescribed for a patient with a spastic equinus foot who has difficulty in slipping his foot into a shoe?

A) Velcro closures
B) Surgical lace-to-toe closure
C) Elastic band closure
D) Zipper closure

17) A patient presents with a prosthetic limb following a below-knee amputation. What heel modification is recommended for the shoe that is to be fitted to the prosthetic limb?

A) Flare heel
B) Medial heel wedge
C) Lateral heel wedge
D) Solid ankle cushion heel

18) A patient presents with severe foot pronation which results in the breakdown of the medial aspect of his shoes, even when using supportive in-shoe orthoses. What modification can be added to his shoes to offer greater support?

A) Lateral sole wedge
B) Medial stabilizer (buttress)
C) Rocker-sole
D) Flare heel

19) What shoe modification would be used to relieve the joint pain caused by a hallux limitus?

A) Rocker-sole
B) Sole lift
C) Medial buttress
D) Lateral sole wedge

20) Which one of the following is not true about a rocker-sole modification?

A) A rocker-sole decreases midfoot joint motion.
B) A long (heel-to-toe) spring steel shank is often used with a rocker-sole.
C) The apex of the rocker is always placed in the same location on a shoe.
D) It provides rocking motion from heel to toe.

See answer sheet on page 177.

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ENROLLMENT FORM & ANSWER SHEET *(continued)*

EXAM #8/11
Prescription Shoes for Foot Pathology (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

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