THE INFLUENCE OF THE INFUSION OF EPHEDRINE AND PHENYLEPHRINE ON THE STABILITY OF THE CIRCULATION AFTER SUBARACHNOID ANESTHESIA IN SENIOR ADULTS

Faculty of Medicine

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Introduction: According to the national arthroplasty registers the prevalence of the hip and knee arthroplasty has increased in number over the past decades. (1,2) Spinal anesthesia (SA) is a commonly used technique (3) for elderly patients undergoing orthopedic surgery. The incidence of spinal anesthesia (SA)-induced hypotension in the elderly is almost 80%.(4)

Study objective: The aim of study was to investigate the influence of ephedrine or phenylephrine given immediately after spinal anesthesia (SA) on hemodynamics in older orthopedic patients.

Design: In prospective, randomized, double-blind, and placebo-controlled study were included 90 patients older than 60 years scheduled for hip and knee orthopedic surgery under SA.

Intervention: Patients were allocated randomly to the E (ephedrine infusion), P (phenylephrine infusion) and C (control group) group. After subarachnoid injection of levobupivacaine 15 mg the participants in group E got the infusion of ephedrine 20 mg, in group P phenylephrine 250 mcg, in C group only saline infusion. The observed parameters were measured and compared 15 minutes before and in 10, 20 and 30 minutes after SA: non-invasive systolic arterial pressure (SAP), mean arterial pressure (MAP), heart rate (HR), CI, SVI.

Results: In the study were included 90 patients among which 6 met the exclusion criteria and 14 had complications, 70 were included in the final analysis.

SAP, MAP and HR were decreased significantly in comparison to baseline values in the C group in all intervals after SA ($p < 0.05$) and in comparison with groups P and E ($p < 0.05$). Significant decrease in SAP and MAP was recorded in the P group in 10 and 20 minutes after SA, while in HR it appeared in 20 and 30 minutes ($p < 0.05$).

The E group had significant increase in HR ($p < 0.05$).
CI (BSA) [l/min/m²] was significantly higher in the E group compared to the P group in 20 minutes after SA ($p \leq 0.009$).

There was no significant change in SVI (BSA) [ml/ m²] in the C group ($p \geq 0.3$).

	Baseline	10 minutes after the block	20 minutes after the block	30 minutes after the block
SAP (mmHg)				
Group C	134 ± 22	110 ± 16 *†1†2	113 ± 15 *†1†2	113 ± 14*†1†2
Group P	128 ± 17	122 ± 18*†1	124 ± 17 †1	125 ± *19 †1
Group E	125 ± 15	125 ± 16 †2	129 ± 16 †2	126 ± 16 †2
MAP (mmHg)				
Group C	90 ± 14	77 ± 13*	77 ± 13*	77 ± 12*
Group P	85 ± 12	79 ± 9*	81 ± 10*	81 ± 12
Group E	84 ± 9	80 ± 11	83 ± 12	82 ± 11
CI (BSA) [l/min/m²]				
Group C	2.5 ± 0.7	2.3 ± 0.5 *	2.3 ± 0.6 *	2.3 ± 0.6 *†2
Group P	2.2 ± 0.5	2.2 ± 0.6 †3	2.1 ± 0.5 †3	2.1 ± 0.5 †3
Group E	2.5 ± 0.6	2.7 ± 0.7 *†3	2.7 ± 0.6 *†3	2.7 ± 0.5 *†2†3
HR (beats/min)				
Group C	75 ± 11	71 ± 12*	70 ± 12*	71 ± 12*
Group P	74 ± 12	69 ± 12*	68 ± 11*	69 ± 11 *†3
Group E	75 ± 12	76 ± 12	75 ± 11	77 ± 11 †3
SVI (BSA) [ml/ m²]				
Group C	33 ± 6	32 ± 5	33 ± 6	33 ± 5
Group P	30 ± 6	32 ± 9*	31 ± 7 †3	31 ± 6
Group E	33 ± 7	35 ± 7*	36 ± 6 *†3	35 ± 7

Table 1. Systolic blood pressure (SAP), mean arterial pressure (MAP), hearth rate (HR), cardiac index (CI) and stroke volume index (SVI) at baseline, 10 min, 20 min and 30 min after spinal anesthesia in three groups of patients. Values are mean +/- SD.
* $P < 0.05$ with respect to baseline.
†1 $P < 0.05$ between the Group P and Group C
†2 $P < 0.05$ between the Group E and Group C
†3 $P < 0.05$ between the Group P and Group E

Conclusions:

Hemodynamic changes after SA in older orthopedic patients could be prevented by immediate infusion of phenylephrine or ephedrine. Better hemodynamic stability after SA was achieved with ephedrine.

Figure1. The change of mean arterial pressure (MAP), frequency (HR), cardiac index (CI), and stroke volume index (SVI) from the baseline, to 10 min, 20 min and 30 min after SA in three groups of patients.