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Research Article

Postoperative cognitive function and controlled hypotensive anesthesia in patients undergoing septoplasty

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KEYWORDS

Controlled hypotensive anesthesia;
Cognitive dysfunction;
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Abstract *Background:* Cognitive dysfunction is the impairment of the mental process and affected by blood pressure. The aim of this work was to assess the cognitive dysfunction after controlled hypotensive and normotensive anesthesia in middle aged patients undergoing septoplasty.
Methods: Sixty patients (ASA I–II), 21 to 50 years were included in the study, undergoing septoplasty operation. Patients were randomly assigned into two equal groups, namely group (A), who were generally anesthetized and associated with controlled hypotension and group (B), who were generally anesthetized and associated with local anesthesia. Heart rates, blood pressure and oxygen saturation were measured throughout the operation. Mini Mental State Examination (MMSE) was used for evaluation of cognitive functions preoperatively and postoperatively.
Results: Regarding cognitive function, there were no statistically significant differences between both groups in preoperative and after 24 h of postoperative period, but there were statistically significant decrease in group (A) in relation to group (B) after 30 minutes and 60 minutes and the incidence of postoperative cognitive dysfunction in group (A) was 23.3% after 30 min, 13.3% after 60 min and 6.6% after 24 h, but in the other group (B) there were no recorded cases of cognitive dysfunction at 30 min,60 min and 24 h.
Conclusion: Increasing isoflurane MAC and using controlled hypotension to get bloodless field can affect the cognitive function appear in MMSE score but light volatile anesthetic combined with regional anesthesia with local vasoconstrictors is better regime to get better postoperative cognitive function.

1. Introduction

Cognitive dysfunction is the impairment of the mental process of perception, memory and information processing which allows the individual to acquire knowledge and plan for the future [1]. Cognitive dysfunction may complicate recovery

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after operation and affect middle aged patients who may have to give up work and social activities [2].

General anesthetic agents, postoperative analgesic regiment, and hypotension associated with anesthesia can cause postoperative cognitive dysfunction [3]. Induced hypotensive anesthesia is essential for drying surgical field during maxillofacial operation like septoplasty to reduce blood loss, ease in operation technique and shorten duration of surgery. Hypotensive anesthesia is associated with the risk of reduced perfusion to important organs and tissues, mainly the brain, heart and kidneys [4].

Bleeding is one of the biggest complications of nasal surgery. Minimization of intraoperative blood loss allows the surgeon to have an operative field which he can visualize well. Blood loss can be minimized by applying epinephrine-containing local anesthetic to the nasal mucosa, maintaining a slight head-up position, and using controlled hypotension in appropriate individuals [5].

The aim of this work was to assess the cognitive dysfunction after controlled hypotensive and normotensive anesthesia in middle aged patients undergoing septoplasty.

2. Patients and methods

After obtaining approval from the Ethical committee and written informed consent, 60 patients ASA I or II, aged 21–50 years were included undergoing septoplasty operation in Misr University for Science and Technology hospital from October 2014 till June 2015. Patients were randomly assigned into two equal groups, namely group (A), who were generally anesthetized and associated with controlled hypotension and group (B) who were generally anesthetized and associated with local anesthesia and vasoconstrictor. Distribution of the patients into the groups was done by using computer-generated randomization code. Patients with arrhythmias, congestive heart failure, coronary arterial disease, hypertension, cerebrovascular diseases, neuropsychiatric disorders and known allergic reaction were excluded from the study.

Patients of both groups were fasting for 8 hours before operations. They did not receive any premedications. Intraoperative monitors were continuous electrocardiography (ECG), pulse oximetry ($Sp0_2$), capnography and invasive arterial blood pressure through a 20 gauge catheter inserted into the redial artery. Ringer's solution with a rate of 5–10 ml/kg was started through an 18 gauge cannula. Patient's head raised 40 degree.

In group (A): Anesthesia was introduced by propofol 2.5 mg/kg, fentanyl 1 μg/kg and atracurium 0.5 mg/kg to facilitate oral intubation. Anesthesia was maintained by starting minimum alveolar of concentration (MAC) of isoflurane 2% in 50% oxygen and 50% air. The MAC increased to maintain mean blood pressure between 50 and 60 mmHg or reducing mean blood pressure by 30% of baseline. The patients were mechanically ventilated, adjusted to maintain end tidal CO_2 pressure between 30 and 35 mmHg. At recovery, muscle relaxant was antagonized with neostigmine and atropine. The patients were transferred to the recovery room on eye opening and responding to verbal command.

In group (B): The anesthetic management was the same as group (A) except that the isoflurane concentration was adjusted to maintain normotensive blood pressure throughout the operation. General anesthesia was supplemented with local anesthesia as follows: initially a topical nasal decongestant (xylometazoline hydrochloride 0.1%) was applied. The nose was packed with local anesthetic soaked gauze and then supplemented with submucosal injection of local anesthetic with epinephrine (1% lidocaine with 1:200,000 epinephrine). The surgical conditions for a bloodless operative field were observed every 10 minutes by the same attending surgeon, who was blinded to the patient groups trying to keep the surgical field condition below 2 (Appendix 1).

Mini Mental State Examination (MMSE) was used for evaluation of cognitive functions [6]. The MMSE was chosen because it is easily applicable, highly valid, and reliable, enabling frequent application. It consists of questions, evaluating orientation to time and places, registration, attention, calculation, short-term recall, language ability, and constructional ability. The MMS was performed 30 min before entry of the patient to the operating room (MMSP), 30 min (MMS30) and 60 min (MMS60) after extubation of the patient, at the recovery room, and at the postoperative 24th hour (MMS24), by the same anesthesiologist, trained in the use of the test and blinded to the patient group allocation. The maximum score being 30 points, a decrease of 2 or more was recorded as cognitive function decline and a score lower than 24 was recorded as cognitive impairment.

Aldrete post-anesthesia recovery score was obtained for each patient at the postoperative 30 and 60 minutes, so that cognitive function testing would only be applied to patients with the similar post-anesthesia recovery state [7] (Appendix 2). An Aldrete Score $\geqslant 7$ was considered as the patient being awake and MMS was applied. The patients were transferred to the ward following the completion of MMS60 and meeting our discharge criteria (the patient being alert and oriented, stable vital signs, talkative and cooperative, with adequate pain control, minimal nausea, and vomiting). Postoperative analgesia was achieved by giving ketorolac 30 mg intravenously every 4 h to both groups.

2.1. Statistical analysis

By using PASS program for sample size calculation, it was calculated that a sample size of 30 per group would achieve 80% power at p value less than 0.05. All statistical calculations were carried out using the computer program statistical package for social science (SPSS Inc. Chicago, Illinois, USA) version 11 for Microsoft windows. Data were expressed as mean plus standard deviation (SD) in demographic data except male and female numbers, MMSE, and Blood pressure unpaired T-test was used to compare data between groups. Results were considered statistically significant if P value was less than 0.05.

3. Results

A total 60 patients ASA I-II enrolled in this study, undergone septoplasty operation. According to demographic data, both groups were similar and there were no statistical significant differences between ages, weight, heights, BMI, anesthesia minutes and surgical times as shown in Table 1. There were no statistical differences regarding heart rate (HR) Fig. 1 and oxygen saturation during preoperative, intraoperative and postoperative periods Fig. 2. Measuring blood pressure in