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Original Research Article

Determining the Depth of Anesthesia and the Transparency of the Operation Field in Ear, Nose and Sinus Surgeries in Tabriz Hospitals

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ABSTRACT

Depth monitoring of anesthesia is one of the lesser-known components of patient monitoring. In the field of limited field surgery and depth anesthesia control to evaluate the transparency of the field, no study has been done so far. Accordingly, in this study, the relationship between anesthesia depth and field transparency in limited field surgeries (nose, ears and sinuses) was considered. This is a cross-sectional descriptive study that was conducted in 2018 with the participation of 91 patients who were candidates for ENT surgery at Imam Reza Hospital in Tabriz. Depth of anesthesia in these patients with BSI criteria by DK-5000 Odense C device made by Danmeter-Goalwick Co. Denmark and the results were reported. In limited field surgeries such as sinus endoscopy, rhinoplasty, tympanoplasty and mastoectomy, in order to create a transparent field by monitoring the depth of anesthesia using the BSI criterion, the maximum frequency in the first and second hours of surgery to achieve this goal is 40 to 50%.BSI criterion is a suitable method for determining the depth of anesthesia in ENT surgeries that have been operated with the help of anesthetic gases (isoflurane, etc.).

Keywords: BSI, Depth of Anesthesia, Transparency.

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Introduction

In limited field surgeries such as ear surgery (mastoidectomy and tympanoplasty), nasal surgery (rhinoplasty) and sinus endoscopy, reducing bleeding in the operation field reduces the duration of surgery and thus helps to improve the outcome of the operation. Sometimes, even in limited field surgery, heavy bleeding prevents the patient from having surgery and the operation being terminated(1 , 2). Common methods used by the surgeon and anesthesiologist to reduce bleeding in this type of surgery include raising the head above body level, injecting epinephrine at the site of surgery(3), and inducing control hypotension. In some cases, the patient is given preoperative clonidine or dexmedetomidine tablets on the morning of surgery(4). In ENT surgery, like other surgeries, the anesthesiologist plays an important role in performing the surgery accurately and without complications(5). Sinus and nasal endoscopy can also be performed without anesthesia, but in most cases local anesthesia or general anesthesia is necessary for the patient and the surgeon to feel comfortable and to reduce the complications of surgery. Complications of sinus endoscopy are numerous, including epiphora hemorrhage, eye injury, and intracranial injury. Bleeding is the most common acute complication of sinus endoscopy(6). In the past, it has been discussed which of the intravenous and local anesthesia methods has better hemodynamic effects on the patient(7). One of the types of monitoring during surgery is monitoring of depth of anesthesia using BSI (8). Depth of anesthesia is recorded by attaching an anesthesia depth measuring device by three electrodes to the forehead, temples and back of the ear. This monitoring is non-invasive and allows the patient to remain under optimal anesthesia during surgery. In the patient who is preparing for surgery, the optimal anesthesia depth for surgery is 40 to 60% (9). Depth monitoring of anesthesia is one of the lesser-known components of patient monitoring. In the field of limited field surgery and depth anesthesia control to evaluate the transparency of the field, no study has been done so far. Accordingly, in this study, the relationship between anesthesia depth and field transparency in limited field surgeries (nose, ears and sinuses) was considered.

Material and Methods

Study design: This is a descriptive study that was conducted in Imam Reza Hospital in Tabriz in 2018. According to the annual statistics of rhinoplasty, tympanoplasty, mastoidectomy and endoscopy of sinuses in the hospital, it is mentioned that these operations are at least 20 per month, and considering the patients who have the criterion of exclusion from the study, 91 samples were obtained in 6 months.

Inclusion / Exclusion Criteria: Patients enrolled in the American Society of Anesthesiology (ASA) class one and two in terms of overall health. Exclusion criteria included patients with hypertension, lung, heart, kidney, diabetes, coagulation disorders and pre-fashioned clonidine.

Methods

Measurement of depth of anesthesia with BSI criteria by DK-5000 Odense C device made by Danmeter-Goalwick Co. Denmark was equipped with a small monitor to display the depth of anesthesia as a percentage and three interface wires to connect to three leads in the forehead, temples and back of the ears. Percentage of anesthesia depth in the first hour and the second hour of surgery in each patient was displayed on the monitor of the device, the average of which was recorded in the relevant checklist form during each hour. In addition, the age and sex of patients were also stated in this form. In this study, the depth of anesthesia was 30 to 40%, 40 to 50% and 50 to 60% on patients who underwent surgery, and the transparency of the field through the naked eye (microscope vision) and the amount of bleeding in the field in these three Depth of anesthesia was assessed. Bleeding rate was measured based on the amount of blood in the suction and the number of small gases consumed per hour. Blood field transparency based on bleeding less than 50 cc / h and transparent field with armed vision (microscope), medium transparency based on bleeding between 50 and 100 cc and low transparency based on bleeding more than 100 cc / h and opaque field with armed vision evaluated . Surgeon's satisfaction was defined as a dependent variable based on the amount of bleeding in the field and the transparency of the field in the armed view (microscope field) in three ways. Is preserved. The second case (moderate satisfaction) is a semi-transparent field with moderate bleeding, that is, a field that is somewhat visible but does not have good transparency throughout the operation. The third case (low satisfaction) is that the whole field is filled with blood and is inoperable. In this case, surgery in the field may be stopped due to insufficient vision. Then, the relationship between surgeon satisfaction and depth of anesthesia was evaluated.

Statistical analyzes: After completing the patient checklist form, data were entered into SPSS software version 20 and statistical analysis of the results was performed using descriptive statistics (frequency, percentage, mean and standard deviation) and chi-square test. Significance level in the tests was considered maximum 0.05.

Ethical considerations: This study was conducted after approval by the ethics committee of Tabriz University of Medical Sciences and in coordination with the head of the operating room of Imam Reza Hospital. Written informed consent was obtained from all patients. No cost was charged to patients for participating in this study.

Results

In this study, 91 patients including 43 males (47%) and 48 females (53%) met the inclusion criteria based on the mentioned criteria. Number of patients in the first hour of surgery in depth of anesthesia 30 to 40% 26 (28.6%), depth of anesthesia 40 to 50% 59 (64.8%) and depth of anesthesia 50 to 60% 6 (6.6 %) And in the second hour of surgery in depth of anesthesia 30 to 40% 21 people (23.1%), depth of anesthesia 40 to 50% 61 people (67%) and depth of anesthesia 50 to 60% 9 people (9.9%)) They were. Anesthesia depth of 40 to 50% was most frequent during the first and second hours of surgery. Regarding the frequency of operations, tympanoplasty was 14 (15%), mastoectomy was 10 (11%), rhinoplasty was 40 (44%) and sinus endoscopy was 27 (30%) with the frequency of depth of anesthesia in the first and second hours There was no significant relationship ($P = 0.166$ and $P = 0.362$, respectively). Gender and age of patients had no significant relationship with the depth of anesthesia in the first and second hours ($P = 0.516$ and $P = 0.311$, respectively). Regarding the transparency of the operation field in the first hour, 52 patients (57.1%) of patients with clear and non-bleeding field, 32 patients (35.1%) with moderate bleeding field and in 7 patients (7.8%) completely field patients It was bloody and cloudy. In the second hour, 41 patients (45%) had clear fields, 44 patients (48.3%) had moderate fields and 6 patients (6.7%) had opaque fields. In the first hour, field transparency had no significant relationship with the percentage of anesthesia depth ($p = 0.404$), but in the second hour, field transparency showed a significant relationship with the percentage of anesthesia depth ($p = 0.002$). It can be said that in the first hour, due to tissue incision and the time required to achieve homeostasis, the relationship between field transparency and the percentage of anesthesia depth was not significant, but in the second hour, because tissue homeostasis was established, this relationship was significant. It should be noted that during this study, no surgery was stopped due to the turbid field. The amount of total bleeding during the operation (total small gases and the amount of blood in the suction) had no significant relationship with the type of operation ($p = 0.272$), but the amount of total bleeding during the operation in the anesthesia depths was significant with $P = 0.003$. The minimum bleeding rate was 8 cc in anesthesia depth of 40 to 50% and the maximum was 165 cc in anesthesia depth of 50 to 60%. Surgeon satisfaction was significantly related to the type of surgery ($P = 0.050$), the results of which are presented in Table 1. Based on these results, in total, 50 cases were high satisfaction (54.9%), 29 cases were moderate satisfaction (31.9%) and 12 cases were low satisfaction (13.2%). Depending on the type of operation, the highest satisfaction percentage was most common in tympanoplasty (78.6%) and in the later stages it was mastoectomy (70%), sinus endoscopy (48.2%) and rhinoplasty (47.5%). Surgeon's satisfaction with total intraoperative bleeding was significant with $p <0.001$. In cases where the surgeon was satisfied during the operation, the minimum bleeding was 8 cc and the maximum was 85 cc. The relationship between surgeon satisfaction and depth of anesthesia in the first hour of surgery was not significant ($p = 0.858$); But this relationship was significant in the second hour of operation with $p = 0.033$, so that in the second hour of a total of 50 operations with high satisfaction, 17 cases in the depth of anesthesia 30 to 40%, 31 cases in the depth of anesthesia 40 to 50% and only 2 cases were 50 to 60% in depth of anesthesia.

Discussion

Since in this study we tried to adjust the depth of anesthesia during the operation in such a way that in surgery with limited field the amount of bleeding is minimal and the transparency of the field is maximum, the frequency of anesthesia depths to achieve these two goals is in the range of 30 to 40%. , Were 40 to 50 percent and 50 to 60 percent. The scope obtained in this study fits the definition of general anesthesia (10). The highest frequency of anesthesia depth to achieve the two goals in the first and second hours of surgery in BSI monitoring was in the range of 40 to 50% with a frequency of 64.8% and 67%, respectively (11). Regarding the effect of monitoring the depth of anesthesia on the operating field, in a study, it was reported that if the patient has light anesthesia during endoscopy of the sinuses, in the monitoring device, the percentage of depth of anesthesia exceeds 60, straining and coughing on the endotracheal tube. It increases the pressure inside the chest and reduces the emptying of the head veins, which in turn increases the bleeding in the field (12 , 13). In the field of monitoring the depth of anesthesia and its effect on field transparency in limited field surgery, no other study has been done so far, but to create a transparent field, especially in sinus endoscopic surgery, several studies have been performed, including the effects of intravenous anesthesia and Inhalation on the transparency of the field of sinus endoscopic surgery indicated that the venous method was more effective in achieving this goal. In another study in sinus endoscopic surgery, a comparison of the use of two methods of using hot saline and transamine in the operating field to create field transparency was investigated and transamine was more effective than hot saline (14, 15). Induction of control hypotension to create a clear field in this type of surgery has been evaluated in several studies, including a study in ear, nose and sinus surgery that nitroprusside was more effective than nitroglycerin in creating a clear field. The method of inducing control hypotension poses risks to the patient and is considered an aggressive method. Dexmedetomidine has been used as a pre-fashion and infusion to help clear the field in limited field surgery. The infusion method of this drug has been more effective than the pre-fashion method to create transparency in the field of action. Monitoring the depth of anesthesia to assess the state of hypnosis is completely non-invasive and prevents the patient from waking up during the operation and experiencing optimal anesthesia; It prevents the patient from taking too much medication during the operation and returns to a faster recovery state, saving $ 5 per anesthesia; However, it is not yet routinely used in Iran and many parts of the world. Hopefully, in the near future, the benefits of this monitoring will be given more attention and it will be used routinely in operating rooms and even ICUs. In particular, depth monitoring of anesthesia is necessary in other cases such as pediatric surgery, heart surgery and emergency surgery where the probability of waking up under anesthesia is higher. The value of this monitoring can be assessed by conducting other research.

Conclusion

In limited field surgeries such as sinus endoscopy, rhinoplasty, tympanoplasty and mastoectomy, in order to create a transparent field by monitoring the depth of anesthesia using the BSI criterion, the maximum frequency in the first and second hours of surgery to achieve this goal is 40 to 50%.

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