Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 8231 - 8237
Received 16 February 2021; Accepted 08 March 2021.

Extubation at Sitting versus Supine Position after Septoplasty Operation

Mohamadreza Rafiei[1], Mohammad Afsahi[2], Mehrshad Namazi[3], Behroz Kheradmand[4], Ebrahim Hazrati[5*]

[1]Associate Professor, Department of Anesthesiology, AJA University of Medical Sciences, Tehran, Iran.
[2]Assistant Professor, Department of Anesthesiology, AJA University of Medical Sciences, Tehran, Iran.
[3]Assistant Professor, Department of Anesthesiology, AJA University of Medical Sciences, Tehran, Iran.
[4]Assistant Professor, Department of Anesthesiology, AJA University of Medical Sciences, Tehran, Iran.
[5*]Associate Professor, Subspecialty Intensive Care, Department of Anesthesiology, AJA University of Medical Sciences, Tehran, Iran. E-mail: E.hazrati@ajaums.ac.ir

ABSTRACT

Background: Tracheal extubation usually causes problems for patients while supine position, but sitting may reduce stress. The aim of this clinical trial study was to evaluate the two supine and sitting methods of different intubation positions in patients undergoing septoplasty.

Materials and methods: We enrolled sixty patients with candidated for elective septoplastic surgery with general anesthesia. All patients were anesthetized with propofol and morphine. After surgery, all patients were transferred to the care unit. Patients were then randomly put into the sitting or supine position while 100% oxygen was administered**.** The two groups were examined for physiological variables and the data were analyzed using statistical software.

Results: In comparison with the supine position, the sitting position significantly decreased endotracheal suctioning and oxygen desaturation at all intervals after extubation ($P = 0.008$, 0.04, respectively), decreased systolic blood pressure and heart rate ($P = 0.063$, $P = 0.052$) after extubation. whilst recovery agitation was similar in both Groups.

Conclusion: Tracheal extubation in the sitting position is associated with reduced endotracheal suctioning and oxygen desaturation, Patient extubation in sitting position after septoplasty operation accompany with better patient condition and outcome than supine position.

KEYWORDS

Septoplasty, Sitting Position, Extubation, Supine Position.

Introduction

One of the important issues in extubation is its complications. In many cases, surgeons prefer to place patients in the supine position after surgery to remove the tube [1]. However, studies have shown that this position has side effects for patients, and in some cases, patients face problems such as lack of oxygen [2].

To solve some complications many surgical procedures are performed in a non-routine(supine) position such as intracranial nerve surgery in the sitting position due to improved intravascular drainage and lower ICP and improved field surgery or doing spinal anesthesia at sitting position for better control the block surface or performing Nd[1] [3-7]. In addition to sitting posture decreases collapsibility of the passive pharynx in anesthetized paralyzed patients [8]. Regarding the advantage of sitting position, it has been stated that the breathing condition in this position improves, especially in obese people [9]. Many people have questioned this position because of the risk of hypotension, which has been taken advantage by using measures such as the previous administration of fluids and the gradual completion of position rather than a one-step process [10].

Extubation at the end of anesthesia may be associated with complications, including loss of the airway and the need to reintubate, extubation is always elective, and should be performed only when physiologic, pharmacologic, and contextual conditions are optimal [11].

[1] YAG Laser capsulotomy in children at sitting position because of more access that surgeons get in this situation for more accurate work

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 8231 - 8237
Received 16 February 2021; Accepted 08 March 2021.

Extubation can be done in routine (supine) or sitting position, compared with supine posture, sitting posture provide significant improvement of pharyngeal airway patency during sitting posture [12].

After the end of septoplasty surgery, for better homeostasis of the operation site, it is closed inside the patients' nostrils with drug-impregnated gases. As a result, the patient, who is supine at the end of the operation, is forced to swallow saliva and breathe through the same mouth at the same time with only the mouth open. Many cases carry the risk of laryngospasm and some degree of hypoxia for the patient. Due to the importance of recognizing the appropriate position with the least complications, we decided to study and introduce the extubation of these patients in a sitting position as a solution to reduce the mentioned complications by designing this research work.

Materials and Methods

Study Design

This singel-blind randomized clinical trial study was performed in the 501 Hospital, Tehran, Iran After Obtaining the University Ethics Committee approval (numberIR.AJAUMS.REC.1394.16) and IRCT20110103005536N7 and informed written consent, sixty patients (20–60 years old) with American Society of Anesthesiologists (ASA) physical status- I, scheduled for septoplasty were enrolled in this study.

Sample

Sample size was determined with the use of previous pilot study and the formula ($n = Z^2 \times \delta^2 / d^2$). In this formula n = sample size and z = confidence interval ($\alpha = 0.05$, $\beta = 10\%$, study power 90%). According to our pilot study in which arterial oxygen desaturation was scaled on percent, the precision was determined as about one percent ($d = 1$). The sample size was calculated 30 patients for each group. Patients were selected through convenience sampling method by random assignment, using black and white cards, the two groups are divided into each group [13], so that patients with a black card to group one, and patients with a white card to group two, and this process repeat again.

Inclusion and Exclusion Criteria

All patients aged 20 to 60 years who were referred for septoplasty under general anesthesia in 501 Hospital were included. Patients with hemorrhagic disorders, people with sleep apnea, people with arthritis rheumatoid arthritis, especially in the neck area, people with cervical stenosis, or people with hypo or severe hypertension, people with intracardiac shunt, patent foramen ovale (PFO) in their history (Risk of Paradoxical Venous Air Embolism) were excluded.

Clinical Assessment and Data Collection

After entering the operating room, all patients underwent general anesthesia with a same protocol and received 5cc/kg normal saline as preload fluid and midazolam 0.03 mg/kg as a premedication. Anesthesia induction was performed by intravenous (IV) administration of 3μg/kg fentanyl and 5 mg/kg sodium thiopental. tracheal intubation was facilitated by IV administration of 0.5 mg/kg atracurium. Anesthesia was maintained with 50% nitrous oxide in oxygen and propofol infusion at a dose of 150 μg / kg / min and 0.1 mg / kg of IV morphine. At the end of surgery and after returning the strength of the muscles patients in one group, extubated at the supine position, and in the other group extubated at sitting position. Meanwhile, information such as amount of arterial oxygen desaturation, frequent suctioning, laryngospasm cases, restlessness, increased blood pressure, and heart rate are recorded in patients in both groups. The Richmond Agitation-Sedation Scale (RASS) was used to assess the patient's restlessness in recovery (table.1) [14]. Demographic data of patients and clinical results were recorded in a pre-designed information form and finally entered for statistical analysis.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 8231 - 8237
Received 16 February 2021; Accepted 08 March 2021.

Table 1. Richmond Agitation-Sedation Scale (RASS)

+4 COMBATIVE Combative, violent, immediate dangers to staff	-1 DROWSY Not fully alert, but has sustained awakening to voice (eye opening & contact >10 sec)
+3 VERY AGITATED Pulls to remove tubes or catheters; aggressive	-2 LIGHT SEDATION Briefly awakens to voice (eyes open & contact <10 sec)
+2 AGITATED Frequent non-purposeful movements, fights ventilator	-3 MODERATE SEDATION Movement or eye opening to voice (no eye contact
+1 RESTLESS Anxious, apprehensive, movements not aggressive	-4 DEEP SEDATION No response to voice, but movement or eye opening to physical stimulation
0 ALERT & CALM Spontaneously pays attention to caregiver	-5 UNAROUSABLE No response to voice or physical stimulation

Statistical Analysis

Collected data was analyzed by SPSS for windows software (version 20, SPSS Inc., Chicago, IL). For comparison between quantitative variables in two groups were compared using T-Student test. For evaluating ranking variables Chi-square test was used. To assess the normal distribution of variables, Kolmogorov-Smirnov test was used. statistical significance was assessed at the 5% level.

Results

Sixty patients with a mean age of 29 years were studied. There was no statistically significant difference between the two groups in terms of gender, age, and it shows that the distribution of the studied variables is normal in the target population (p>0.05). (Table 2).

Table 2. Demographic characteristics of participants

Variables		Sitting position	Supine position	P-value
Gender	M	18	17	0.43*
	F	12	13	
Age (year)		30.03±4.55	28.90±4.94	0.35**

* Chi-square test ** independent T-Student test

The two groups have significant differences in the variability of arterial oxygen desaturation and the need for endotracheal suctioning (Table 3).
In comparison with the supine position, the sitting position significantly decreased endotracheal suctioning and oxygen desaturation at all intervals after extubation (12 vs. 3, 8 vs. 2, 1, $P = 0.008$, 0.04, respectively),
Heart rate and systolic blood pressure in the sitting group showed better results than the supine group, but this value was not statistically significant; Also there were no statistical differences in Laryngospasm and Restlessness in the recovery room between the two groups (p> 0.05).

Table 3. Frequent Distribution of variables in two groups

	variables											
groups	endotracheal suctioning		Laryngospasm		Restlessness in the recovery room		Increased HR HR>100/min		Increased systolic BP SBP>140mmg		Arterial oxygen desaturation O2sat<90%	
	Not Has	Has	Not Has	Has	Not Has	Has	Not Has	Has	Not Has	Has	Not Has	Has
supine	18	12	28	2	23	7	20	10	21	9	22	8
sitting	27	3	30	0	23	7	26	4	27	3	28	2
p-value	0.008		0.24		0.50		0.063		0.052		0.04	

The severity of arterial oxygen desaturation and restlessness in recovery differ significantly in both groups and

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 8231 - 8237
Received 16 February 2021; Accepted 08 March 2021.

higher at supine position and there was a significant difference between oxygen saturation at different levels in the two groups ($P = 0.01$) (Table 4).

Table 4. Comparison of the two groups in terms of severity of restlessness in recovery and arterial oxygen desaturation

Variables		Sitting position	Supine position	Total	P-value
Arterial Oxygen Desaturation	Mild-I	6.6%(2)	6.6%(2)	13.2%(4)	0.01
	ModerateII	0	3.13(4)	3.13%(4)	
	Severe-III	0	6.6%(2)	6.6%(2)	
Restlessness in Recovery	+1	6 (20%)	3 (10%)	9 (30%)	0.95
	+2	1 (3.3%)	4 (13.3%)	5 (16.6%)	
	+3	0	0	0	
	+4	0	0	0	

Discussion

In our study, extubation of patients undergoing septoplasty in two supine and sitting conditions was compared based on the variables defined in the two groups.

The results showed that the amount of oxygen and frequent suctioning in the sitting group was significantly reduced compared to the supine group (Table 2). Similar studies have shown a decrease in frequent suctioning and an increase in oxygen levels in the sitting position and have shown that improving oxygen saturation levels during extubation is an important issue in human health [4, 15, 16]. by giving the patient a seat position during extubation, as in the study by Rémy C. Martin et al, the gravity force (Gravitation) which helps to drainage more fluid into the mouth and eliminate need for endotracheal suctioning and facilitate work of breathing [17, 18].

In this study, by giving a sitting position during extubation and helping drainage of oral secretion we eliminated the underlying factor for laryngospasm also in this study it was found that the increase in systolytic blood pressure and heart rate in patients with sitting position for extubation was less than supine, which is consistent with the study of Young ML and colleagues, although there was no significant p-value, which could be due to need to greater Sample size [10]. Other similar studies have shown the role of sitting position in lowering blood pressure [19-21].

After septoplasty extubation of the patient, that have nasal tampon, at sitting position is associated with an fewer frequency of arterial oxygen desaturation than at the supine position which can be due to increased pulmonary volumes and capacity at sitting position and amount of oxygen is more available to the bloodstream [22](table.3).

during septoplastic surgery, due to changes in the part of the patient's airway (nasopharynx), the condition of patient's airway is placed in the different Airway Classification, because with the packing of the nasal hole (nasopharynx) and become edematous them following surgical trauma, indeed an anatomical change and a limitation on access to the patient's airway will increase the morbidity and mortality rate [23-25].

One of the complications of extubation of patients with airway is the laryngospasm comflict, which is due to inability to swallow and discharge of mouth secretion immediately after extubation [26, 27]**.**

We show that at sitting position the degree of drop in oxygen desaturation is lower (Grade I versus Grade II, III) than the Supine group because at sitting position, not only increased lung volume and capacity, but also, as shown by Langou RA et al., has decreased oxygen consumption and the ventricular chamber size and ventricular wall stress then as result increased oxygen supply in the bloodstream [28].

In this study, the frequency of restlessness in the two groups did not differ significantly, although the severity of restlessness was higher in ranking at supine group, as documented by Fujiwara N, Leblond J, Zhu PJ and colleagues, due to oxygen deficiency for brain cells cause reduction of excitatory potentials and affecting the area of hippocampus, that is essential for the cognition, thus reduce complete patient recovery and awareness and causes

more restlessness, however, with regard to the value of p, this is not significant [29-31].
Studies have shown that recognizing the airways and the best position during extubation is important in reducing postoperative complications and air difficulty [13]. In addition, recent findings have shown that new methods can be effective in oxygenation and management of difficult airways and reduce extubation complications [32-34].

Certainly, in addition to the extubation position, attention to more reassuring and more effective methods can be effective in patients' health. In general, the present study considered extubation in the sitting position to be suitable for septoplasty surgery. One of the limitations of the present study was the dissatisfaction of some patients after entering the study, which was eliminated by replacing qualified individuals. The strengths of the present study were the repetition of the measured items for greater reliability.

Conclusion

Tracheal extubation in the sitting position is associated with reduced endotracheal suctioning and oxygen desaturation**,** Patient extubation in sitting position after septoplasty operation accompany with better patient condition and outcome than supine position. Many surgeons in Iran use the supine position when extubation patients undergoing nasal septum surgery. The findings of the present study suggest the use of the sitting position. Finally, studies with higher sample size are also recommended.

Conflicts of Interest

There are no conflicts of interest.

References

[1] Scott, B. (2012). Airway management in post anaesthetic care. *Journal of Perioperative Practice, 22*(4), 135-138.

[2] Von Ungern-Sternberg, B.S., Davies, K., Hegarty, M., Erb, T.O., & Habre, W. (2013). The effect of deep vs. awake extubation on respiratory complications in high-risk children undergoing adenotonsillectomy: a randomised controlled trial. *European Journal of Anaesthesiology (EJA)*, *30*(9), 529-536.

[3] Ganslandt, O., Merkel, A., Schmitt, H., Tzabazis, A., Buchfelder, M., Eyupoglu, I., & Muenster, T. (2013). The sitting position in neurosurgery: indications, complications and results. a single institution experience of 600 cases. *Acta neurochirurgica*, *155*(10), 1887-1893.

[4] Andreu, M.F., Bezzi, M., Pedace, P., Fredes, M., Salvati, I., Leoz, A., & Aguirre, M. (2019). Survey on the extubation procedure in intensive care units in Buenos Aires, Argentina. *Revista Brasileira de terapia intensiva*, *31*(2), 180-185.

[5] Gupta, P., Rath, G.P., Prabhakar, H., & Bithal, P.K. (2018). Complications related to sitting position during pediatric neurosurgery: an institutional experience and review of literature. *Neurology India*, *66*(1), 217-222.

[6] Longmuir, S., Titler, S., Johnson, T., & Kitzmann, A. (2013). Nd: YAG laser capsulotomy under general anesthesia in the sitting position. *Journal of American Association for Pediatric Ophthalmology and Strabismus*, *17*(4), 417-419.

[7] Soltany, S. (2020). Postoperative peritoneal adhesion: an update on physiopathology and novel traditional herbal and modern medical therapeutics. *Naunyn-Schmiedeberg's Archives of Pharmacology*, 1-20.

[8] Tagaito, Y., Isono, S., Tanaka, A., Ishikawa, T., & Nishino, T. (2010). Sitting posture decreases collapsibility of the passive pharynx in anesthetized paralyzed patients with obstructive sleep apnea. *The Journal of the American Society of Anesthesiologists*, *113*(4), 812-818.

[9] De Jong, A., Wrigge, H., Hedenstierna, G., Gattinoni, L., Chiumello, D., Frat, J.P., Ball, L., Schetz, M., Pickkers, P., Jaber, S. (2020). How to ventilate obese patients in the ICU. *Intensive Care Medicine*, *46*(12),

2423-2435.

[10] Young, M.L., Smith, D.S., Murtagh, F., Vasquez, A., & Levitt, J. (1986). Comparison of surgical and anesthetic complications in neurosurgical patients experiencing venous air embolism in the sitting position. *Neurosurgery*, *18*(2), 157-161.

[11] Suraseranivong, R., Krairit, O., Theerawit, P., & Sutherasan, Y. (2018). Association between age-related factors and extubation failure in elderly patients. *PloS one*, *13*(11), e0207628.

[12] McEvoy, R.D., Sharp, D.J., & Thornton, A.T. (1986). The effects of posture on obstructive sleep apnea. *American review of respiratory disease*, *133*(4), 662-666.

[13] Parotto, M., Cooper, R.M., & Behringer, E.C. (2020). Extubation of the Challenging or Difficult Airway. *Current Anesthesiology Reports*, 1-7.

[14] Sessler, C.N., Gosnell, M.S., Grap, M.J., Brophy, G.M., O'Neal, P.V., Keane, K.A., & Elswick, R.K. (2002). The Richmond Agitation–Sedation Scale: validity and reliability in adult intensive care unit patients. *American journal of respiratory and critical care medicine*, *166*(10), 1338-1344.

[15] Mesquida, J., Gruartmoner, G., Espinal, C., Masip, J., Sabatier, C., Villagrá, A., & Artigas, A. (2020). Thenar oxygen saturation (StO 2) alterations during a spontaneous breathing trial predict extubation failure. *Annals of intensive care*, *10*(1), 1-7.

[16] Arabi, Y.M., Arifi, A.A., Balkhy, H.H., Najm, H., Aldawood, A.S., Ghabashi, A., & Al Raiy, B. (2014). Clinical course and outcomes of critically ill patients with Middle East respiratory syndrome coronavirus infection. *Annals of internal medicine*, *160*(6), 389-397.

[17] Martin-Du, P., Benoit, R., & Girardier, L. (2004). The role of body position and gravity in the symptoms and treatment of various medical diseases. *Swiss medical weekly*, *134*(3738), 543-551.

[18] Deye, N., Lellouche, F., Maggiore, S.M., Taillé, S., Demoule, A., L'her, E., & Brochard, L. (2013). The semi-seated position slightly reduces the effort to breathe during difficult weaning. *Intensive care medicine*, *39*(1), 85-92.

[19] Ozden, M.G., Bakan, N., & Kocoglu, H. (2020). The effect of extubation in prone position on emergence and recovery in lumbar spinal surgery. *Journal of Neurosurgical Sciences*.

[20] Srivastava, S., Goyal, P., Agarwal, A., & Singh, R.K. (2010). Emergence from anaesthesia in supine versus prone position in patients undergoing percutaneous nephrolithotomy surgery. *Journal of Anaesthesiology Clinical Pharmacology*, *26*(3), 315-318.

[21] Bithal, P.K., Pandia, M.P., Dash, H.H., Chouhan, R.S., Mohanty, B., & Padhy, N. (2004). Comparative incidence of venous air embolism and associated hypotension in adults and children operated for neurosurgery in the sitting position. *European Journal of Anaesthesiology (EJA)*, *21*(7), 517-522.

[22] Buist, A.S. (1987). Standardization of spirometry. *The American review of respiratory disease*, *136*(5), 1073-1074.

[23] Cooper, R.M., & Hagberg, C.A. (2007). Extubation and changing endotracheal tubes. *Benumof's Airway Management*, 1146-1180.

[24] Sezari, P., Safari, F., Nashibi, M., & Mottaghi, K. (2020). Tracheal Intubation Using Nelaton Catheter: A Simple Device, an Airway Rescue Option. *Turkish Journal of Anaesthesiology and Reanimation*, *48*(5), 414-416.

[25] Ababneh, O., Alghanem, S., Al-Shudifat, A., Khreesha, L., Obeidat, S., & Bsisu, I. (2020). Acute Macroglossia Post Craniotomy in Sitting Position: A Case Report and Proposed Management Guideline. *International Medical Case Reports Journal*, *13*, 391-397.

[26] Chung, D.C., & Rowbottom, S.J. (1993). A very small dose of suxamethonium relieves laryngospasm. *Anaesthesia*, *48*(3), 229-230.

[27] Landsman, I.S. (1997). Mechanisms and treatment of laryngospasm. *International anesthesiology*

clinics, *35*(3), 67-74.

[28] Langou, R.A., Wolfson, S., Olson, E.G., & Cohen, L.S. (1977). Effects of orthostatic postural changes on myocardial oxygen demands. *The American journal of cardiology*, *39*(3), 418-421.

[29] Fujiwara, N., Higashi, H., Shimoji, K., & Yoshimura, M. (1987). Effects of hypoxia on rat hippocampal neurones in vitro. *The Journal of Physiology*, *384*(1), 131-151.

[30] Leblond, J., & Krnjevic, K. (1989). Hypoxic changes in hippocampal neurons. *Journal of neurophysiology*, *62*(1), 1-14.

[31] Zhu, P.J., & Krnjević, K. (1997). Adenosine release mediates cyanide-induced suppression of CA1 neuronal activity. *Journal of Neuroscience*, *17*(7), 2355-2364.

[32] L'Hermite, J., Wira, O., Castelli, C., De La Coussaye, J.E., Ripart, J., & Cuvillon, P. (2018). Tracheal extubation with suction vs. positive pressure during emergence from general anaesthesia in adults: A randomised controlled trial. *Anaesthesia Critical Care & Pain Medicine*, *37*(2), 147-153.

[33] Root, C.W., Mitchell, O.J., Brown, R., Evers, C.B., Boyle, J., Griffin, C., & DuCanto, J. (2020). Suction Assisted Laryngoscopy and Airway Decontamination (SALAD): A Technique for Improved Emergency Airway Management. *Resuscitation Plus*, 100005.

[34] Bhatnagar, V., Jinjil, K., & Dwivedi, D. (2019). Time to include video laryngoscope as a tool for extubation in difficult airway cases!. *Indian Journal of Anesthesia*, *63*(8), 677-678.