Pathway to Promote Highest Functional Outcomes in Diabetic Limb Preservation Programs

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No commercial disclosure

Vascular Surgeon with a strong interest in Limb Preservation and Wound Care
  • 23 years experience with the Limb Preservation Program at MAMC

Work for US Government; and any opinions or recommendations are my personal recommendations and not the opinions of the US Government
Pathway to Promote Highest **Functional** Outcomes in Diabetic Limb Preservation Programs

- A change in philosophy is required – Tissue preservation is not always the same as functional preservation or functional restoration.
- Early limb preservation centers were focused on tissue preservation –
  - Function needs to be a major outcome
- An appropriate team cannot only prevent major amputations but can preserve function or restore function at the highest level
Limb Salvage Initiatives
Historical Perspective

- Initial focus in many centers was to avoid any type of amputation.
- Any amputation even a toe was looked on as a failure (BLACK MARK IN HEAVEN).
- This led to unbalanced feet with isolated toes and a high rate of recurrent ulcers.
- Chronic wounds were a source of morbidity, a source for infection and set the stage for a more emergent higher level of amputation.

REALIZATION: TISSUE PRESERVATION (TOE PRESERVATION) IS NOT THE SAME AS FUNCTION PRESERVATION.
Salvage of Toes may not give you the best functional result
Limb Preservation - salvage of a limb that would have otherwise been amputated

In addition to avoiding a major amputation it is critical to focus on the foot.

In addition to avoiding major amputations, the goal of a limb preservation initiative is to achieve a plantigrade foot that provides the highest level of function with the shortest recovery period, even if that means a minor amputation and/or reconstructive foot surgery.

Goal - Promoting the highest level of function for the longest period of time

Limb Preservation – Supplement to WOUNDS Sept 2009

• Tissue Preservation vs. Functional Restoration
  • Managing a diabetic foot ulcer in the wound care clinic with weekly dressing changes for a year to avoid a toe amputation may be tissue preservation but is not functional restoration.
  • Sequential removal of 4 toes over a year with episodes of recurrent ulceration, antibiotics and hospitalization is not good functional restoration

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ULCER INFECTION or CLI AMPUTATION

Limb Preservation Initiative “Stop the Cycle”
Success – Understanding and Addressing all Factors

Peripheral Neuropathy; Altered biomechanics; Repetitive Stress

A Successful Limb Preservation Program addresses all factors, not just the CLI

Understand and treat the Disease
Understand and treat the confounding factors
(TEAM APPROACH)
Amputation in patients with diabetes major problem worldwide

In the World there Is an Amputation every 30 sec as a result of Diabetes – 2,500 limbs per day
Amputations

• Centers for Disease Control and Prevention (CDC) statistics from 2010 documented 73,000 non-traumatic amputations in adults 20 years or older.
• Sixty percent in patients with diabetes
• Diabetes is the most common cause of non-traumatic amputation in the United States.

Limb Preservation – MAMC Experience
• Diabetic patients referred to Vascular Surgery had advanced disease with ulcerations and/or foot infections. *(Delayed Recognition)*

• *(High amputation rate)* in diabetics with poorly treated wounds admitted with foot infections

• Large number of wound care products *(No Wound Care Standards)*
• Multidisciplinary group met to address the problem and a Foot at Risk Clinic was established in 1995
  • (23 years of experience)
• Goal was to decrease the amputation rate in diabetics
• Screening of diabetics – neuropathy, vascular insufficiency, foot deformity and previous history of foot infections or ulcers
• Stratified as low, moderate or high risk for amputation
• Initiated a formal wound care clinic and wound care consultative service with wound care standards
• Foot at risk clinic expanded to a Limb Preservation Service
• Limb Preservation Service has full time chief and a dedicated staff
  • Dr. Vickie Driver
  • Dr. Thomas Roukis
  • Dr. Valerie Schade
  • Dr Mario Ponticello
• First Limb preservation fellow started in July 2003. Seven fellows have completed program
Success of the Team Approach

Incidence rate was decreased 82%.

Five major amputations since October 2015 making the limb salvage rate 99.2% (5 major amputations in the 600 patient at risk population).

With a successful limb preservation program the number of minor amputations will increase but the number of major amputations will decrease.

A well planned TMA may lead to the highest level of function and the lowest incidence of recurrence.

Preventing Amputations
(Team Approach)

- A retrospective review of a limb salvage program in Sweden reported a 78 percent reduction in major amputation rates.
- Prospective studies in the United States (over five years) and United Kingdom (over 11 years) have shown an 83 percent reduction and 62 percent reduction respectively when utilizing a team approach to limb salvage.


Building a Successful Limb Preservation TEAM

• Similar to an NFL Team – not weekend touch football
• Select players with correct skills
• Passionate coach
• Playbook - protocols
• Practice – on same field
• Huddle, Huddle, Huddle (Constant Communication)
• Celebrate success – use the 12th man (Involve Patients)

Andersen C, Diabetic Limb Preservation: Defining Terms and Goals. Journal of Foot and Ankle Surgery 49 (1) 106-107, Jan/Feb 2010
Vascular Component

• Requires a vascular team with skills, dedication and passion for preventing amputations

• Diagnosis
  • Non Invasive Vascular Lab
  • Angiography Suite

• Treatment
  • Advanced endovascular techniques
    • Distal tibial intervention is critical
  • Open surgical expertise
• Large number of unnecessary primary amputations are still occurring today - many times due to a lack of understanding of CLI (Misleading term - Small Vessel Disease in patients with diabetes)
• Large number of amputations are performed without a vascular evaluation or assessment by a limb preservation team.
• Timely Vascular assessment and revascularization is critical
• With currently available techniques most patients with CLI can be revascularized
• Revascularization is critically important but only one piece of the solution
Could you have PAD?

PAD:
- Is caused by hardening of the arteries
- Starves the legs and feet of oxygen
- Can cause foot sores that won’t heal
- Can lead to amputations, even death

Keep your legs & feet healthy:
- Tell your doctor if you have leg pain
- Don’t smoke; if you do smoke, quit!
- Walk 30 minutes/day, 3 to 5 times a week

Many patients have NO symptoms, but PAD affects 8 to 12 million Americans over 50.

Learn more:
V5Web.org/PAD
Podiatric Component

- Requires a Podiatric team with skills, dedication and passion for preventing amputations
- Limb Preservation has become a subspecialty in podiatry
  - Advanced surgical skills
- General podiatry often functions as the gate keeper
- Understanding of biomechanics and orthotics
Strategies to Prevent and Heal Diabetic Foot Ulcers: Building a Partnership for Amputation Prevention

A Joint Publication of the SVS® and the APMA
Wound Care

- Requires a wound care team with skills, dedication and passion for healing wounds and preventing amputations
- Knowledge of the disease as well as knowledge of wound care
  - In a diabetic ulcer it is more important what you take off the wound than what you put on the wound
  - OFF Loading - TCC
- Advanced wound care techniques
The persistence of a chronic wound increases the risk for severe adverse events (infection, osteomyelitis, amputation and death) and has a significant impact on the well-being of the patient and the health care system.

Standard treatment has a low chance of healing chronic ulcers in a timely fashion.

Utilization of evidence based protocols with advanced wound care heals diabetic foot more rapidly thus decreasing severe adverse events.

THE LONGER A WOUND IS PRESENT THE MORE LIKELY YOU WILL END UP WITH AN AMPUTATION

Consensus Recommendations On Advancing The Standard of Care for Treating Neuropathic Foot Ulcers in Patients With Diabetes
Ostomy Wound Management 2010;56 supplement
• Wound care has become a science
  • Exciting new products and adjunctive therapy
  • Understanding interaction at the cellular activity

• Shift from healing wounds to reconstructing tissue defects to promote the best function and to prevent recurrences

• Healing wounds vs. regeneration of functional tissue

• **Rapid and functional reconstruction of tissue defects saves health care dollars, decreases morbidity and amputations and promotes return to function**

• **Need to look at not only the rate of healing but the time to heal**
  • Sometimes a toe amputation or even a TMA is better than prolonged wound care
In proper situations FUNCTIONAL LIMB PRESERVATION with a well-balanced partial foot amputation through virgin tissues as the index procedure is frequently the most humane treatment option and will provide a durable native foot with better quality of life compared to a chronic wound or a prosthetic limb.

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Components of Pathway to prevent major amputation and promote function

- Early recognition of diabetes and diabetic control
- Cardiovascular risk factor control preventing CLI
- Foot Screen
- Prevention – orthotics
- Ulcer Treatment – wound care, internal and external offloading
- Timely CLI identification and treatment
- Early Infection identification and aggressive treatment
- Diabetic foot reconstruction – may require minor amputation
- Continued treatment of disease and prevention of recurrent ulceration
Conclusions

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