HEMODYNAMIC CHANGES AFTER INTERSCALENE BRACHIAL PLEXUS BLOCK DEPENDING ON ITS SIDE

Cesnaitis T., Tamosiunas R., Gelmanas A.

Department of Anesthesiology, Hospital of Lithuanian University of Health Sciences,
Kaunas, Lithuania

INTRODUCTION

Regional anesthesia decrease the probability of general anesthetic related side effects and complications. Interscalene brachial plexus block (ISB) is now very popular in shoulder surgery. Risks related to the use of ISB are generally low but hemodynamic changes during the surgery are known and serious complications can occur. The changes can be ascribed to the factor of sitting position (decrease in preload), effects of the Bezold-Jarisch reflex, and the undesired block of sympathetic trunk cervical ganglions. The mechanism of hemodynamic changes due to the side of ISB can be explained as sympathetic inhibition from the right side of ISB with and/or parasympathetic innervation. Fujii et al in his study suspected that the right side of ISB involved the right side of the stellate ganglion block which have been reported to be related with vagal reflex [1]. Study performed by Schlack et al compared left stellate ganglion block with the right and found that left stellate ganglion block leads to regional denervation of the left ventricle. The disruption of sympathetic pathways to a particular region of the left ventricle produces an imbalance in the uniform spread of electrical activation and, thus, induces asynchronous myocardial contraction with potential adverse effects in left ventricular function. Significant abnormalities in regional ventricular function have been described in animals; however, the clinical implications are less clear [2].

METHODS

We investigated 78 patients, who needed shoulder surgery. All subjects were in sinus rhythm, and no abnormalities were detected with medical history and physical examination. Patient exclusion criteria: refused consent of enrollment in the investigation; coexisting diseases that were likely to impact changes in hemodynamics during the surgery. After obtaining the approval from the Ethics Committee the patients were included randomly into 2 groups depending on operating side. Two equal groups of 39 patients underwent one side ISB. All patients received 0.5% 20 ml bupivacaine and 2% 20 ml lidocaine Ultrasound-Guided ISB. Hemodynamic changes were registered with impedance cardiography test using “CardioDynamics” and standard patient monitoring in various periods of operation for the first hour. Data we recorded was - systolic, diastolic and mean arterial blood pressure, heart rate (HR), systolic index (SI), cardiac output (CO), cardiac index (CI), systemic vessels resistance index (SVRI), and acceleration index (ACI) changes in these parameters during the surgery.

RESULTS AND DISCUSSION

The patient population included both sexes, median age was 42,3 years with the ASA physical status I and II, weight from 50 to 98 kg and height between 155 and 192 cm. We found statistically significant difference between left and right side block. Left side ISB caused lower CI 10 (2,33 vs 2,87), 20 (2,23 vs 2,69) and 40 minutes (2,11 vs 2,88 L/min/m2) (p<0,05) (Figure 1).

Figure 1. CI changes during operation in both groups.

SVRI significantly decreased after 10 (2149,10 vs 2771,51), 20 min (2048,38 vs 2817,51), 30 (2093,62 vs 2715,46), 40 (2066,84 vs 2955,09), 50 (2257,86 vs 3082,04), 60 minutes (2401,95 vs 2949,80 dynes-sec/cm-5/m2) in the Left ISB group (p<0,05) (Figure 2).

Figure 2. SVRI changes during operation in both groups.

Mean blood pressure was significantly lower after positioning (97,36 vs 105,03), 20 (87,79 vs 101,72), 30 (88,31 vs 95,90) and 60 minutes (94,64 vs 103,90 mmHg) after Left ISB (p<0,05). Heart rate decreased after 20 (74,08 vs 80,18) and 40 minutes (71,51 vs 77,79 bpm) also in Left ISB group (p<0,05).

There was no statistically significant differences concerning systolic index and cardiac output. ISB has a different effects to hemodynamics depending on the block's side. In respect to our hypotheses, we suggest that left ISB, possibly through extension of block to the stellate ganglion, alters the autonomic outflow to the central circulatory system more than right ISB. With interest we observed drop of SVRI in almost every period of observation but, as compensatory mechanism, heart rate was not increased statistically significant most probably due to minimized or blocked sympathetic regulation.

CONCLUSION

In our study left side ISB had slightly higher influence to hemodynamic changes during left shoulder surgery. To fully investigate the influence of ISB side to hemodynamic changes more studies should be carried out and reviewed systemically to get reliable results.

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