



Diabetic Complications in the Prediabetic Patient

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Abstract

There are approximately 21 million diabetics in the United States. Research has shown a significant association between hyperglycemia and the progression of vascular disease and its complications. These vascular complications include myocardial infarctions, strokes, renal failure, amputations and blindness, especially if the hyperglycemia is not well controlled. Uncontrolled diabetes also causes numerous foot, skin and nerve complications (Charcot Joint, hammer toes, dry skin, and neuropathy) which combined with the vascular disease and decreased ability to fight infection lead to limb threatening ulcers.

To be labeled diabetic, one of the following criteria has to be fulfilled. The patient has to have a fasting blood sugar (FBS) of 126mg/dl or a blood sugar of 200mg/dl or greater after a two hour glucose tolerance test (GTT). A patient is labeled prediabetic with a FBS of 100-125mg/dl or a two hour GTT of 140-199mg/dl. Once a patient is labeled diabetic, every effort is made to keep the patients blood sugar controlled to prevent the complications of diabetes. This is not always the case with the prediabetic.

The following case illustrates a patient with severe bilateral diabetic foot ulcers, osteomyelitis, advanced neuropathy and distal vascular disease. The patient's prior history was negative for diabetes, but was consistent with prediabetes.

History and Physical Exam

This is a 68 year old white female who noted a callous over the plantar aspect of her left

1st metatarsal, which quickly developed into an ulcer. She was initially treated with oral antibiotics by her private medical doctor due to increasing redness and swelling. She denied any pain, fever or chills. During that period she also began to develop an ulcer over the right 3rd and 4th metatarsal heads and she was referred to our clinic. She noted sensory neuropathy of both feet and lower legs, but denied having diabetes. Her history was complicated by suffering a recent fracture of her left foot which was treated conservatively.

Past medical history was positive for hypertension and elevated triglycerides.

Family history was strongly positive for diabetes.

She smoked ¼ packs per day for 8 years, but quit many years ago.

Review of systems was negative for claudication, but was positive for occasional rest pain.

Physical Exam revealed palpable pulses through out and a stocking like neuropathy involving both feet and lower legs. Her ulcers are noted below.

Before Treatment



Before Treatment



Before Treatment

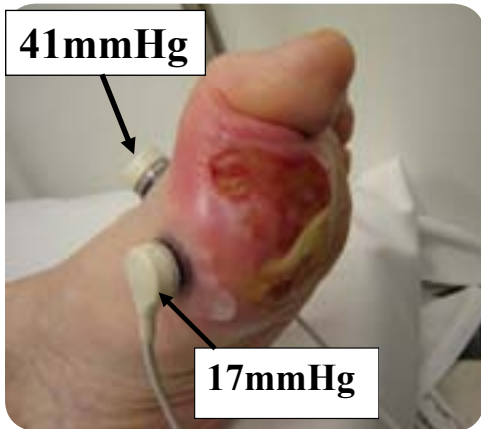
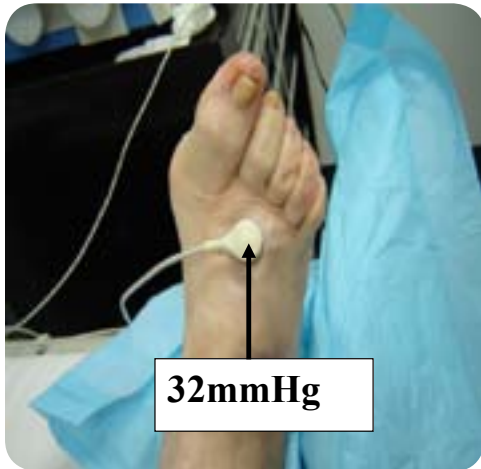


Our initial impression was that the patient had infected ulcers of both feet with possible osteomyelitis and diabetes.

Work Up

Transcutaneous oximetry was performed.

TcpO₂



Labs: Hgb A1C 6.3, GFR 58 (moderate decrease), WBC 11,000, ESR 46, CRP 7.8

Arterial Doppler ABI Right 1.0 & Left 1.05

X-ray right foot revealed old fractures of the 2nd, 3rd and 4th metatarsals and a bone scan showed probable osteomyelitis of the 1st metatarsal.

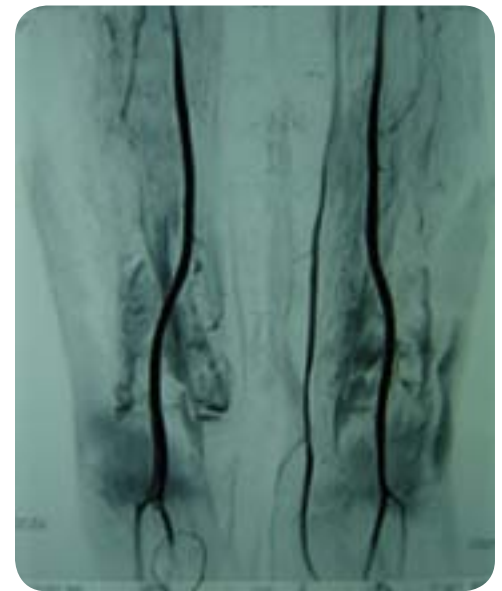
Xray



Bone Scan

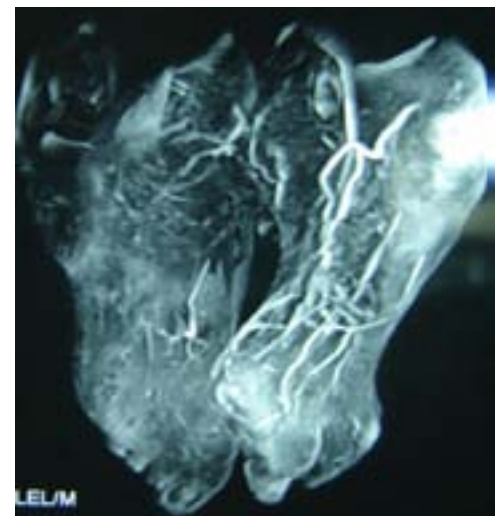


MRA



MRA identified distal vascular disease, with occlusion of the left distal anterior tibial artery. There is stenosis proximally of the right posterior tibial artery and poor flow into the right foot

MRA



The patient was admitted to the hospital, started on IV antibiotics and an orthopedic consult was obtained. Her blood sugars were aggressively treated and she required multiple surgical debridements of soft tissue and bone of her left foot.

Surgical Debridements



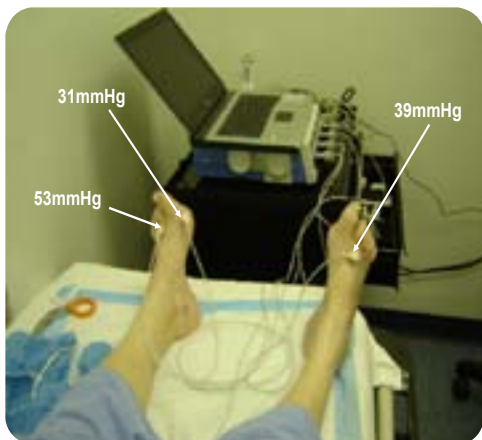
After discharge from the hospital, the ulcer sites slowly began to worsen.

During Treatment



Excessive drainage from the left 1st metatarsal site was treated with Iodosorb and hyperbaric oxygen therapy (HBOT) was begun. The patient followed her diabetic diet and lost 25 pounds during the course of her treatment. Repeat transcutaneous oximetry was performed after approximately 20 HBOT's, which showed that angiogenesis was progressing.

TcpO2



We continued the patient on antibiotics, Iodosorb in the ulcers, diabetic control mainly with diet, off-loading with a wheelchair and stopped the HBOT after 40 treatments. During this time she was being followed both by her orthopedic surgeon and an infectious disease consultant. Due to persistence of the drainage at the left 1st metatarsal head another debridement was performed. Gradually the drainage decreased and the ulcer began to decrease in size.

During Treatment



Her blood sugars came back to normal due to conscientious dietary control and her ulcers went on to heal.

During Treatment



She is now being fitted with molded shoes and is again able to ambulate.



Conclusion

The case demonstrates that the complications of diabetes are developing during the prediabetic phase, long before the patient is labeled diabetic by the usual testing methods. This is not an isolated case at our clinic and the literature is also demonstrating the progression of severe coronary artery disease during this same period. There are 54 million prediabetics in the United States. We may need to consider treating these prediabetics more aggressively or lowering the laboratory criteria for making the diagnosis of diabetes.

About Precision Health Care

Precision Health Care is a comprehensive wound healing and hyperbaric medicine service organization dedicated to the development of state-of-the-art hyperbaric and wound healing centers through partnership and collaboration with our affiliate hospitals.

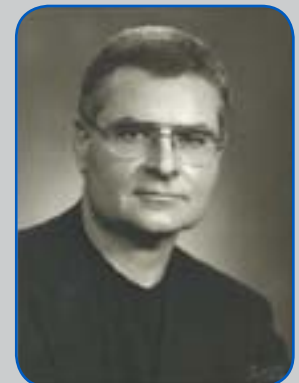
Questions or Comments?

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About the Author



Charles D. Rice, M.D., F.A.C.S., U.H.M. is the Medical Director of the Center for Wound Healing & Hyperbaric Medicine at Mount St. Mary's Hospital in Lewiston, N.Y., with Board Certifications in Surgery and Hyperbaric Medicine. He has over 20 years experience in General and Vascular Surgery. Since 2003, his practice has been devoted solely to Wound Healing and Hyperbaric Medicine.