Study Protocol and Statistical Analysis Plan

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Title: Comparative Effects of Ephedrine and Norepinephrine on Fetal Acidosis in Cesarean Deliveries Under Spinal Anesthesia: A Prospective, Randomized Controlled Trial

Background:

Maternal hypotension is a frequent complication of spinal anesthesia in cesarean sections. Ephedrine and norepinephrine are two commonly used vasopressors. Recent studies suggest norepinephrine may be associated with a lower incidence of fetal acidosis compared to ephedrine due to its distinct pharmacodynamic profile.

Objective:

To compare the effects of intravenous ephedrine versus norepinephrine on fetal acidosis prevention in patients undergoing cesarean delivery under spinal anesthesia.

Methods:

Design: Prospective, double-blind, randomized controlled trial.

Setting: Gazi Ya■argil Training and Research Hospital, Diyarbak■r, Türkiye.

Population: 100 healthy parturients (ASA I-II) scheduled for elective cesarean delivery under spinal anesthesia.

Interventions: Patients will be randomly assigned to receive ephedrine (5-10 mg) or norepinephrine (5-10 µg) intravenously in response to hypotension.

Primary Outcome: Umbilical artery pH < 7.20.

Secondary Outcomes: Incidence of maternal hypotension, maternal and fetal tachycardia, Apgar scores, additional vasopressor requirements.

Ethics:

The study has received ethical approval from the Harran University Clinical Research Ethics Committee (Decision No: HRÜ/25.08.38).

Informed consent will be obtained from all participants prior to inclusion.

Statistical Analysis Plan:

Statistical analyses will be performed using SPSS v25.

Categorical variables will be compared using Chi-square or Fisher's exact test.

Continuous variables will be tested for normality (Shapiro-Wilk test).

Normally distributed variables will be compared using Student's t-test; non-normally distributed variables using the Mann–Whitney U test.

Logistic regression will be used to identify predictors of fetal acidosis.

A p-value < 0.05 will be considered statistically significant.

Sample Size Justification:

Based on previous literature, an expected incidence of fetal acidosis of 20% with ephedrine and 7% with norepinephrine was used to calculate a minimum of 47 subjects per group with 80% power and $\alpha = 0.05$. To account for dropouts, 50 patients per group will be recruited.