



TcpO2 - A Simple Non-Invasive Screening Tool for Peripheral Arterial Disease in the Diabetic Patient

Charles D. Rice, MD, FACS, UHM

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Abstract

Non-invasive measurements of limb systolic pressures are used routinely to assess the severity of peripheral arterial disease, including the evaluation of critical limb ischemia. Ankle pressures, however, cannot be measured reliably in patients with calcified vessels as is commonly seen in patients with diabetes.

TcpO₂ measures the pO₂ of the capillaries in the dermal layer of the skin and is not affected by these calcified vessels. TcpO₂ monitoring is a useful screening tool to identify hemodynamically significant peripheral arterial disease, especially in the diabetic patient.

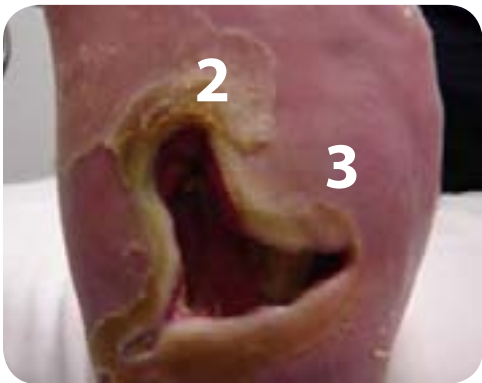
Case Report

The patient was a long standing insulin dependent diabetic with a non-healing ulcer of the right foot, Charcot joints, diabetic neuropathy and no palpable pulses below the poplitals. Bilateral ankle-brachial indices (ABI) were 1.0 (normal).

Past surgical history is positive for bilateral little toe amputations for osteomyelitis.

The patient was treated with appropriate antibiotics, multiple surgical debridements and appropriate standard wound care over the course of six weeks without significant wound healing.

RT Foot TcpO2 Sensor Sites



TcpO₂ monitoring was performed to rule out tissue hypoxia as one of the contributing factors in failure of this wound to heal.

TcpO2 Equipment



Tissue Oxygenation Monitoring (Tcm) Report					
PATIENT INFORMATION			TEST INFORMATION		
NAME	DOB	MRN	TEST NO.	DATE	TIME
John Doe	12/12/1950	12345678	001	01/15/2006	10:00
Site	Location	Initial pO ₂ (mmHg)	Final pO ₂ (mmHg)	Delta pO ₂ (mmHg)	Notes
2	Right Foot	45	35	-10	
3	Right Foot	14	10	-4	

Interpretation of TcpO2 Study

Air - Site #3 had pO₂ of 14 mmHg on room air. A pO₂ below 40 mmHg is not usually adequate to support the cellular metabolism of wound healing.

TcpO₂ monitoring was performed to R/O Tissue Hypoxia as one of the contributing factors in failure of this wound to heal.

Elevation - When the legs are elevated 30°, the pO₂ at sites #2 and #3 dropped significantly. This occurred because the blood flow (and consequently the pO₂) decreased distal to the obstruction when flowing against gravity. This identifies a vascular obstruction.

100% O₂ - When the patient was then given an O₂ challenge, both sites #2 and #3 increased significantly. This result indicates that the tissue hypoxia is reversible, thereby confirming the patient is a candidate for Hyperbaric Oxygen Therapy (HBOT).

LT Foot Charcot Deformity



Arterial obstruction was suspected due to the drop in pO₂ with elevation of the legs. An MRA was ordered and identified that the patient had an occlusion of the right superficial femoral artery.

Before Treatment



The patient was referred to a vascular surgeon for possible bypass.

TcpO₂ monitoring in this case helped identify:

1. A major arterial occlusion of the right superficial artery.
2. Local tissue hypoxia at the ulcer (site #3 on air).
3. The tissue hypoxia was reversible with an oxygen challenge (sites #2 and #3 at 100% O₂)

Conclusion

- TcpO₂ is a useful screening tool to identify patients suspected of having a major arterial occlusion.

- TcpO₂ identifies reversible tissue hypoxia (candidates for HBOT).

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.

Community-based and patient-focused, we are driven by this mission philosophy: To provide select hospitals safe, comprehensive, compassionate wound healing and hyperbaric services for patients in need.

Questions or Comments?

Contact us:

at Precision Health Care:

1-888-HyperHeal (497-3743)

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.

THE PRIMARY CARE PHYSICIAN SHOULD REFER THE PATIENT FOR ADVANCED WOUND CARE IN A WOUND HEALING CENTER IF THE PATIENT:

- Has a wound that persists for more than 30 days after treatment
- Has a wound and Reynaud's phenomenon
- Has purpura
- Has a wound and hypertension
- Has gangrene or necrotic tissue in a wound
- Has a wound and diabetes