**A Comparison of the Performance of Pulse Oximeters during Blood Pressure Cuff-Induced Hypoperfusion in Volunteers.**

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## Background

Pulse oximetry is considered a standard of care in both the operating room and the postanesthetic care unit, and it is widely used in all critical care setting. (1) In some patients, measurements of SpO2 and blood pressure should be made on the same arm. Loosing pulse oximetry signal during inflating cuff for blood pressure measurement may miss important information, particularly in the patients with hemodynamic instability. The purpose of the present study was to compare the performance of pulse oximeters during blood pressure cuff-induced hypoperfusion.

## Methods

Ten healthy volunteers (25-42 yr) participated in the study. To simulate clinical situation, all measurements were performed in the same operating room using the same monitor at the same room temperature. Blood pressure was measured, by cuff, using a conventional vital signs monitor (Hewlett Packard). Each volunteer was instrumented with pulse oximeter sensor on the index finger, and blood pressure cuff on the same arm. We tested the following pulse oximeters for comparison: Masimo SET Radical (Masimo), Nellcor N-395 (N-395), Nellcor N-20PA (N-20PA), and Nellcor D-25 (D-25). To evaluate the performance of the pulse oximeters, time to peak of cuff pressure (TP), time to loss of signal (TLS), time to recovery of signal (TR), and failure interval (FI) were measured. All measurements were performed three times in one pulse oximeter, and averaged. Differences among the pulse oximeters were analyzed using ANOVA. $P < 0.05$ was taken as significant. All data were expressed as mean ± SD.

## Results

There were no differences in hemodynamic measurements among the groups. TLS was longer in Masimo than the other pulse oximeters. Masimo and N-395 showed a significant short TR than the other two pulse oximeters. FI was in the order of Masimo << N-395 < D-25 = N-20PA.

## Conclusion

Our study clearly demonstrates that the Masimo SET Radical shows better performance than the Nellcor N-395, Nellcor N-20PA, or Nellcor D-25, yielding a long-lasting and quick recovery in SpO2 during blood pressure measurement.

References: (1) Anesthesiology 1997; 86: 101-8

Performance of Pulse Oximeters During Blood Pressure Cuff-Induced Hypoperfusion

| | TP (sec) | TLS (sec) | TR (sec) | FI (sec) |
|---|---|---|---|---|
| Masiomo SET | 8.8±1.3 | 24.7±4.0 | 29.1±3.7 | 4.4±2.8 |
| Nellcor N-395 | 8.0±1.4 | 9.2±1.9[a] | 28.3±7.3 | 17.1±6.9[a] |
| Nellcor N-20PA | 8.2±1.5 | 8.1±1.5[a] | 36.6±4.2[ab] | 28.5±5.0[ab] |
| Nellcor D-25 | 8.2±1.7 | 9.7±1.4[a] | 35.7±7.3[ab] | 26.0±6.8[ab] |

[a]P<0.05 vs MasimoSET, [b]P<0.05 vs N-395