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# Pulse Oximetry May Not Reliably Assess Peripheral Perfusion

*To the Editor:*—Findlay *et al.* propose that pulse oximetry can be used to confirm adequate foot perfusion during radical perineal prostatectomy.[1] Specifically, they recommend that a pulse oximeter probe be attached to a toe when the legs are positioned in a fashion that potentially compromises extremity perfusion. Their theory is that "when the foot is perfused, the pulse oximeter displays a normal tracing." Conversely, "when the blood pressure decreases below a threshold value for that patient, no pulse waveform is displayed."

That pulse oximetry might be a useful measure of perfusion is intuitive and has been proposed numerous times.[2–6] The difficulty with this approach, however, is that pulse oximeters are "too good." Specifically, they contain extremely powerful amplifiers that can detect saturation and display a waveform even when flow is critically compromised. A further difficulty is that oximeters actually evaluate arterial pulsation, not flow *per se.* The result is a substantial potential for false-normal results.

The consensus among vascular and hand surgeons is that prolonged digital systolic arterial blood pressures <40 mmHg are likely to result in tissue injury.[7–11] My concern about using pulse oximetry as an index of flow is that the technique appears unreliable. In one study, for example, the technique failed to detect critical reductions in distal extremity pressure in two of three cases.[12] Another study demonstrated that the pulse oximeter signal is maintained (without even a "low perfusion" warning) until flow is reduced to ≈8% of normal.[13] Pulse oximetry obviously detects the most extreme reductions in tissue flow—those bordering on complete ischemia. However, the method proposed by Findlay *et al.*[1] seems likely to provide false reassurance in a substantial number of cases where flow is actually seriously restricted.

I would thus like to propose an equally easy, but potentially more reliable, measure of foot perfusion: ankle blood pressure. Simply position the cuff of an oscillometric blood pressure monitor around the ankle and confirm that the systolic arterial pressure exceeds 40 mmHg. An alternative is to attach a cuff sized for premature infants to the long toe. Obviously, pressure at these sites should be monitored at relatively infrequent intervals, say ≈10-min intervals, so the measurements themselves do not excessively restrict flow.

Human extremities are, fortunately, relatively resistant to ischemia. It would nonetheless be risky to maintain critically low foot perfusion for the duration of a radical prostatectomy or similar procedure. Measurements of ankle blood pressure will alert anesthesiologists to inadequate perfusion, allowing interventions that might include increasing systemic blood pressure or altering patient position.

**Daniel I. Sessler, M.D.**
Department of Anesthesia
University of California, San Francisco
374 Parnassus Avenue, 3rd Floor
San Francisco, California 94143-0648
sessler@vaxine.ucsf.edu

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