ABSTRAK

Latar Belakang: Postoperative nausea and vomiting (PONV) dan hipotensi merupakan komplikasi yang dapat terjadi setelah anestesi spinal. Barisitas bupivakain memengaruhi distribusi anestetik lokal dalam cairan serebrospinal dan karakteristik blok simpatis sehingga berpotensi memengaruhi kejadian PONV, hipotensi, dan respons inflamasi perioperatif. Platelet-to-lymphocyte ratio (PLR) merupakan biomarker inflamasi sederhana yang berpotensi mencerminkan respons stres sistemik akibat anestesi dan pembedahan. Penelitian ini bertujuan menganalisis perbedaan kejadian PONV, perubahan PLR, dan kejadian hipotensi antara penggunaan bupivakain isobarik adjuvan fentanyl dan bupivakain hiperbarik adjuvan fentanyl pada anestesi spinal.

Metode: Penelitian eksperimental dengan rancangan randomized controlled trial melibatkan 50 pasien ASA I–II yang menjalani operasi sectio caesarea elektif dengan anestesi spinal. Subjek dibagi menjadi kelompok bupivakain isobarik 12,5 mg dengan fentanyl 25 µg (n=25) dan kelompok bupivakain hiperbarik 12,5 mg dengan fentanyl 25 µg (n=25). PONV dinilai pada interval 0–6, 6–12, 12–18, dan 18–24 jam pascaoperasi. PLR diperiksa sebelum dan 2 jam setelah anestesi spinal, sedangkan kejadian hipotensi dinilai berdasarkan pemantauan mean arterial pressure selama 60 menit. Analisis menggunakan uji Mann–Whitney U, Friedman, Fisher's exact, dan korelasi Spearman dengan tingkat kemaknaan $p<0,05$.

Hasil: Skor PONV pada kelompok hiperbarik lebih tinggi dibandingkan kelompok isobarik pada interval 0–6 jam (median 3 vs 2; $p<0,001$), 6–12 jam (median 2 vs 1; $p<0,001$), dan 12–18 jam (median 1 vs 1; $p<0,001$), sedangkan pada interval 18–24 jam tidak terdapat perbedaan bermakna ($p=0,153$). Skor PONV menurun secara bermakna selama periode pengamatan 24 jam ($p<0,001$). Median perubahan PLR (ΔPLR) lebih tinggi pada kelompok hiperbarik dibandingkan kelompok isobarik (21,38 vs 6,81), tetapi perbedaannya tidak bermakna secara statistik ($p=0,138$). Tidak terdapat perbedaan bermakna PLR sebelum ($p=0,421$) maupun sesudah anestesi ($p=0,946$) antara kedua kelompok. ΔPLR menunjukkan korelasi positif lemah dengan skor maksimum PONV selama 24 jam, tetapi tidak mencapai kemaknaan statistik ($\rho=0,279$; $p=0,050$). Kejadian hipotensi ditemukan pada 20% subjek kelompok isobarik dan 44% kelompok hiperbarik. Tidak terdapat perbedaan bermakna kejadian hipotensi antara kedua kelompok pada setiap titik waktu pengamatan. Subjek yang mengalami hipotensi memiliki skor maksimum PONV yang lebih tinggi dibandingkan subjek tanpa hipotensi (median 3 vs 2; $p=0,006$), sedangkan ΔPLR tidak berbeda bermakna berdasarkan kejadian hipotensi ($p=0,493$).

Kesimpulan: Penggunaan bupivakain hiperbarik adjuvan fentanyl pada anestesi spinal menghasilkan skor PONV yang lebih tinggi dibandingkan bupivakain isobarik adjuvan fentanyl selama 18 jam pertama pascaoperasi. Tidak terdapat perbedaan bermakna pada PLR sebelum, PLR sesudah, maupun perubahan PLR antara kedua kelompok. Kejadian hipotensi secara deskriptif lebih tinggi pada kelompok hiperbarik, tetapi tidak menunjukkan perbedaan bermakna pada analisis berdasarkan titik waktu pengamatan. Hipotensi berhubungan dengan skor maksimum PONV yang lebih tinggi, tetapi tidak dengan perubahan PLR.

Kata kunci: anestesi spinal, bupivakain hiperbarik, bupivakain isobarik, fentanyl, hipotensi, *platelet-to-lymphocyte ratio*, *postoperative nausea and vomiting*

ABSTRACT

Background: *Postoperative nausea and vomiting (PONV) and hypotension are complications that may occur following spinal anesthesia. The baricity of bupivacaine affects the distribution of local anesthetics within the cerebrospinal fluid and the characteristics of sympathetic blockade, potentially influencing PONV, hypotension, and perioperative inflammatory responses. The platelet-to-lymphocyte ratio (PLR) is a simple inflammatory biomarker that may reflect the systemic stress response to anesthesia and surgery. This study aimed to analyze differences in PONV, changes in PLR, and hypotension between isobaric bupivacaine with fentanyl and hyperbaric bupivacaine with fentanyl for spinal anesthesia.*

Methods: *This randomized controlled trial included 50 ASA physical status I–II patients undergoing elective cesarean section under spinal anesthesia. Participants were allocated to receive either 12.5 mg isobaric bupivacaine with 25 µg fentanyl (n=25) or 12.5 mg hyperbaric bupivacaine with 25 µg fentanyl (n=25). PONV was assessed at 0–6, 6–12, 12–18, and 18–24 hours postoperatively. PLR was measured before and 2 hours after spinal anesthesia, while hypotension was assessed based on mean arterial pressure monitoring over 60 minutes. Statistical analyses were performed using the Mann–Whitney U test, Friedman test, Fisher's exact test, and Spearman's rank correlation, with statistical significance set at $p<0.05$.*

Results: *PONV scores were significantly higher in the hyperbaric group than in the isobaric group at 0–6 hours (median 3 vs. 2; $p<0.001$), 6–12 hours (median 2 vs. 1; $p<0.001$), and 12–18 hours (median 1 vs. 1; $p<0.001$), whereas no significant difference was observed at 18–24 hours ($p=0.153$). PONV scores decreased significantly throughout the 24-hour observation period ($p<0.001$). The median change in PLR (ΔPLR) was higher in the hyperbaric group than in the isobaric group (21.38 vs. 6.81), although the difference was not statistically significant ($p=0.138$). No significant between-group differences were observed in pre-anesthesia PLR ($p=0.421$) or post-anesthesia PLR ($p=0.946$). ΔPLR showed a weak positive correlation with the maximum PONV score during the 24-hour observation period but did not reach statistical significance ($\rho=0.279$; $p=0.050$). Hypotension occurred in 20% of patients in the isobaric group and 44% of those in the hyperbaric group. No significant between-group differences in hypotension were observed at any individual time point. Patients who experienced hypotension had significantly higher maximum PONV scores than those without hypotension (median 3 vs. 2; $p=0.006$), whereas ΔPLR did not differ significantly according to hypotension status ($p=0.493$).*

Conclusion: *Hyperbaric bupivacaine with fentanyl for spinal anesthesia resulted in higher PONV scores than isobaric bupivacaine with fentanyl during the first 18 postoperative hours. No significant differences were observed in pre-anesthesia PLR, post-anesthesia PLR, or changes in PLR between the two groups. Hypotension was descriptively more frequent in the hyperbaric group, although no statistically significant differences were found at individual observation time points. Hypotension was associated with higher maximum PONV scores but not with changes in PLR.*

Keywords: *bupivacaine, fentanyl, hyperbaric bupivacaine, hypotension, isobaric bupivacaine, platelet-to-lymphocyte ratio, postoperative nausea and vomiting, spinal anesthesia*