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Original Article

The effect of demographic characteristics on anxiety and hemodynamic response during intubation in patients undergoing septoplasty

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Abstract

Aim: To investigate whether the demographic characteristics of patients scheduled for septoplasty had an effect on their trait and preoperative state anxiety and hemodynamic response caused by endotracheal intubation.

Material and Methods: In our prospective observational study, after the demographic characteristics of the patients were recorded, the State-Trait Anxiety Inventory (STAI) was administered three times to measure preoperative trait (STAI-1), preoperative state (STAI-2) and postoperative state (STAI-3) anxiety. The preoperative basal hemodynamic parameters were noted. The percentage changes in the hemodynamic responses of the patients during intubation (systolic arterial pressure, diastolic arterial pressure, and mean arterial pressure) were evaluated. The relationship between the severity of anxiety and hemodynamic changes was investigated.

Results: Preoperative state anxiety was present in 85% of the patients (STAI-2≥50). The mean STAI-1 score was found to be statistically significantly lower in men (42.81) than in women (45.46) (p=0.005). The mean STAI-2 score, showing preoperative state anxiety, was statistically significantly lower in males (53.89) than in females (57.72) (p=0.001). The mean STAI-2 score was 58.05 in patients aged 45 and over and 54.15 in those under 45 years (p<0.001). In addition, the percentage changes in hemodynamic response were significantly higher in the group aged 45 and over (systolic arterial pressure: 16.32 mm-Hg, diastolic arterial pressure: 23.88 mm-Hg, mean arterial pressure: 20.34 mm-Hg) (p<0.001).

Conclusion: In this study, we observed that preoperative state anxiety was more prevalent in elderly and female patients, and the vital changes during endotracheal intubation were seen at a higher rate in elderly patients.

Keywords: Demographic characteristics; preoperative anxiety; hemodynamic changes

INTRODUCTION

Anxiety is a feeling of fear and uncertainty experienced internally and suddenly in response to an unfavorable situation. It is a kind of alarming feeling that is more prominently seen when the person does not feel safe (1). The overall anxiety rate in hospitalized patients is reported to range from 10 to 30% (2). However, the incidence of preoperative anxiety reaches 80% in adult patients (1,2). Anxiety that develops in the perioperative period plays a determining role in the emotional, cognitive, psychological and physiological responses of the patient. One of the aims of perioperative care in the preoperative period is to manage the patient's emotional state, improve the quality of life, and take measures against unexpected physiological responses (3).

Preoperative anxiety poses an important problem in patients scheduled for surgery (4). The release of neuroendocrine mediators is elevated due to anxiety, especially during the waiting period in the morning of surgery. This increases the risk of complications, such as nausea, vomiting, tachycardia, hypertension, and wound infection in patients with high anxiety levels and prolongs the length of hospital stay. In addition, studies have shown that the required dose of anesthetics and postoperative pain scores are higher in patients with increased anxiety (3,5,6).

Due to general anesthesia, some complications associated with sympathetic nervous system stimulation may occur in patients undergoing endotracheal intubation. As a result of endotracheal tube stimulation leading to neuroendocrine

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mediator release, tachycardia and hypertension may occur and cause vital complications related to other systems, especially in the presence of underlying predisposing diseases. It has been demonstrated in previous studies that the demographic features of patients also have an effect on the development of such complications (7-10).

Septoplasty is a surgical operation commonly performed by otolaryngology and head and neck surgeons. The duration of the operation varies depending on the patient and the physician, but is approximately 30 minutes. This surgery is common for all age and gender groups (9).

In this study, we examined the effect of demographic data on anxiety and cardiovascular response caused by endotracheal intubation in a single type of surgery under general anesthesia.

MATERIAL and METHODS

All procedures carried out in studies including human participants were conducted in compliance with the ethical standards of institutional and/or national research committee, the 1964 Helsinki Declaration and its amendments or comparable ethical standards. For this prospective observational study, approval was obtained from the local ethics committee (Ankara Numune Training and Research Hospital E-18-2418), and written informed consent was obtained from all participants scheduled for septoplasty under general anesthesia. The sample size was calculated using the G-power (Version 3.1) package program. Student's t-test was used to determine the sample size required to test the basic hypothesis of our research. As a result of the sample size analysis performed as previously described, it was determined that to reveal statistically significant differences between two groups (aged 45 and over) at 80% power ($1-\beta = 0.80$), $\alpha = 0.05$ error (95% confidence interval) and 0.6 effect size, a total of at least 110 individuals (minimum 50 for each group) were required.

Male and female (118 patients) between the ages of 18 and 80 years with no additional disease, who were scheduled for elective septoplasty and were going to undergo anesthesia for the first time, and had an ASA score of one were included in the study. All patients underwent septoplasty under general anesthesia only due to nasal septum deviation. The operation took approximately 20-30 minutes for each patient.

Excluded from the study were patients who were previously diagnosed with any psychiatric disease, those using neuroleptics or benzodiazepine for any reason within one month before the operation, those with any additional disease, and those with the difficult airway. All the patients included in the study were informed about the process of septoplasty by the otolaryngologist and general anesthesia by the anesthesiologist the day before the operation. All patients underwent septoplasty under general anesthesia.

Anesthetics Used During Surgery and Patient Follow-Up

The patients included in the study were not premedicated. After admission of the patients to the otolaryngology service and 30 minutes of bed rest, the non-invasive blood pressure measurement was undertaken from the right arm (Nihon Kohden BSM-6501, Japan) and the heart rate of the patients was recorded three times using 3-lead electrocardiography (Nihon Kohden BSM-6501, Japan). The averages of the three measurements were accepted as the basal values. After the patients were transferred to the operating room, a 18 G intravenous cannula was placed on the left hand, and the infusion of Ringer's lactate solution was started at a rate of 6 ml/kg/h. Non-invasive blood pressure monitoring (GE Aisys CS2, Madison, WI, USA) was continued from the right arm and the 3-lead electrocardiography device (GE Aisys CS2, Madison, WI, USA) and a pulse oximeter (GE Aisys CS2, Madison, WI, USA) were connected. Before anesthesia, the patients were given intravenous lidocaine (1 mg/kg) against the propofol injection pain. Fentanyl (1 mcg/kg) was administered and anesthesia was induced with propofol (2-3 mg/kg) (propofol Lipuro 1%, B. Braun Melsungen, Germany). After the eyelid reflex disappeared, rocuronium (0.6 mg/kg) (Esmeron vial 50 mg/5ml) was applied, and the patient was intubated by the same anesthesiologist using a Macintosh laryngoscope of an appropriate size without damaging soft tissues. Systolic arterial pressure (SAP), diastolic arterial pressure (DAP), mean arterial pressure (MAP), and heart rate were measured after intubation (at minutes 0 and 1). These parameters were recorded for each patient. The highest values after intubation were divided by the preoperative basal values, subtracted from 1, and multiplied by 100. Thus, the differences in percentages in the vital values of the patients after intubation were determined. Endotracheal tube number 7.5 was used in female patients and 8 in male patients, and patients presenting with any difficulties were excluded from the study.

Measurement of Anxiety

The State-Trait Anxiety Inventory (STAI) was developed by Spielberger et al. in the United States in 1970. The STAI-trait subscale is used to measure the general level of anxiety of the patient. It contains general questions and scores the level of anxiety that a person generally experiences in life. The STAI-State anxiety subscale consists of statements followed by "right now" to measure the current level of anxiety of the person (11). The STAI score ranges from minimum 20 to maximum 80. Previous studies suggested that the patients should be considered anxious when this score is over 50. Accordingly, in our study, we evaluated that scores over 50 indicated the presence of anxiety (11-17).

The patients admitted to the otolaryngology service for surgery were informed about STAI and verbally administered STAI-trait (STAI-1) and STAI-state (STAI-2) at 9-10 p.m. on the night before surgery to measure their general and current anxiety levels, respectively (11). The state subscale was applied again after the operation at the fourth hour (STAI-3).

The patients were divided into groups according to gender and age (≥45 and <45 years). We used 45 years as the age threshold for patient grouping because Kim et al. referred to changes in cardiovascular response beginning at this age (18).

Student's t-test was used in the analysis of continuous variables with normal distribution and Mann-Whitney U test for those without normal distribution. The Kruskal-Wallis test was conducted to compare more than two independent groups. The degree of relationship between continuous variables was determined using Spearman's correlation test. A p value of <0.05 was considered statistically significant.

RESULTS

Of the 141 patients that were initially evaluated, a total of 23 patients were excluded due to not agreeing to participate in the study (n = 2), taking regular medication (n = 8), and having a history of surgery (n = 13). As a result, the final sample consisted of 53 male and 65 female volunteers. The mean age of the patients included in the study was determined as 38.62 ± 13.37 years, being calculated as 37.26 ± 10.46 years for the male patients and 39.74 ± 12.25 years for the females (p=0.247).

When the patients were examined according to gender in terms of STAI, SAP, DAP, MAP and heart rate values, the STAI-1 score, showing the trait anxiety value, was found to be statistically significantly lower in men (p=0.005). Preoperative state anxiety was present in 85% of the patients (STAI-2≥50). The mean STAI-2 score, indicating preoperative state anxiety, was statistically significantly lower in men (p=0.001). Table 1 presents the detailed results of the investigated parameters according to gender.

Table 1. STAI scores and hemodynamic changes according to gender

	Male (n = 53)	Female (n = 65)	p
Age	37.26 ± 10.46	39.74 ± 12.25	0.247
STAI-1	42.81 ±3.78	45.46 ± 5.77	**0.005**
STAI-2	53.89 ± 3.87	57.72 ± 6.99	**0.001**
STAI-3	46.38 ± 3.67	48.43 ± 5.74	**0.026**
State anxiety difference	7.51 ± 2.62	9.29 ± 3.58	**0.003**
Heart rate	52.47 ± 5	50.20 ± 5.38	**0.020**
SAP	15.64 ± 4	15.11 ± 4.36	0.494
DAP	20.49 ± 5.54	22.23 ± 6.25	0.116
MAP	18.06 ± 3.79	18.94 ± 4.33	0.253

STAI-1, preoperative trait anxiety inventory; STAI-2, preoperative state anxiety inventory; STAI-3, postoperative state anxiety inventory; State anxiety difference, the difference between the STAI-3 and STAI-2 scores; SAP, percentage change in systolic arterial pressure; DAP, percentage change in diastolic arterial pressure; MAP, percentage change in mean arterial pressure

Table 2. Comparison of STAI scores and hemodynamic data between the age groups

	45 and over (n = 56)	Under 45 (n = 62)	p
STAI-1	45.32 ± 6.46	43.32 ± 3.30	0.340
STAI-2	58.05 ± 7.20	54.15 ± 4.12	**<0.001**
STAI-3	47.84 ± 6.53	47.21 ± 3.06	0.497
State anxiety difference	10.21 ± 2.69	6.94 ± 3.02	**<0.001**
Heart rate	50.18 ± 5.15	52.16 ± 5.33	**0.043**
SAP	16.32 ± 4.57	14.47 ± 3.64	**0.016**
DAP	23.88 ± 5.08	19.26 ± 5.92	**<0.001**
MAP	20.34 ± 3.99	16.93 ± 3.51	**<0.001**
MAP	18.06 ± 3.79	18.94 ± 4.33	**0.253**

STAI-1, preoperative trait anxiety inventory; STAI-2, preoperative state anxiety inventory; STAI-3, postoperative state anxiety inventory; State anxiety difference, the difference between the STAI-3 and STAI-2 scores; SAP, percentage change in systolic arterial pressure; DAP, percentage change in diastolic arterial pressure; MAP, percentage change in mean arterial pressure

When the patients were examined according to the age groups, there were 56 patients aged 45 and over and 62 patients under 45 years old. The preoperative state anxiety score, STAI-2, was significantly higher in patients over 45 years of age (p<0.001). The changes in SAP (p=0.016), DAP (p < 0.01), MAP (p < 0.01) changes were also significantly higher in patients aged 45 and over. Under the age of 45 years, the heart rate of change was significantly higher (p=0.02). The details of the investigated parameters examined according to the age groups are given in Table 2.

DISCUSSION

In this study, we found that the trait anxiety level was high in women, and the preoperative state anxiety level was high in women and especially patients aged 45 and over. We also observed that the hemodynamic response caused by intubation was more affected in patients older than 45 years.

In this study, preoperative state anxiety was present in 85% of patients (STAI-2≥ 50). Similarly, in the literature, there are studies reporting a high percentage of patients with preoperative state anxiety (19-21). However, some researchers observed that the percentage of patients with preoperative state anxiety was lower (12,17,22). In a previous study, the reason for the high percentage of patients with preoperative state anxiety was attributed to the low sociocultural level of patients and restrictions in patients' access to information related to anesthesia and surgical procedure (23). In the current study, we informed our patients preoperatively, but we still consider that the high state anxiety scores obtained may be due to the differences in the sociocultural level of the patients who participated in the study.

When we evaluated the findings according to age, we determined that the preoperative state anxiety (STAI-2) was higher in patients aged 45 and over, which is consistent with the results reported by Kim et al. (18). In contrast, other researchers stated that younger patients had higher anxiety scores but they used a more general scale, namely the visual analog scale, to measure the anxiety level of the patients (24). STAI is considered to be more valuable to measure patients' anxiety at a specific moment in response to a specific event, such as preoperative anxiety (11). Accordingly, we also measured the trait and state anxiety levels of the patients individually, which may be the reason why we obtained different statistical results compared to some studies in the literature.

In many previous studies, it has been mentioned that women have higher preoperative anxiety levels (20, 25). In the current study, we found that both trait and state anxiety values of the female patients were significantly higher than those of male patients, which is in agreement with the literature. As a possible reason for this situation, Kim et al. considered women being more sensitive to fearful and exciting events and hormonal changes (18).

In the ≥45 years group, the increase in MAP after intubation was higher while in the group under 45 years, the increase in the heart rate after intubation was greater. These results are consistent with those reported by Kim et al. We consider that these results may be related to the differences in the sensitivity of catecholamine between the two age groups. These effects may occur as an increase in blood pressure in older patients and an increase in the heart rate in younger patients due to the age-related effects of increased catecholamine on the cardiovascular system. Cardiovascular response was found to be increased in the 40-50 years group by Ismail et al. and in the 35-50 years group by Bullington et al.; however, in these studies, the authors applied premedication (midazolam) and eliminated the anxiety factor (26,27).

One of the limitations of this study is that we were not able to measure the blood pressure of patients using intraarterial cannulation after tracheal intubation because our sample included young and healthy individuals. Instant blood pressure monitoring would have been helpful in showing the highest pressure level. We observed that in previous studies, the intubation-related blood pressure change reached the highest level at 10 seconds and 1 minute (28), and therefore we performed our measurements at minutes 0 and 1. We aimed to minimize the effect of this limitation by increasing our sample size.

In this study, we observed that the blood pressure increase due to intubation was higher in patients aged 45 and over. Considering the complications related to elevated blood pressure, further studies should be conducted on the use of premedication to reduce anxiety, especially in patients older than 45.

CONCLUSION

In this study, we observed that state anxiety was higher in elderly and female patients, and the vital changes during endotracheal intubation were greater in the older group. In the light of these data, considering the elevated level of preoperative state anxiety and increased hemodynamic response during endotracheal intubation, we think that further studies should be undertaken to investigate how to reduce anxiety, especially in elderly patients to prevent cardiovascular complications.

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