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The influence of sevofluran, in the dose of produced saliva and at the periodontal status, at pediatric patients

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Abstract

Purpose: Under the analysis of the characteristics of general anesthetics and via side effects, the goal of the study is to assess the impact of the sevofluran in the dose of produced saliva. This changing is considering in connection with the change in status of gingival health of pediatric patients, before and after the surgical procedure.

Materials and methods: The study was applied in 28 gingival status measurement and assessment to 14 patients that received treatment, without limitation an age, who underwent surgical treatment protocol. The selection of children was conducted on basis of the kind of general anesthetic used and applied in full agreement with the parents.

Results: Difference in ml for 5 minutes, between the mean values, is 0.36ml. Expressed in datas, the growing is by double of the normal production value per minute. From the table, it appears that 57% of patients including in the study, are in terms of quantity of produced saliva. 36% of children suffer from hipersalivacion and 7% suffer from hiposalivacion. About around 25% of children involved with in the study, suffered from periodontal illnesses. Patients were classified according to their change of values by three degrees.

Conclusion: The general anesthetic sevofluran influences on increasing the volumes of produced saliva. Applying sefovluran affect the aggravation of periodontal status at gingival margo and at fixed gingiva.

1.Introduction

Before any surgical procedure, it is intended to achieve complete anesthesia, the effects of coma, loosing of consciousness, amnesia and analgesia, using general adequate anesthetic in relation to the prescribed duration of surgical procedures, according to N P Franks and W R Lieb.Weighing the desired effects by those unwanted, whether side effects also, for achievement of the protocol of agranting general anesthesia, is the goal for choosing the proper anesthetic. At the department of pediatric surgery, in QSUT, the selection of the combination of general anesthetics is done according to realized these effects and according the surgical procedure that follows. On achieving of the goal of our study, the selected combinations are sevofluran- fentanyl and fentanyl-propofol.

We selected sevofluran, as inhalator anesthetic and propofol, as intravenous anesthetic, to observe the characteristics of anesthetic, on the basis of duration for inducing anesthesia, duration of achieve adequate anesthesia, the time required for regeneration of the patient, in about these features with the percentage of inhaled anesthetic and intravenous dosage, especially in cases of long surgical procedures. These changes can be utilized for improving the methodology, appropriate protocols for the materialization of the performing anesthesia and to increase the security to the patient, according to Sakai EM et al.

Intravenous anesthesia with propofol, if compared to inhalation anesthesia, sevofluran, that is also used for procedural sedation, according to a study on S. Kubo et al; it provides output of slow and less gentle agitation, based on Stephen H. Y. et al. The period of recovery is most brief, patients leave hospital more quickly. Because of the antiemetic properties of propofol, nausea and vomiting occur less, but as the drug is metabolized in the liver, it is considerd as disadvantage, based on S.Heta (2015). The characteristics of inhalator sevofluran are rated in relation to surgical procedure that will take place, in relation to time which lasts from the time after surgical intervention up to extubation, in connection with pain after surgical and time of exit of anesthesia. These subjects are those who have side effects also, and causes for the lower blood pressure, vazodilatacion, apnea, nause, cough, increased salivary flow etc.

2. Material and methods

The study has as purpose:

1. analyzing the characteristics of the case anesthetic general anesthetic;

2. evaluating the influence of sevofluran to the quantity of produced saliva;

3. evaluating the change in gingival status of children patients, before and after the surgical procedure.

Based on data provided the literature, sevofluran causes the increase of the salivar production (Jin Gu Kang et al). As inhalator anesthetic not very soluble, with some advantages, as faster induction and replication faster, after long surgical procedures, based on Young CJ et al, provides control of high depth of anesthesia and recovery with expeditious, explaining by the decrease digestibility. According to Goa KL et al, it is not irritating the airways and it is well tolerated by patients.

The reason for conducting of this microtheme, we got from the study conducted on laparoscopic treatment of reflux gastroezofagial period 2009-2013, at which any clinical cases classified based on anesthetic, or combination of general anesthetic, that was used.

Assessment of the anesthetic characteristics is based on data collected from the literature reference. For measuring the quantity of saliva was used simple methods of its collection in the test tube and funnel. Patient is required that the entire quantity of produced saliva is spited and gathered in the test tube, for 5 minutes. Patients have not eaten the night before surgery. To eliminate the influence of various daily variations in flow salivar, child patients underwent the procedure around midday. Neither of them was given any medication before surgery. The child is recommended to spit whenever comes for swallow. This procedure is carried out before the patient enters the operating room, and after emerging from the operating room, without entering anything in the mouth. Sialometria is applied to diagnose pathological problems regarding the production of saliva, these pathologies that affect directly to the emergence of kserostomia. It is not invasive, therefore is safe, being sensitive for detection of pathological clinical cases, based on W Kalk et al.

On the assessment of periodontal status was selected the PMA index, as an index that assesses only dental inciziv vestibular side, divided into fixed gingiva, gingival papillary and marginal gingiva. Assessment is carried out with the values 0-5. The index is presented for the first time in 1944-1947, and later was modified by Muhlemann et al, in order to achieve to PMA modified index. Evaluation data in this index, performed as follows, according to Stephen H. Y. Wei et al:

P0 - no inflammation, normal.
P1 - eased papillary hypertrophy, increase in size of the bed.
P2 - significant increase, at gingival papilla, bleeding in printing.
P3 - significant increase in size, accompanied by spontaneous hemorrhage.
P4 - necrotic papilla.
P5 - atrophy and disappearance of the papilla (by the process of inflammation).
M0 - normal, non recognizable inflammation.
M1 - hypertrophy, slight increase in size, not bleeding.
M2 - sensitive hypertrophy, bleeding under pressure.
M3 - gingival margo is swollen, bleeding spontaneously started the infiltration on fixed gingiva.
M4 - necrotic gingivitis.
M5 - the free gingival recession at marginal enamel-cement junksion section, as a result of inflammatory changes.
A0 - normal, the color pink, orange leather present.
A1 - hypertrophy slight loss that orange skin, changes in color can or not be presented.
A2 - sensitive gingival hypertrophy fixed in significantly increased red tint. It is presented the formation of the pocket.
A3 - advanced periodontitis. Present deep pockets.

3. Results

Below are presented the results that are collected in table relevant (table 1 and table 2).

Table 1. Result collected respectively for patients who underwent the anesthesia with fentanyl-sevofluran.

No.	Saliva quantity before surgical procedure	The amount of saliva after surgical procedure	Index PMA before surgical procedure	Index PMA after the surgical procedure
1	1.5ml	1.75	P3M2A1	P3M3A2
2	1.75ml	2.25	P1M0A0	P1M1A0
3	2.25ml	2.5	P0M1A0	P0M2A0
4	1.25ml	1.75	P2M2A1	P2M2A1
5	2ml	2.5	P0M0A0	P0M1A0
6	1ml	1.5ml	P3M2A1	P3M3A2
7	2.5ml	2.5ml	P1M3A2	P1M3A2

On the context of data collected for sevofluran, come on results before surgical procedure: Mean 1.7500; SD 0.5401; SEM 0.2041.

On the context of data collected for sevofluran, come on results, after surgical procedure: Mean 2.1071; SD 0.4296; SEM 0.1624.

P value is much smaller than 0.0001.

Table 2. Results collected respectively for patients who underwent anesthesia with fentanyl-propofol.

No.	Saliva quantity before surgical procedure	The amount of saliva after surgical procedure	Index PMA before surgical procedure	Index PMA after the surgical procedure
1	1.25	1.35	P2M2A2	P3M3A2
2	2	2	P2M3A1	P2M3A1
3	2.25	2.35	P0M1A0	P1M1A0
4	1.5	1.45	P1M3A1	P1M3A1
5	2	1.85	P2M3A1	P3M3A1
6	2.5	2.5	P5M1A0	P5M2A0
7	3	2	P2M2A2	P2M3A2

On the context of data collected for propofol, come on results before surgical procedure: Mean 2.0714; SD 0.5901; SEM 0.2230.

On the context of data collected for propofol, come on results after surgical procedure: Mean 1.9286; SD 0.4251; SEM 0.1607.

P value is 0.0716, a difference considered not fully statistically significant.

Salivary flow value is at normal rate 0.3-0.4ml ml/min, below the 0.2 value is hiposalivacion, over 0.4 value is hipersalivacion. At table 3 are collected the datas for normal, hipo and hiper salivation.

Table 3. Table that summarizes the study data provided on basis of quantity salives that gathered under the concept of hypo and hipersalivacionit.

Patients analyzed	**Healthy patients**	**The teeth affected by problems in relation to the production of saliva**
Salivary normal flow	8	-
Hiposalivacion	-	1
Hipersalivacion	-	5

At table 4 and 5 are summarized the study's datas on based of PMA index, at patients who underwent treatment with sevofluran and with propofol, before and after the surgical procedure.

Table 4. Table summarizes the study data provided on basis of index PMA after the surgical procedure.

Patients analyzed	**Healthy patients**	**Patients affected by periodontal disease**
Anesthesia with sevofluran	2	5
Anesthesia with propofol	1	6

Table 5. Table that summarizes data based on the index study PMA before surgical procedure.

Patients analyzed	**Healthy patients**	**Patients affected by periodontal disease**
Anesthesia with sevofluran	3	4
Anesthesia with propofol	1	6

PMA index value changes are collected at table 6.

Table 6. Table that summarizes the data provided in the basic study of changes of PMA index before surgical procedure.

Patients analyzed	**Changes with one degree of assessment to value P**	**Changes one degree assessment to value M**	**Changes one degree assessment to value A**
Anestezia me sevo	0	5	2
Anestezia me propofol	3	3	0

Discussion

Sevofluran has a lower coefficient blood:gas. This coefficient helps the application without problems, in induction and in control of the depth of anesthesia. Patient recovery time is faster with sevofluran than for example with halothan, other inhalational anesthetic, based on Christine M. Dugan et al. Dose injection of sevofluran is 250ml for inhalation, and for propofol is 10mg/ml. In table 7 are summarized some of the characteristics of two anesthetic substances used, according to Kobylarz K et al.

Table 7. The table below summarizes some of the characteristics of sevofluran and propofol.

Characteristics	Induction	The period of recovery	Elimination	Postoperative feeling	Side effects
Sevofluran	It reduces peripheral vascular resistance. Cardiac frequency is not affected.	Volume decreases, increased respiratory rate. Glomerular infiltration lowers. Decreases hepatic blood flow.	Expirim.	Mukociliar effect is reduced. It increases the potential for post-operative respiratory infections.	Liver toxicity.
Propofol	Systemic blood pressure increases. It reduces peripheral vascular resistance.		Metabolisation in the liver, with extrahepatic elements.	Vomiting, nausea less.	Apnea, pain on injection, hipotonus, tremor.

For sevofluran, the coefficient blood:gass is 0.69, and 1.7 blood:brain; this speaks of relatively good supporter solubility for the brain and for blood. It is fluid, that's why easily evaporates, the vapors are absorbed by the alveoli, resulting in breathing frequency rate and dosage. Sevofluran is in the center of the order on the basis of the magnitude of the metabolism of the anesthetic, halothan is two degrees above, the rate is descending, based on Bertram Katzung.As post-surgery effects can be mentioned the toxicity of liver and kidney damage, this depending on the mode of elimination. The liver toxicity has as risk factors: female sex, increasing of age, genetic predispozimin for obesity.

Side effects that drew attention to this issue, is the addition of salivary fluid, that implies sevofluran effect and that remains in the data collected, according Christine M et al. Difference in ml for 5 minutes, between the mean values, is 0.36ml. Expressed in figures, it is rised twice the normal production value per minute.

For cases that underwent anesthesia with propofol, there was no increase in the average value of the collected amounts of saliva, even minimal decrease was recorded. In table 3 data are distributed based on the normal production of saliva, or hypo or hipersalivation. From the table, it appears that 57% of patients included in the study are the norm in terms of the quantity of produced saliva. 36% of children suffer from hipersalivacion and 7% suffer from hiposalivacion.

Tables 4 and 5 summarize the data divided these patients according to the assessment of periodontal status, in healthy or not individuals according to periodontal disease. Although the selection of patients was random, a percentage was 21% of patients with periodontal problems in the group of patients with sevofluran, and 28% of patients with propofol. About average 25% of children involved in the study suffered from periodontal disease. This assessment was carried out on periodontal status of children, before surgical intervention.

The data of table 6 were highly significant. The index includes the assessment of inter dental papilla health, the health of marginal gums and gingival health fixed. Health periodontal intervention was recorded before and after surgical intervention. In table 6 patients were classified depending on the change of values according to three degrees (PMA). For patients who underwent anesthesia with sevofluran, was recorded significantly distinguished aggravation of periodontal status, aggravated health of the health of gums and marginal fixed gingiva. It is worth mentioning for the fact that sevoflurani is inhaler anesthetic, and anesthetic mask that is applied in the form of vapor, makes contact with gingiva. Data from the table, characterized that the contact is greater with marginal gingiva and to fixed gingiva.

In cases of application of anesthesia with propofol, it is distinguished significant changes appered at the level of papillary health. This can be explained perhaps by the effects on the level of the blood circulatory system, for inter dental papilla.

Conclusions

Sevofluran as the inhaler general anesthetic affects the increase of the quantity of produced saliva. By influencing the frequency of breathing rate and dosage of this medicine, may increase the local effect that has to gingival health. Sefovluran application affects the aggravation of periodontal status, at level of gingival margo and at fixed gingiva. Although the small number of patients involved in this study, the value 25%, or about a quarter of them are infected at periodontal standpoint, speaks many.

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