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 with any experienced prosthesis-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 and thus meet the mobility expectations of both patient and pros-theticist, the intended fit and component performance must continue to exist. If either becomes degraded, the prosthetic outcome will decline as well.

Therefore, it becomes necessary to replace individual components or the entire prosthesis from time to time, depending on the lifestyle of the amputee and the complexity and composition of the replacement limb. The Amputee Coalition of America/National 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 components.
• Components are no longer working to the specifications of the manufacturer.
• The individual’s activity level is no longer compatible with the components used.
• A specific component/module needs replacing, but the replacement is not compatible with the rest of the existing components.
• So many changes/alterations have been made that structural integrity is compromised.

Note to Our Readers

Mention of specific products in our newsletter neither constitutes endorsement nor implies that we will recommend selection of the particular products for use with any particular patient or application. We offer this information to enhance professional and individual understanding of the orthotic and prosthetic discipline and the experience and capabilities of our practice.

We gratefully acknowledge the assistance of the following resources used in compiling this issue:

Ohio Willow Wood • Orthofeet Inc. • Orthomerica Products Inc. • Marlo Ortiz, P.O. • Ossur Americas • Otto Bock Health Care

Vacuum Socket Suspension Comes of Age

Nothing is more important to an amputee wearing a prosthetic leg than keeping the prosthesis firmly anchored to the residual limb. The more the residuum moves around inside the socket, the less effective the ambulation, the greater the stress on limb tissues, and the higher the chance the limb will come off entirely, often precipitating a fall.

With conventional suspension methods (atmospheric suction, pin, anatomic, belt, etc.), prosthesis wearers typically experience 6-12 percent residual limb volume change during the day, caused by alternating weight-bearing pressure during stance and gravity pulling during swing phase. As a result, an intimate socket fit at the beginning of the day deteriorates to a loose attachment in a few hours, either requiring bothersome addition of limb socks or resulting in increased pinning with reduced proprioception and accelerating fatigue.

A majority of lower-limb amputees who wear prosthetic limbs face the reality every day.

The 1999 introduction of a vacuum-assisted suspension system promised a better way. By removing air molecules from the sealed space air pressure over a total surface weight-bearing socket and a prosthetic liner covering a residual limb, the vacuum holds the liner firmly against the socket wall, creating a vastly superior extraction force—the force required to create separation between the liner and socket—to any other current suspension method.

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 systems such as the Harmony® give wearers unparalleled “attachment” to their prostheses.

O&P Trends & Developments

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

Making Strides

Vacuum Suspension Benefits

• Superior linkage to prosthesis
• Reduced pressure on load-bearing areas
• Minimal residual limb volume fluctuations
• Improved proprioception
• Enhanced residual limb health

The intimate socket fit produced by vacuum assist also enhances the wearer’s spatial awareness ( proprioception) and control of the prosthesis. The leg responds immediately to residual limb movement and feels lighter, thereby reducing energy expenditure and improving endurance.

(Continued on page 2)
Keeping Diabetic Patients On Their (Own) Two Feet

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 graph). 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, it is the diabetic patient. Thus, the older diabetic patient receives from a prosthetic limb...

Sobering Stats

Recent American Diabetes Association and centers for Disease Control statistics relating to the incidence and outcomes of diabetes indicate a growing health issue: • The CDC estimates that 23.6 million Americans—8% of the population—have diabetes, 5.7 million of whom are undiagnosed. Diabetes prevalence increased 13.6% from 2005 to 2007. • Nearly 30% of diabetes age 40 and older have some form of hypertension. An estimated 15% of people with diabetes will develop foot ulcers. • Diabetics are the underlying cause in an estimated 90,000, primarily lower-extremity, amputations in the U.S. last year. Worldwide, diabetes is linked to one million foot and leg amputations annually. • More than 60% of non-traumatic lower-limb amputations occur in people with diabetes. The amputation rate for people with diabetes is 10 times higher than for people without diabetes. • 1 of every 10 health care dollars in the U.S. is spent on direct and indirect costs of diabetes.

Electronic Vacuum Innovations Foretell Better Sockets for Above-knee Amputees

Throughout 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 expanded with the introduction of two improved vacuum pump models. The Harmony® 1 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 torso adapter, which effectively replaces the open sore holes that have been observed to heal while the patient continues daily activities. The substantial advantages of vacuum suspension can be achieved only with careful design and fabrication of a total surface assembly to run smoothly and in perfect harmony with the amputee's activity level. The Harmony system maximizes both vacuum suspension and knee flexion action. The LimbLogic® V5 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 incorporates a locking device to prevent knee buckling. 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 of the introduction of the Harmony system, leading to significant improvements in range of motion and comfort, both standing and sitting. Once set by the prosthetist, LimbLogic continuously monitors and maintains the desired vacuum pressure within preset limits; the wearer can adjust the pressure (Continued from page 1) Prosthetic Implications of Diabetes

C omplications of diabetes frequently also complicate prosthetic rehabilitation of the new diabetic amputee. Common issues include ischemia and/or neuropathy in both the amputated and contralateral limb, diminished strength, coordination and endurance, visual impairment; balance problems; cognitive difficulty; and desire to resume an active lifestyle. The first determination is whether the patient can indeed benefit from a prosthetic limb. The recuperating amputee must possess certain prerequisites that enables him to progress. The ability to rise from bed or chair and pivot on the contralateral limb and sufficient hand and arm strength to maneuver prosthetic components. These prerequisites also require an adequate level of balance and cognition.

The Harmony e-pulse adds the benefits of an externally actuated spring and a microprocessor-controlled pump. The Harmony e-pulse is available in both the Harmony and LimbLogic systems. The impedance switch monitors and maintains the desired vacuum pressure within preset limits; the wearer can adjust the pressure. 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® micropump microcontroller knee system was introduced a decade ago, the invariable question was "Is it covered by insurance?" We were asked this question in the negative. 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.

Component Selection

Light weight, durability and ease of use are particularly important attributes in managing treatment for patients. Because sores and infection occur so frequently in insensitive limbs, optimal socket design and appropriate liners are crucial. Flexibl, dynamic sockets help prevent undue pressure over sensitive skin or nerve areas and bony prominences. Gel liners help reduce friction and skin irritation and increase tolerance for forces within the socket. For above-knee diabetic amputees, a lightweight knee component provides a high degree of stability and is usually prescribed. Polycentric designs are a frequent choice with some incorporating a locking device to prevent knee buckling while ambulating.

Lightweight foot components appropriate to the amputee’s activity level will help maximize the benefits of the older diabetic patient receives from a prosthetic limb. Good options for patients with diabetes include the new FlexFoot Assure, Endolite Senior, and the still-reliable SACH (solid ankle, cushion heel) foot, among others. Our practitioners are dedicated to providing the best possible care for our diabetic patients. We are available to help with patient education, resolve component issues as they occur, and assist patients in achieving the compliance necessary for success. For additional information, give us a call.

Electronic Vacuum Innovations Foretell Better Sockets for Above-knee Amputees

Within those limits using a small wireless remote unit. Both the controller and remote 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. Liner modules that work with diabetes include the new FlexFoot Assure, Endolite Senior, and the still-reliable SACH (solid ankle, cushion heel) foot, among others. Our practitioners are dedicated to providing the best possible care for our diabetic patients. We are available to help with patient education, resolve component issues as they occur, and assist patients in achieving the compliance necessary for success. For additional information, give us a call.

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When to Replace a Prosthetic Limb

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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 comfort at the outset—will not retain all that excellence forever. The experienced prosthesis-wearer will corroborate, these replacement components used.

Sometimes, components simply wear out. Keeping a good socket fit is essential to maintaining optimum mobility. • It is impossible to increase/decline 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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O& P TRENDS & DEVELOPMENTS SPRING 2009

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With conventional suspension methods (atmospheric suction, pin, anatomic, belt, etc.), vacuum suspension techniques are the most consistent. The intimate socket fit produced by vacuum suspensions is an essential to maintaining optimum mobility 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.

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O&P TRENDS & DEVELOPMENTS

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

Leimkuehler Orthotic & Prosthetic Center, Inc.

A publication of Leimkuehler Orthotic & Prosthetic Center Inc.

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Vacuum systems such as the HarrisonMfg. vacuum systems such as the HarrisonMfg.

“attachment” to their prostheses.

Courtesy Otto Bock HealthCare

LimbLogic VS opens vacuum suspension to all causes amputees.

Courtesy Otto Bock HealthCare

On April 25th, 2009 the Leimkuehler Orthotic-Prosthetic Center will host 16th Annual Amputee Support Group Picnic to be Held June 24, Wednesday. The picnic will be held from 6 to 9 p.m. at the Amherst Amherst facility, 205 N. Leavitt Rd. This picnic is free and open to anyone and everyone. We look forward to seeing you there.

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16th-Annual Amputee Support Group Picnic to Be Held June 24

Wednesday, June 24, 2009 at 6 p.m. the Leimkuehler Orthotic-Prosthetic Center staff will host their 16th amputee support group picnic at their Amherst facility, 205 N. Leavitt Rd. This picnic is open to all our amputees and their families.

A pot luck-type dinner will be served outdoors (weather permitting). Come and share your favorite dish and fellowship with fellow amputees. This is a rain-or-shine event.

Please call and let us know if you will attend:

(440) 988-5770

(Continued on page 2)