WHAT SHOULD I LOOK FOR IN A WALKING BOOT?

Walking boots for orthopedic injuries have become an important treatment option to the physician. There are many factors that affect the function of a walking boot. The most important of these is the shape and height of the rocker bottom. The rocker is composed of four sections; the heel strike section, mid-stance section, rock through section, and the toe-off section. All of these sections combine to form the proper curvature that permits normal walking for a given boot size. Each size of boot may represent three or four shoe size ranges. As a result, it is important that the position of the foot is slightly adjustable inside the boot to keep the weight-bearing line centered over the mid-stance section of the rocker bottom. This means that posterior shell designs have a built-in deficiency. The foot is forced to the very back of the shell. The foot is not in the proper position with respect to the rocker bottom. Bledsoe boots permit the foot to be shifted slightly to the front or to the rear to optimize balance and walking characteristics.

Each of the sections of the rocker bottom contributes to the walking gait as well as the comfort and stability of the design. The heel strike section must absorb the force at heel impact at the appropriate point relative to the weight bearing line. If the rocker heel is too far aft, the boot will tend to rock forward. If the rocker heel is too far forward, there will be a tendency to hyper-extend the knee. When walking, the foot does not strike the ground at a 90° angle. If the rocker heel is too wide and flat, the knee will be forced in a valgus direction. If the rocker heel is too narrow, insufficient balance results.

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The mid-stance section of the rocker bottom should have a slightly flattened area to permit standing with adequate balance. The arm angle should be tilted about five degrees forward to permit standing with the knee slightly flexed. If no flattened spot is present, or if not tilted, a lack of balance results. If the flattened area is too long, the boot will try to remain flat and will not walk properly.

The rock through section permits the weight-bearing line to shift from the mid-foot to the ball of the foot at rock through. The length of the foot, as well as the leg length, affect the rock through curve. This is the most curved area of the rocker bottom. It is also the most sensitive to foot positioning.

The final section is the toe-off section. This is the point in the gait when the knee flexes, the thigh rotates forward as well as up, and the toe pivots about a small point before it lifts off. If the toe of the boot is too long or too short for a given patient, a noticeable hesitation or dip will occur in the walking gait.

The combination of each of these curves defines the rocker bottom. If the foot were placed on a flat surface with the appropriate rocker curvature placed beneath it, the resulting rocker bottom would be about two inches thick. The average street shoe has a heel height of less than one inch. In order to reduce the height of the rocker bottom it is necessary to permit the toes to slightly dorsi-flex to allow the foot to drop lower into the boot. This slight toe up position is about the same as would be experienced in an average street shoe. Although some surgical procedures prevent using an upturned toe design, in more than 95% of the indications for such devices there is no adverse effect. The positive side is the ability to provide a very low heel height without compromising the walking gait of the patient. If more than 1/2" difference in length exists between the two legs, back pain will result after a short period of walking.

The material from which the rocker bottom is made is also important. If the material is too hard it will not absorb enough force on heel strike. It will also tend to exaggerate any forces that are produced from an improperly curved rocker bottom. If the material is too soft it will not provide the appropriate balance, and will generally not last very long. The Bledsoe boot features a tough micro-cellular polyurethane material with a tough solid skin that is similar to the sole material used on

current hiking boots. It is resilient, long lasting, and features just the right amount of shock absorption.

The height and the material of the upright arms is also important. Slight mismatches between the walking gait and a rocker bottom will produce some force against the leg. The longer the arms of the boot, the lower will be the force experienced at the top strap, and the more comfortable the device. Short walking boots are not as comfortable as tall ones. The strength of the arms must be sufficient to prevent twisting and bending when large loads are placed against them from patients with inadequate muscular support following injury.

The force that is placed on a walking boot is extremely high. The boot must absorb several times body weight at heel strike, and similar forces at rock through. The formed aerospace aluminum shell of Bledsoe walking boots is capable of handling this force without difficulty. Both the aluminum upright arms and the shell are capable of being formed to fit extremely large ankles or changes in leg shape. This cannot be accomplished in molded plastic boots. The width of the ankle area must be sufficient to accommodate swollen ankles. And finally, the interior padding must be thick enough to be comfortable, but must also be breathable to prevent skin breakdown.

Both fixed and hinged walking boots are available. Hinged walking boots have adjustable hinges to permit setting limits to motion. However, it must be remembered that the curvature of the rocker bottom was designed to produce the correct walking gait when the arms are in a fixed neutral position. When the hinge setting permits motion, full body weight will usually force the boot to pivot to the ends of the motion stops as walking occurs. Hinged boots permit some limited motion exercise, but the same thing can usually be accomplished in a fixed boot by simply removing the boot and performing the exercise. Hinged boots should not be used for Achilles tendon ruptures. There is always a chance of hinge failure or not setting the hinge properly. Furthermore, severe plantar-flexion of the foot will force the knee into hyperextension if the foot accidentally touches the ground. Therefore, a special Achilles tendon boot should be utilized for these injuries.

Other specialty boots are also available such as PTB boots (patellar tendon bearing) and boots for Achilles tendon ruptures or reconstructions. The special Achilles tendon boot features four wedge-shaped heel lifts to remove tension from the Achilles tendon. Each wedge measures 10 degrees and can be removed as necessary during rehabilitation. This boot permits early weight bearing without crutches. The gastrocnemius and soleus muscles remain flaccid when walking in this boot. The PTB boots feature long arms and pre-molded plastic fracture plates to permit some fracture treatment in lieu of casting.

All of the design factors mentioned above must be combined together to produce a walking boot that walks properly, can be fitted easily, will accommodate large and small patients, and has all of the special characteristics to prevent secondary problems. The short three-minute application times for walking boots has brought them into wide use for treating orthopedic problems.

There is a difference!

The difference is in the details!