Foot plant gangrene

Reconstruction of the foot

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www.gfmer.ch/ICLS/Homepage.htm
Right foot
Clinical information

- Diabetic Patient
  - Previous treatments performed elsewhere:
    - Intravenous antibiotics
    - Hyperbaric chamber
    - Advanced local wound treatment
A: Treatment progress:

- General assessment
  - Decompensated Diabetes
    - Insulin adjustment
    - Fluid and electrolyte balance
  - Mild to moderate Acute Renal failure

- Arteriography
  - Gaseous Contrast (Carbon Dioxide) integrated by Iodinated Contrast.
    - Gas was used to reduce further damage to an already impaired renal function

- Angioplasty
  - Insertion of Self Expanding Stent in the Femoral Artery.
Arteriography

- Arteriography with Iopamiro 300
  Non-ionic iodinated contrast media

Short severe stenosis of the superficial femoral artery
Percutaneous Transluminal Angioplasty

- Procedure performed in part by using Carbon Dioxide. This was done to reduce the total amount of non-ionic iodine contrast thus minimizing further renal damage.

Angioplasty balloon inserted and inflated at a pressure of 8 Atmospheres.

Stenosis of the Superficial Femoral Artery.

Balloon inflated at 16 Atmospheres.
Insertion of BS 6 mm self-expandable stent *Symphony* stent

**CO₂ Arteriography**
Highly soluble Carbon Dioxide gas is injected in the femoral artery
To visualize results of Angioplasty.
Gaseous contrast does not produce renal toxicity

Stent inserted in the femoral artery
Arterial flow is verified by injecting Carbon Dioxide
Verification of adequate flow in the vessels below the knee with Carbon Dioxide Injection
A single, simple stenosis of the Superficial Femoral Artery alone in a non-diabetic patient rarely produce gangrene.

but...:

A stenosis of the femoral artery may help severe gangrene develop in diabetic patients who develop infections or in patients who have chronic renal failure.

Treating the stenosis is essential to increase blood flow to the foot.
after successful Stenting and correction of the stenosis...

B: Treatment progress:

- Surgical debridement
  - Anesthesia
  - Surgical resection of necrotic and infected tissue from the foot

- Cultures and sensivities
  - Identification for prevalence bacteria by
    - Gram stain
    - Aerobic and anaerobic culture
    - Antibiotic testing in vitro
  - Specific Antibiotic treatment
Foot before PTA

July 21, 1998
Plant of foot before PTA and surgical debridement

July 29, 1998
Plant of foot 1 week after PTA and Debridement
Comments

Restoring blood flow alone by angioplasty **IS NOT ENOUGH** to save the foot and prevent amputation!

Further immediate treatment is necessary...
Admission to
National Center for Limb Salvage

C: Treatment progress:
- Long term local wound treatment
  - Daily surgical cleaning
  - Medication of wound with
    - 10% diluted Povidone Iodine (Betadine®)
- Foot reconstruction
- Rehabilitation
- Follow-up controls
D: Treatment progress:

- Foot reconstruction
  - Skin Transplant
September 16, 1998
Shortly after Skin Transplant to the foot
E: Treatment progress:

- Rehabilitation
- Follow-up controls
20 Luglio 1999: Un anno post PTA

July 20, 1999
1 year post PTA
October 18, 1999
15 months post PTA
July 1998 – October 1999

- Functional foot with normal walking capabilities
3-year post stenting: PRIMARY PATENCY and no recurrent foot ulcer
F: Treatment progress:

- Long-term follow-up controls
- Strict control of diabetes
- Foot hygiene
- Footwear accurately chosen
Follow-up care

- F: Treatment progress:
  - Life-long yearly medical work-up of patients
  - Diabetes surveillance
  - Appropriate hygiene
  - Diet and weight control
  - Proper foot ware and preventive care
  - Repeated early intervention for recurrent arterial disease
Conclusions

- Even with extensive foot plant gangrene an effective limb salvage is feasible
- Anatomical and functional results can both be satisfactory
- Hyperbaric chamber may help, but it should not be considered a mainstay in the treatment of gangrene in diabetic patients: it should be better considered no more than an accessory aid to avoid dispersion of resources.
  - Literature data on the effect of Hyperbaric Oxygen on non-clostridial infections are at best controversial
  - When concentrating on hyperbaric Oxygen therapy, one may focus less attention on much more important therapeutic maneuvers which could be more determinant in the limb salvage process.
  - Priority should be given to re-vascularization, aggressive debridement, foot reconstruction, diabetes control and nutritional support, accurate microbiology and well chosen antibiotics, logistic and psychological support to the patient and his/her family.
  - Hyperbaric chamber probably accelerates the growth of granulation tissue, thus helping speed the healing process, but only when the problem of infection and poor blood supply has been solved by more effective means.
  - More often than not, a diabetic limb can be salvaged without Hyperbaric chambers.
  - Rarely can one save a limb with the sole use of Hyperbaric Oxygen.