FOOT CARE AND LIMB SALVAGE IN THE DIABETIC PATIENT
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Disclosures
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Objectives
- Understand the systemic effects of diabetes on the lower extremity
- The significance of structural and biomechanical deformities in the diabetic patient
- Identify high risk patients for lower extremity amputation and provide preventative care
Diabetes
- 1%-4.1% of world is diabetic
- Diabetic population 30 times higher risk for amputation
- BKA increase cardiac output and decrease ambulation vs. TMA
- 20% of patient population
- 70% of ulcers
- 90% of medical cost

Diabetes
- Multiple affects on the lower extremity
- THE BIG THREE
  - Vascular
  - Neurologic
  - Musculoskeletal
- *All contribute to diabetics being the leading population for AMPUTATION!*

Diabetes and Comorbidities
- Microvascular disease by definition
- Hypertension (renal)
- Nutritional Status
- High Blood Glucose Levels (>200mg%)
- Smoking (CO vs. Nicotine)
- This combination leads to increased risk for ulceration, infection, and amputation
Diabetes and Renal Disease

- There is an increased rate of ulceration in the diabetic with the start of Dialysis.
- This increased rate of ulceration also correlates with an increased rate of lower extremity amputation.
- Lower extremity amputation is 10 times higher in diabetics with diabetes and ESRD.
- This is a contributing factor to increased mortality rates in diabetics receiving dialysis.

The effect of elevated blood glucose

Glucose is our "energy" and is designed to be sequestered in our muscles.
Insulin from the pancreas is meant to recognize and "push" excess glucose into muscle.
If there is too much glucose floating around in our bloodstream it sticks to things and makes them not work correctly.

Peripheral Neuropathy

- Affects hands and feet
- Demyelination of peripheral nerves
- Diabetics lose feeling, get blisters, and get infected without knowing it.
- Diabetes also affects eyesight
- Easy to screen with tuning fork and Semmes Weinstein monofilament
Nerves begin to swell and lose their myelin sheath.
Swollen nerves get pinched or compressed at tight areas of the body (hypoxic event).
Below the knee and ankle are common areas.
Neuropathy occurs in a stocking and glove distribution.
Loss of balance, then discriminate touch, and then pressure sensation.
Excess blood sugars cause inflammation of the blood vessel walls. This shuts down the small blood vessels (especially in the feet and organs). This hardens the medium size blood vessels (garden hose into a hard pipe). Increases the rate of CAD (coronary artery disease). Can lead to blockages in blood vessels.

Vascular effects of elevated blood glucose in diabetics
- Excess blood sugars cause inflammation of the blood vessel walls
- This shuts down the small blood vessels (especially in the feet and organs)
- This hardens the medium size blood vessels (garden hose into a hard pipe)
- Increases the rate of CAD (coronary artery disease)
- Can lead to blockages in blood vessels

Vascular
- Insufficiency—need Vascular Surgery input
- Bypass and Endovascular procedures
- Arterial and/or Venous Stenting???????
- Often see Medial Calcific Sclerosis on radiographs
- Combined with Neuropathy will see hydration problems of skin
- Dry and cracked feet
Vascular
- Venous Insufficiency - Superficial vs. Deep
- Need compression therapy
- Compression hose long term
- Proximal involvement? May-Thurner Syndrome, Factor V leiden??

The effect of elevated blood glucose on tendons and ligaments
- Excess glucose sticks to tendons
- Tendons become tighter leading to foot deformities
- Hammertoes, bunions, and ankle equinus
- Positional deformities can lead to hypoxic tissue zones

Foot Deformities
Podiatry Input
- Hammertoe - Simple deformity causing 3 major pressure problems
Equines

- Increase forefoot pressure
- Diabetic Fibrosis of tendons=contractures
- Forefoot amputations also increase forefoot pressure
- Conservative Management
- Rocker bottom shoe with stiff shank
- Surgical Offloading
- Achilles Tendon Lengthening

Equines

Equinus
Ulcer Care

- Topicals-antibacterial, enzymatic debrider, biologics
- Mechanical-negative pressure, tissue expanders (microcell deformation)
- Metabolic-Hyperbaric Oxygen, Tissue Stimulators???
- **Mechanical Debridement!!!!!!!!!!**

Ulcer Care

**Clinical Debridement**

- **Mechanical Debridement!!!!!!!!!!**
Charcot Foot
- Profound Neuropathy
- Great Circulation
- Usually equinus present
- Unknown trauma starts cascade of hyperemia
- Continued ambulation leads to continued trauma
- Eventually leads to fracture dislocation
- Unstable deformed foot with plantar dislocated bone

**Charcot Foot**
- Initially see acute erythema, edema, calor
- Often treated as *cellulitis* with antibiotics
- Patient allowed to keep ambulating-Mistake
- Need to be **NWB immediately**-will save the foot
- **Radiograph** will be diagnostic
- **Bisphosphonates** help-alendronate, boniva, Fosamax ?
- Surgical vs. Offloading shoe gear (CROW boot)
- Need both

**Charcot**
The combination of Peripheral Neuropathy, Peripheral Vascular Disease, and Foot Deformity can lead to Foot Ulcerations.

Foot Ulcerations can lead to infections and amputations.

It takes 60% more cardiac output to walk with a Below Knee Prosthesis.

With the combination of Cardiac disease and neuropathy most people can not balance with a prosthesis.

Significant increase in mortality after a Below Knee Amputation from Congestive Heart Failure (CHF).

Physicians and Nursing can play a huge role in public health.

Early recognition of pathology along with patient education can greatly decrease morbidity and mortality in the diabetic patient.

This should never happen.
Conclusion

- Prevention and/or aggressive management of diabetes can dramatically decrease amputations.
- Diabetics patients NEED A PODIATRIST!
- Multidisciplinary approach works the best.
- Foot care, hygiene, and daily foot checks can greatly decrease amputations and mortality.

Questions?


Thanks

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