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Sympathetic-parasympathetic cardiac autonomic tonus during induction of anesthesia with propofol and fentanyl

*^{1,2}Iuliana Feghiu, MD, Assistant Professor; ¹Sergiu Cobiletschi, MD, Assistant Professor;
¹Sergiu Sandru, MD, PhD, Professor

¹Valeriu Ghereg Department of Anesthesiology and Intensive Care No 1

²Department of Pathophysiology and Clinical Pathophysiology

Nicolae Testemitsanu State University of Medicine and Pharmacy, Chisinau, the Republic of Moldova

*Corresponding author: i.dimitriu@yahoo.com

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Abstract

Background: Administration of propofol and fentanyl for induction of general anesthesia is often associated with cardiovascular instability. This effect can be caused by changes in the cardiac autonomic tonus induced by the drugs. In the literature there is no consensus regarding the effect of propofol and fentanyl on sympathetic or parasympathetic balance of the heart.

Material and methods: There was performed a randomized prospective study which was approved by the Ethic Committee. Written informed consent was signed by all patients. The study group involved 47 patients scheduled for surgical intervention, anesthetic risk ASA I-II. The analysis of heart rate variability and the changes in cardiac autonomic tonus was performed with Holter ECG at rest, after premedication with fentanyl solution and after induction of general anesthesia with propofol and fentanyl.

Results: After administration of fentanyl in doses of 1.0 mkg/kg for premedication there were not significant changes of heart rate variability and autonomic heart tonus. Administration of propofol 2.5 mg/kg combined with fentanyl 1.0 mkg/kg for induction of general anesthesia leads to significant changes in heart rate variability. There was a considerable reduction of heart rate variability. The LFun (marker of sympathetic heart tonus) has enhanced by 6.8% compared with previous stage (67.1 (95% CI 63.1-71.1) vs 72.0 (95% CI 67.9-76.1) ($p=0.004$). The HFun (marker of parasympathetic cardiac tonus) has reduced by 19.8% (32.9 (95% CI 28.9-36.8) vs 26.4 (95% CI 20.4-34.3) ($p=0.007$). After administration of propofol and fentanyl for induction of general anesthesia the LFun/HFun ratio has enhanced by 30.8% (2.7 (95%CI 2.1-3.4) vs 3.9 (95%CI 2.9-4.8) ($p=0.003$), signaling an enhanced sympathetic heart tonus.

Conclusions: Administration of fentanyl solution in doses 1.0 mkg/kg for premedication is not associated with significant changes of autonomic tonus of the heart. Administration of propofol 2.5 mg/kg in combination with fentanyl 1.0 mkg/kg for induction of general anesthesia leads to significant enhanced sympathetic cardiac tonus.

Key words: heart rate variability, sympathetic cardiac tonus, parasympathetic cardiac tonus.