

Non-Invasive Doppler Blood Pressure Monitoring in the Monoplace Hyperbaric Chamber, Reviewed

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Background

Blood pressure (BP) measured non-invasively (NIBP) may need to be monitored during hyperbaric oxygen (HBO₂) therapy in the monoplace chamber. Previous work (1991) using the Oscillomate 1630 during monoplace HBO₂ therapy demonstrated good correlation with systolic BP measured by indwelling arterial catheter: BP, noninvasive = 112±8.1 mmHg (mean±1 standard deviation); BP, arterial catheter = 114±7.6 mmHg, ($P < 0.001$, paired t -test, $n=92$ measurements in 8 subjects over a range of chamber pressures 0.85 to 2.9 ATA). However, the Oscillomate 1630 is no longer available. The use of an alternative NIBP device will be described.



Results

The NFPA limits electrical leads to 28 volts/0.5 watts and temperatures up to 60°C inside the Class B chamber.² The Parks Medical 811-B outputs a maximum of 0.02 watts³ and does not produce heat. This Doppler device is used in helicopter and emergency departments where the noise level can impact the ability to obtain a blood pressure measurement.

Without a pressure relief valve, the cuff can be overinflated, which could injure the patient and damage the gauge. Consider using a pediatric flowmeter to limit the gas supply to the cuff.

Materials and Methods

Ultrasound wiring from a Parks Medical Electronics, model 811-B, 9 mghz ultrasound, adult flat probe and luer-lock pressure tubing was inserted through, and caulked within, the bore of a 4-inch length of 3/8 inch OD copper pipe conduit. This assembly can then be passed through the chamber hatch via a standard Sechrist intravenous pass-through fitting.

Radial or brachial arterial blood flow is detected by the ultrasound probe taped into position over the artery. Systolic BP is measured by inflating a standard BP cuff with a hospital oxygen flow meter, while observing the sphygmomanometer located inside the chamber.

The manual cuff valve is pegged at least half open, inhibiting over-pressurization of the cuff and permitting the cuff to deflate automatically when the oxygen flow from the flow meter is reduced. An in-line pressure relief valve and a check-valve on the supply line can also reduce the risk of cuff over-inflation and protect the gauge.

The systolic NIBP is recorded when the first flow sound is heard during deflation.

CAUTION: Disconnect the charging unit from the Parks Medical 811-B and use on battery only when it is connected to the hyperbaric chamber/patient.



Conclusions

The NFPA allows only physiological and communication leads inside the class B chamber. This device meets the NFPA 99, 2005 edition requirements. This device can be assembled inexpensively and safely with commonly available supplies.



1. Weaver LK, Howe S. Non-invasive Doppler blood pressure monitoring in the monoplace hyperbaric chamber. *J Clin Monit* 1991;7(4):304-308.
2. National Fire Protection Association. NFPA 99: Standard for health care facilities. 2005 ed. Quincy, Massachusetts, 2005.
3. Afarin A, Parks L. 811-B Doppler flow detector operating/service manual. Rev 6.1. Parks Medical Electronics, Inc. Aloha, Oregon, 2010.