

UDC 616.441-089.87:615.211

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Sevoflurane consumption over the low-flow or minimal-flow anesthesia during thyroid surgery in thyrotoxicosis patients

Background. The purpose was to study the consumption of an inhalation anesthetic and to compare of clinical and economic components during using of the low-flow anesthesia or the minimal flow anesthesia by sevoflurane in hyperthyroidism patients undergoing thyroidectomy. **Materials and methods.** All patients were divided into 2 groups: in a group of “sevoflurane balanced analgesia” (BA-S) were included 35 patients, whom were used the minimal flow anesthesia (MFA) with fresh gas flow (FGF) = 400 ml/min. In a group “sevoflurane control group” (C-S) were included 46 patients, the low-flow anesthesia (LFA) with the fresh gas flow (FGF) = 500 ml/min was used in 25 patients (subgroup C-SLFA), LFA with FGF = 700 ml/min was used in 21 patients (subgroup C-SLFA0.7). We evaluated the consumption of sevoflurane by Dion's equation and Biro's equation by assessing the vaporizer dial concentration in percent, FGF in liters/minute and time for which the concentration was set in minutes. We calculated the cost of anesthesia as a cost of average doses of sevoflurane and expendable materials that were used during anesthesia. **Results.** The sevoflurane consumptions by Dion's equation were $6,25 \pm 0,23$ ml for the BA-S group, $6,77 \pm 0,26$ ml for the subgroup of C-SLFA and $8,04 \pm 0,32$ ml for the subgroup of C-SLFA0,7 and were not significant ($p < 0,05$) more than in Biro's equation, where The sevoflurane consumptions were $5,81 \pm 0,24$ ml, $6,37 \pm 0,27$ ml and $7,52 \pm 0,34$ ml for BA-S, C-SLFA and C-SLFA0,7 subgroups, respectively. Between the values of sevoflurane consumption by Biro's and Dion's equations there is a strong direct correlation on Spearman's correlation coefficient (rs). For the group of BA-S rs = 0,87, for C-SLFA rs = 0,86, for C-SLFA0,7 rs = 0,84. The sevoflurane consumption was significantly ($p = 0,034$, the Wilcoxon criterion) lower in the BA-S compared to the control subgroups C-SLFA and C-SLFA0,7. In the BA-S group MFA has been demonstrated pharmacoeconomic benefits, which were amounted to $100,3 \pm 4,1$ UAH and $107,8 \pm 4,0$ UAH for both equations, Biro's and Dion's, respectively. These rates were significantly ($p = 0,029$, the Wilcoxon criterion) lower in the BA-S group compared to subgroups C-SLFA and C-SLFA0,7. In our point of view, Dion's equation for assessment of volatile anesthetic consumption reflects sevoflurane consumption largely, that Biro's equation,

because Dion's equation takes into account the sum of products of each segment anesthesia and minimal changes in components, such as the vaporizer dial concentration in percent, FGF and duration which the concentration was set up. There is the final formula for fluid sevoflurane consumption (ml) = $0,05457 \times (P_n \times F_n \times T_n)$, where P_n , F_n , T_n — the sum of products of sevoflurane vaporizer dial concentration (P), the fresh gas flow (F) and the duration of use of these parameters (T) under anesthesia: $((P_1 \times F_1 \times T_1) + (P_2 \times F_2 \times T_2) \dots n)$. When applying the MFA greater influence on sevoflurane consumption has the fresh gas flow than the vaporizer dial concentration, whereas with an increase of FGF to 500–700 ml/min greater influence on consumption has anesthetic vaporizer dial concentration than FGF. The MFA with FGF = 400 ml/min has significantly less the cost of anesthesia, than the LFA with 500–700 ml/min. **Conclusions.** Both, Biro's method and Dion's equation have been allowed to estimate the sevoflurane anesthesia consumption. Between the equations there are a strong positive correlation, there is no significant difference between the results of the calculations. The sevoflurane consumption was significantly ($p < 0,05$) lower under MFA with FGF = 400 ml/min, compared with LFA with FGF = 500 ml/min and 700 ml/min.

References

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UDC 616-089.5-032:611.829-0.538

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Anterior rectus sheath blocks in children with abdominal wall pain due to anterior cutaneous nerve entrapment syndrome after laparoscopic surgery: a prospective case series of 15 children

Background. Chronic abdominal pain in children may be caused by the anterior cutaneous nerve entrapment syndrome. Local nerve blocks are recommended as an initial treatment in adults. Evidence on effectiveness and safety of such a treatment in children is lacking. Our aim was to study outcome and adverse events of anterior rectus sheath blocks in childhood anterior cutane-