



Ankle Blood Pressure as a Predictor of Neonatal Outcomes in Obese Women Undergoing Cesarean Delivery (CD) under Spinal Anesthesia (SAB)

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- Spinal-induced hypotension in CD has an incidence up to 71% in parturient patients [1], with fetal acidosis as a known complication.
- Brachial blood pressure measurement is the standard of care, but it is often technically difficult [2] and may fail to detect distal hemodynamic changes.

Are brachial BP measurements and ankle BP measurements interchangeable?

Hypothesis:
Ankle-based hypotension thresholds are independently associated with neonatal morbidity.

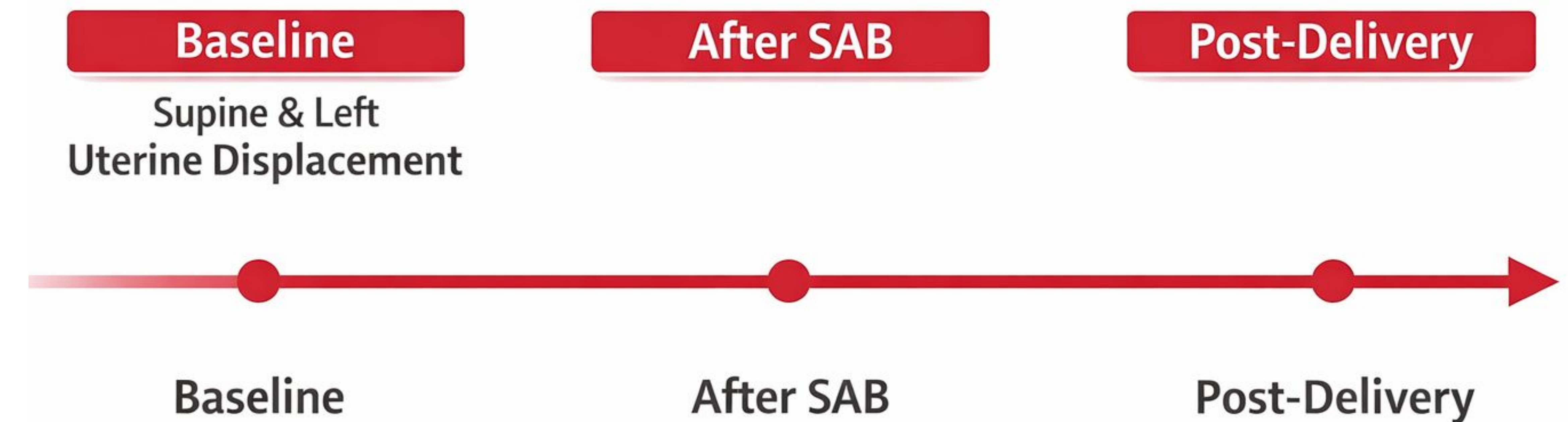
1. Butwick A, Columb M, Carvalho B. Preventing spinal hypotension during Caesarean delivery: what is the latest? *British Journal of Anaesthesia*, 114, 183-186
2. Kuck K, Baker PD. Perioperative noninvasive blood pressure monitoring. *Anesth Analg*. 2018;127(2):408–411.





A Prospective Observational Study

- Patient Population: term patients with obesity undergoing scheduled CD under SAB
- Collected epidemiologic and characteristic data from IRB approved, at-term patients
- Collected BP measurements at both sites, at 3 different time points: prior to SAB, after SAB initiated; and after delivery.
- Collected post-delivery neonatal outcomes, APGAR scores, needs of airway support, NICU admission.
- Data analysis: Agreement between hypotension thresholds at the arm and ankle was assessed using Bland–Altman analysis. Stepwise multivariable logistic regression models were created to find associations with the primary outcome, NICU admission.



**Hypotension defined using 22 thresholds;
11 for SBP and 11 for MAP at both sites.**

- ❑ SBP at arm ≤ 100 mmHg (recommended), ≥ 0 -40% from baseline SBP at both arm and left ankle
- ❑ MAP at ankle ≤ 65 mmHg (most believed), ≥ 0 -40% from baseline MAP at both arm and left ankle



Results

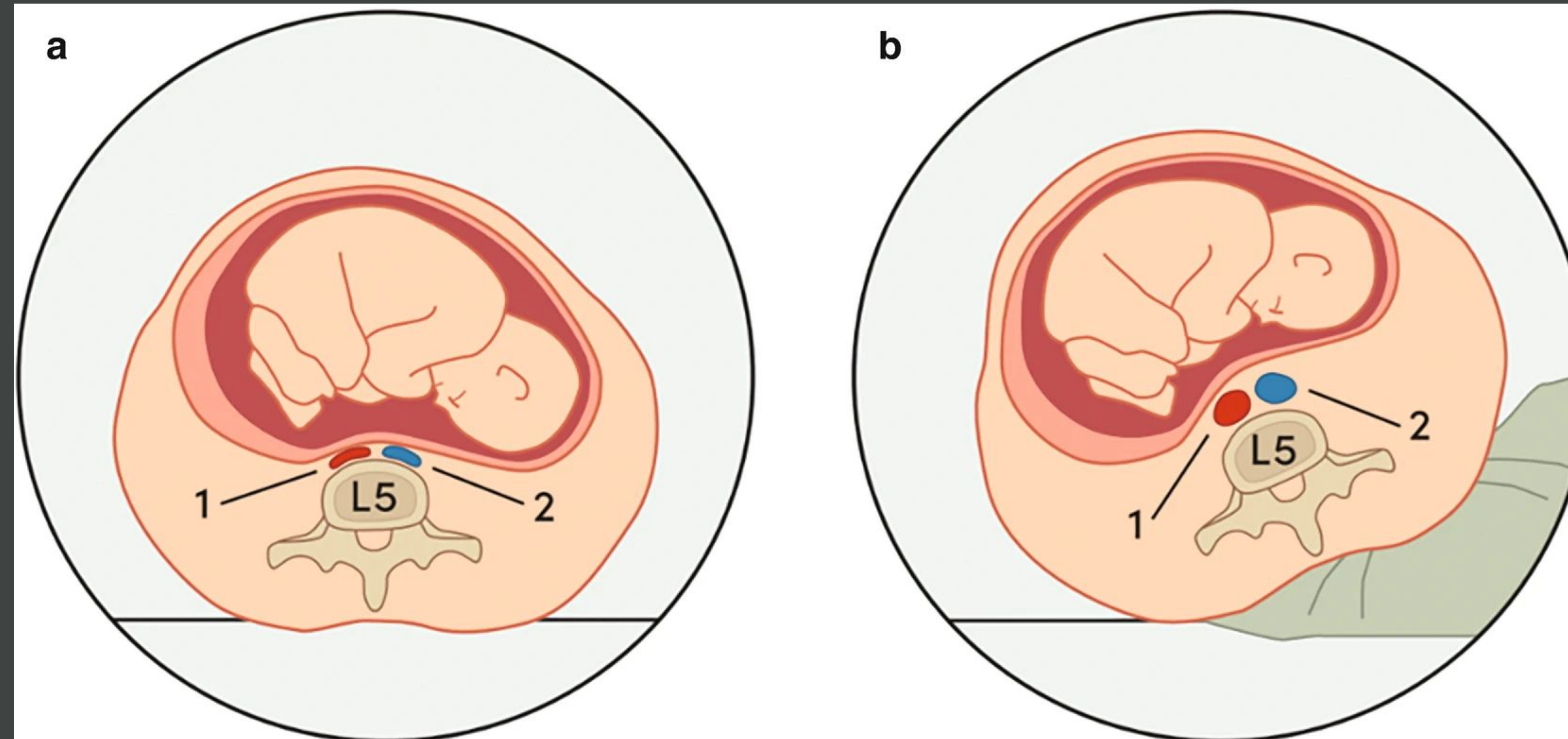
- Ninety-seven women with BMI of 43.1 ± 7.9 kg/m² and gestational age of 38.6 ± 0.9 weeks
- NICU Admission incidence was 12.4%
- Bland–Altman analysis revealed a systematic negative bias, with arm measurements consistently lower than ankle measurements
 - mean bias for SBP: -13.8 to -21.0 mmHg; MAP: -5.5 to -12.3 mmHg

Table 1. Multivariable Logistic Regression Analysis for Predictors of NICU Admission			
Variable	Adjusted OR	95% CI	p-value
Ankle MAP $\geq 30\%$ from baseline	33.19	2.66 – 413.51	0.007
Ankle SBP ≥ 30 % from baseline	13.40	1.36 – 131.65	0.026
Hypertensive Disorders (HDP)	5.04	1.20 – 21.08	0.027
Arm BP $\geq 30\%$ from baseline	2.02	0.29 – 14.09	0.473
BMI (per unit increase)	1.05	0.94 – 1.18	0.385

- In multivariable models, ankle hypotension, specifically a decrease of $\geq 30\%$ from baseline, was a strong independent predictor of NICU admission.
- This association was significant for ankle MAP, more than for ankle SBP.

- Hypotension measured at the arm at any threshold was not associated with NICU admissions.

Aortocaval compression [3]



Conclusion: In patients with obesity undergoing CD under SAB, arm and ankle BP measurements are not interchangeable. Ankle-site monitoring provides unique predictive value for neonatal risk.