When to Replace a Prosthetic Limb

A s technology, materials and designs have advanced, particularly in recent years, the function, performance and reliability of prosthetic limbs have likewise improved. But, as any experienced prosthetics-wearer will corroborate, these replacement limbs—though they may offer unparalleled performance, fit and comfort at the outset—will not retain all that excellence forever.

With the human body, things have a way of changing; and with the repetitive stress amputees place on their limbs, components have a way of wearing out. For a limb prosthesis to perform optimally the repetitive stress amputees place on their limbs, components have to continue to function properly for a limb prosthesis to continue to function properly for as long as possible.

The Limb Loss Information Center offers guidelines for help in determining when a prosthesis should be replaced:

• Amputee weight is no longer within the safety range of the prosthesis.
• So many changes/alterations have been made that structural integrity is compromised.
• Residual limb volume loss has reached a level that will affect the limb’s mobility.
• The socket becomes deformed to the point where it cannot fit properly.
• The socket lining (liner) no longer provides a tight seal.
• The socket bond morning to night.
• Enhanced residual limb health
• Reduced pressure on load-bearing areas
• Improved prosthesis fit
• Enhanced residual limb health

Vacuum Socket Suspension Comes of Age

Vacuum systems such as the Harmony give wearers unparalleled "attachment" to their prostheses.Courtesy Otto Bock HealthCare

Virginia Prosthetics, Inc. 4338 Williamson Rd. Roanoke, VA 24012

Welcome, Roanoke Orthopedic Appliance Company Doctors, Patients

Virginia Prosthetics is pleased to announce the January, 2009 acquisition of Roanoke Orthopedic Appliance Company. We look forward to providing ROAC referring physicians and patients, many of whom we already share, the same excellent level of service they had come to expect from Roanoke Orthopedic Appliance. Rusty Rich, CPO has been designated primary hospital contact, assisted by Doug Smiley, CPO and Todd Girl, CO.

In anticipation of our new patients, we will commence a patient area renovation at our main Roanoke office in April to add new patient exam rooms and renovate our patient admissions and check-out area. We will continue stocking of the former ROAC office in downtown Roanoke for our hospital call staff but will see all former ROAC patients at our main Roanoke office at 4338 Williamson Rd.

We are striving to make this transition as seamless as possible. If you have any questions or suggestions, please call us at 540-366-8287.
The occurrence of diabetes, already the leading cause of limb loss in the United States, is growing...by 13 percent in just two years (see accompanying statistics). Prosthetists, orthotists and pedorthists in the United States see more patients with diabetes than any other presenting condition. If any patient type can be described as the foundation of O&P and amputee care, it could be the older diabetic individual with peripheral sensory neuropathy.

Despite decades of progress in managing the disease, the course of diabetes still frequently culminates in varying degrees of lower-limb morbidity and ultimately amputation (see statistics). An estimated 90,000 lower-limb amputations were performed on diabetic patients in 2007 with vascular insufficiency secondary to diabetes. Such amputations can be removed.

With other types of practitioners usually involved in diabetic limb care, we frequently do not see a diabetic patient until an infection, lesion or deformity has progressed to the point that amputation becomes the best option, and we are engaged to provide prosthetic management. However, if you are asked to assist our team is well-equipped to help at-risk patients preserve their intact limbs, but not limb following amputation of the other... or both.

Another disturbing diabetes statistic reveals that up to 50 percent of surviving diabetic amputees will lose their contralateral limb within five years of an initial amputation. Our goal is not to add to that number. In the case of unilateral diabetic amputees, it is not uncommon to have rigorous orthotic-pedicure management under way for the non-amputated leg while active prosthetic care is in progress. Such care is particularly the case during the period of extensive gait training that accompanies the recent amputee’s transition to prosthetic ambulation...or both.

Yet another benefit of vacuum suspension is substantially better relief but can be removed periodically for bathing and dressing changes.

While amputation of a part of a lower limb may be a sound therapeutic decision, it does not redress the host of conditions that likely prompted the amputation in the first place for the aging diabetic patient: ischemia and/or neuropathy in the lower limb, generalized weakness of muscle and balance, and visual and cognitive impairments. Thus, continuing aggressive management of these conditions with the O&P practitioner as an involved participant plays an important management strategy.

Electronic Vacuum Innovations Foretell Better Sockets for Above-knee Amputees

(Continued from page 1)

The substantial advantages of vacuum suspension can be achieved only with careful design and fabrication of a total surface weight-bearing socket that closely matches residual limb shape, a carefully selected roll-on gel liner, and for a transfemoral socket an air-inflatable knuckle sleeve.

Componentry Options

Since the introduction of the breakthrough Harmony Vacuum-Assisted Socket System a decade ago, various new innovations have expanded vacuum opportunities for amputees.

• Harmony®—The original Harmony system has been enhanced with the introduction of two improved vacuum pump models. The Harmony e-pulse is a mechanical in-line pump actuated by alternating weight-bearing pressure and swing-phase relief during ambulation to maintain negative pressure within the socket while cushioning each step. A plastic tube connects the pump to a valve on the back of the socket. The Harmony mechanical system also features an integrated torsion adapter, which effectively replaces the normal ankle rotation of the human leg during ambulation. The Harmony mechanical units are appropriate only for trans-tibial applications and cannot be used with a long residuum. The Harmony mechanical system requires a prosthete.

• The LimbLogic VS is a battery-powered system that can be mounted either in-line directly below the socket or external to the shaft for long residual limbs. The controller unit weighs less than a half-pound and can be worn in a belt or on a leg band.

Perhaps the most noteworthy advantage of the LimbLogic system is that it opens the door to vacuum suspension for above-knee amputees. As a result new componentry and options have been developed, leading to significant improvements in range of motion and comfort, both standing and sitting.

Once set by the prosthetist, LimbLogic continually monitors and maintains the desired vacuum pressure within preset limits; the wearer can adjust the pressure for within those limits using a small wireless remote. Both knee and ankle are water-resistant.

• The Harmony e-pulse adds the benefits of an externally mounted, battery-powered vacuum unit to the original Harmony system, replacing the in-line mechanical pump. Like other options, the e-pulse can work with any residual limb length and thus can be used for both above-knee and below-knee patients.

The e-pulse offers four preset vacuum levels, easily selected by the wearer. The e-pulse is small, lightweight, quiet, and provides audio and visual feedback. As with most O&P breakthrough technology, widespread insurance coverage for advanced vacuum suspension systems is not yet a reality...it will take time. When the now immensely popular C-Leg® microprocessor knee system was introduced a decade ago, the inevitable patient question “Is it covered by our insurance?” was almost inevitable. Today, C-Legs are frequently covered by insurance, including Medicare, with proper authorization and documentation. As the performance and comfort benefits of vacuum suspension become more widely appreciated, we may expect that this technology will likewise qualify for reimbursement.
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Testing with the system confirmed its effectiveness: For the average size limb (13 inches proximal circumference), an extraction force exceeding 150 pounds was required to separate liner from socket under vacuum. (For reference, extraction forces encountered in daily activities seldom exceed 20 pounds.) By comparison, less than one pound extraction force can cause separation with all other suspension methods.

Vacuum Socket Suspension Comes of Age

Note to Our Readers
Mention of specific products in our newsletter neither constitutes endorsement nor implies that we will recommend selection for which it was designed or that all or part of it is wearing out, we invite you to call our office for a prosthetic check-up.

Virginia Prosthetics, Inc.
4338 Williamson Rd.
Roanoke, VA 24012

Keeping a good socket fit is essential to maintaining optimum mobility.

• It is impossible to increase/decrease the size of the socket and/or frame without rebuilding the whole prosthesis.

As the essential link between residual and prosthetic limb, the fit and function of the socket is critical to prosthetic success. If socket fit or condition has declined significantly, if the materials are no longer strong enough to bear the weight of the wearer, or if suction or proper hygiene cannot be maintained, it’s probably time for a replacement. Frequently, a new socket can be provided without having to replace the entire limb.

If you or someone you know has reason to believe your prosthesis is not delivering the full function for which it was designed or that all or part of it is wearing out, we invite you to call our office for a prosthetic check-up.

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The intimate socket fit produced by vacuum assistance creates a vastly superior extraction force—the force required to create separation between the liner and socket—to any other current suspension method. Not only does vacuum suspension create a secure bond between limb and socket at the beginning of the day, but by eliminating the pressure fluctuations within the socket normally encountered during ambulation, the system prevents daily residual limb volume loss altogether, thus maintaining the strong limb–socket bond morning to night.

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