Title: THE PERFORMANCE OF THE FINAPRES CONTINUOUS BLOOD PRESSURE MONITOR DURING THE PERI-INDUCTION PERIOD IN HIGH-RISK PATIENTS

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INRODUCTION: The Finapres™ (Ohmeda, Denver, Co) is a new, non-invasive blood pressure monitor which provides continuous arterial waveform display using a finger cuff. Several studies have demonstrated the accuracy of the Finapres by showing that the mean difference between Finapres and direct arterial pressure measurements over a large number of determinations is small[1,2]. However, few studies have specifically addressed the *reliability* of the Finapres by examining how often the Finapres fails to reflect the arterial pressure during periods of hemodynamic change. The purpose of the current study was to assess the reliability of the Finapres, by examining the frequency, duration and magnitude of differences between Finapres and direct arterial pressures during the peri-induction period in high risk patients.

METHODS: After Institutional Review Board approval, 15 patients undergoing cardiac or major vascular surgery in whom direct arterial pressure monitoring was planned were studied. A 20-g Teflon cannula was inserted into a radial artery and connected to a calibrated disposable pressure transducer using 180cm long, 1.5mm diameter low compliance tubing. The direct arterial pressure was displayed on a Hewlett Packard (HP) 78534C monitor, which calculated the mean arterial pressure (MAP). An appropriate sized Finapres cuff was placed on the middle phalanx of the contralateral middle finger. This avoided potential artifact from placing the Finapres cuff distal to the arterial cannula. The hydrostatic pressure caused by the height from the right atrium to the Finapres cuff was monitored using a separate transducer, and was subtracted from all Finapres values. Every 2s a laboratory computer (IBM PC/AT) collected the digital time-weighted average MAP simultaneously from the Finapres and the HP monitor using RS-232 communications. The data were recorded directly onto disk. Data collection commenced prior to induction and continued for 60 minutes or, in the cardiac patients, until the institution of cardiopulmonary bypass. Using a computer program, the data was processed off-line, firstly to obtain data points which were the average of 3 consecutive measurements, and secondly to remove invalid data points caused by artifact (e.g. periods when the Finapres was performing a 'lock-adjust'). A comment code was entered into the computer each time there was interference with either monitoring system. Data points during periods of interference were deleted. The processed data were analyzed using the SAS system to determine the differences between simultaneous Finapres and direct MAP measurements, the frequency of various magnitudes of difference, and the duration of prolonged discrepancies (A discrepancy was defined as > ±7.5mmHg difference for 2 or more contiguous data points).

RESULTS: A total of 20,830 pairs of Finapres and HP data points were collected in the 15 patients over 11.5 hours, and were processed into 3,820 pairs of 6s-averaged points for comparison. This represented a mean of 253 data point comparisons per patient, and an average of one comparison every 11s. Figure 1 displays the frequency of various magnitudes of MAP difference between the Finapres and the HP monitor. 44.8% of the differences were < ±5mmHg, and 88.5% of the differences were < ±15mmHg. Only 5% of the differences were > ±25mmHg. Figure 2 displays the duration of prolonged discrepancies. The majority of the discrepancies were <1 min duration, and discrepancies of >5 min duration were rare (observed on only 4 occasions in 11.5h of data collection).

DISCUSSION: The Finapres is a new approach to non-invasive blood pressure monitoring. It provides beat to beat information and arterial waveform display without the discomfort, risks and expense of invasive monitoring. However, these advantages are inconsequential unless the Finapres accurately and *reliably* reflects the direct MAP. Our study provides a detailed description of the performance of the Finapres in the peri-induction period in high risk patients. Our results support the conclusions of previous studies which have shown that the mean difference between Finapres and direct MAP is small[1,2]. Our results are particularly pertinent, as unlike previous studies, we used the contralateral arm for Finapres measurements. Moreover, our results show that large discrepancies between Finapres and direct MAP are infrequent and are usually of short duration. These findings suggest that the Finapres can be used as an attractive alternative to other methods of non-invasive monitoring. However, as occasional large discrepancies do occur, a more complete characterization of the performance of the Finapres is necessary before the Finapres can be considered an alternative to invasive arterial pressure monitoring.

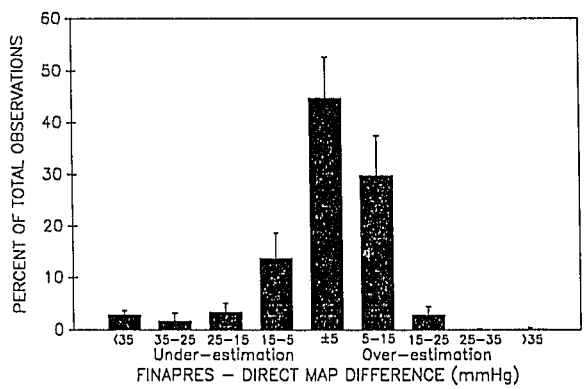

FIGURE 1 Frequency of various magnitudes of Finapres - direct mean arterial pressure (MAP) differences. Bars indicate mean ± sem.

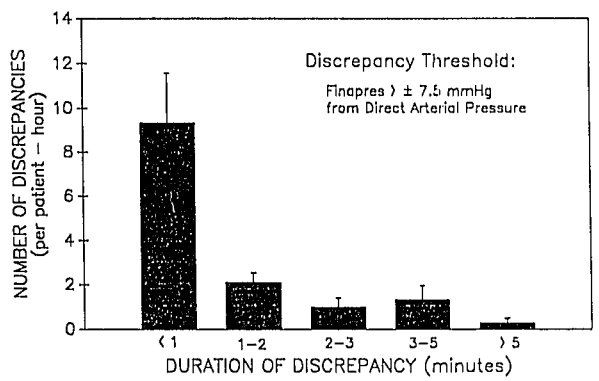

FIGURE 2 Frequency of various durations of discrepancy between Finapres and direct mean arterial pressure. Bars indicate mean±sem.

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