

A Review on Supplemental Oxygen Effects on Nausea and Vomiting in Patients under Spinal Anesthesia for Elective Cesarean

Galehdar Nasrin¹, Sediqeh Nadri², Vahabi Sepideh³, Ebrahimzadeh Farzad⁴

¹School of Allied Medical Sciences; ²Department of Anesthesiology;

³Department of Anesthesiology; & ⁴Department of Statistics,

Lorestan University of Medical Sciences, Khorramabad,

IRAN.

¹ galehdar_nas@yahoo.co.in

ABSTRACT

Introduction: Nausea and vomiting is seen after surgery in 20 to 70 percent of cases. In some studies supplemental oxygen could decrease Nausea and vomiting after surgery and in other studies it had no positive effect to decrease Nausea and vomiting. So this study aims to study on using supplemental oxygen effects on Nausea and vomiting changes of elective cesarean in patient under spinal anesthesia.

Methods: 120 women who candidates for elective cesarean were chosen randomly for two-group intervention study. During the surgery and for six hours after surgery the intervention group received 60% oxygen and the control group received 30% oxygen with simple mask. The rate of Nausea and vomiting was recorded by visual tool (VAS) and the result was analyzed by SPSS19.

Result: the incidence of Nausea and vomiting during surgery, recovery and women ward was different but there was not meaningful difference. There was also no meaningful difference for the intensity of Nausea and vomiting between two groups.

Conclusion: in this study clinical trial to prescribe supplemental oxygen could not show any prevention role on Nausea and vomiting rather than routine oxygen.

Keywords: Nausea and vomiting, supplemental oxygen, cesarean, spinal anesthesia

INTRODUCTION

Nausea and vomiting is the most common complications after surgery. The mechanism of Nausea and vomiting includes vestibule stimulation and Cochlea in ear and stimulation of central chemical receptors and gastrointestinal local mechanisms. Outbreak of this is reported between 20-70% but in spinal anesthesia it is reported 66%. These complications may cause outpatients release delay, electrolyte disorders, wound dehiscence, increase of eye and skull pressure, tiredness and stress of patients, dehydration and wound bleed, increase of aspiration risk and release delay of recovery ward. Researches show that patients want to stop Nausea and vomiting after surgery even by spending more money or even suffering pain. There are researches which recommend using supplemental oxygen during and after surgery or acupuncture to prevent Nausea and vomiting after surgery. In abdominal surgeries, supplemental oxygen is prescribed after surgery for patients to prevent hypoxia and its complications. In cesareans, patients are at the risk of hypoxia for the high pressure on stomach and diaphragm and for the spinal anesthesia. And unfortunately cesarean is increasing and spinal anesthesia increases nausea and vomiting after surgery. Beside decrease of blood pressure, unrelated factors such as fatness, sex of patient and age can affect nausea and vomiting. According to the researches in some cases prescribing oxygen with high concentration decreased nausea and vomiting after surgery but in other cases it had no effect.

In the other word prescribing oxygen with high concentration had different effects in different researches. Qods and friends found a meaningful difference between using oxygen with 60% concentration with mask and using oxygen with 30% concentration with Canola and incidence and severity of nausea and vomiting after cesarean with general anesthesia. But Seydi and friends reported no meaningful difference for incidence of nausea and vomiting in recovery after 6 hours of the surgery. In some researches there was mentioned some limitations like lack of controlling mobile dizziness, alcohol and cigarette consumption which show incomplete control on distortive factors in those researches. So the researcher tried to have better control on mentioned limitations and to review effects of prescribing supplemental oxygen on nausea and vomiting after elective cesarean with spinal anesthesia in Asali educational hospital of Lorestan province in Iran.

METHODS

The randomized intervention was carried out on 120 women candidate for cesarean after receiving the code from ethic committee and clinical trial center of Iran IRCT and after acceptance of Asali educational hospital. On arrival to operating room necessary information was given to the patients and their testimonials were gathered. The samples divided into two groups (60 persons) based on block categorization and randomized numbers table and with considering parity and age matching of patients.

Qualified individuals for sampling including elective cesarean had to be fasting 6-8 hours before and after surgery, they had to have no symptomatic digestive diseases, no moving disease, no dizziness, no Cardiovascular and Pulmonary problems, no Middle ear diseases , diabetes , infectious diseases , fever , hypertension, side surgeries except cesarean, no smoke and alcohol consumption, no Immunosuppressive medications, no too much or unusual bleeding during surgery, no Hemoglobin higher than 10 per DL, no receiving any medication except antibiotic and one time painkiller until 6 hours after surgery.

All patients received spinal anesthesia with same method. Before spinal anesthesia 500ML Ringer serum infused for patients and then 100 mg Lidocaine Hayprbar injected to patients with needle No 25 and patients sit in supine position and their blood pressure and heart beats were measured and recorded per 1 and then per 5 minutes. The anesthesia team and nurses of the ward received necessary trainings. The Shahed group received 30% oxygen 3-5 ml per minute with simple mask during surgery and in recovery ward. the Azmun group received 60% oxygen after surgery in recovery ward and for 6 hours in surgery ward. The results were recorded by two trained nurses as 10 oxygen venturi masks were recorded. In case of any problem like necessary general anesthesia, tough vomiting, unwillingness to continue cooperating or side surgery necessity patients would be spared from the research. The data gathering tools included questionnaires and check lists which all demographic information of patients including nausea and vomiting condition during and after surgery for 6 hours recorded in them. Numbers of nausea and vomiting were measured and recorded by standard tools. Based on this tool numbers and intensity of nausea and vomiting is expressed from 0-10. 0 means no nausea and vomiting, 1-3 means slight nausea and vomiting, 4-7 means average nausea and vomiting and 8-10 means tough nausea and vomiting. Data was analyzed by SPSS which Anesthesiologists, obstetricians, and statistical consulting group operating room and anesthesia team chose it. Stability of the test achieves $r=0.92$ with retesting and Spearman correlation coefficient. All data and information of the test analyzed by SPSS 19 using independent T statistical and Chi-square methods. The meaningfulness of the tests was 0.05.

RESULTS

In this research 61 persons were studied in the intervention group and 59 persons were studied in the control group. The age of patients was between 18-42 years old and their average BMI was 30.55-/±3.30. The parity average was 2.11_/±0.86 and their hemoglobin was 12.1-/±0.77. Although the Peripheral oxygen saturation of patients in the intervention group was higher than the control group but based on the independent T test there was no meaningful difference for SPO2 in the first minute, during and last minutes of caesarean between the groups and based on the independent test the Chi square had no meaningful difference for nausea and vomiting during surgery. No meaningful difference seen for nausea and vomiting intensity $P>0.05$.

Table 1. Comparison of the incidence of nausea and vomiting during surgical

Nausea and Vomiting	Test Group	Yes		No		P - Amount
		Numbers	Percent	Numbers	Percent	
Nausea	Intervention	26	42/6	35	57/4	P= 0/729
	Control	27	45/8	32	54/2	
Vomiting	Intervention	12	19/7	49	80/3	P= 0/369
	Control	8	13/6	51	86/4	

According to the independent T test there were no difference for Length of stay in the recovery room , systolic and diastolic pressure in the recovery room , recovery room temperature , SPO2 first minute last minute entry and stay in the recovery room between the intervention and control groups. Based on the independent test the Chi square had no meaningful difference for nausea and vomiting indication between the intervention and control groups (table 2) ($P>0.05$). Also there was no meaningful difference between nausea $P=0.056$ and vomiting $P=0.191$ in recovery for the two groups.

Table 2. Comparison of the incidence of nausea and vomiting in recovery

Nausea and Vomiting	Test Group	Yes		No		P - Amount
		Numbers	Percent	Numbers	Percent	
Nausea	Intervention	7	11/5	54	88/5	P= 0/121
	Control	13	22	46	78	
Vomiting	Intervention	2	3/3	59	96/7	P= 0/379
	Control	4	6/8	55	93/2	

According to the independent T test there was no difference between the groups for Systolic and diastolic pressure in surgery ward. There was no meaningful difference between the two groups for SPO2 in first minutes entering surgery ward $P=0.202$ and six hours after surgery $P=0.583$. Based on the independent test the Chi square had no meaningful difference between nausea indication between two groups in surgery ward (table 3) and between vomiting intensity between the groups $P=0.572$. There was no vomiting in the groups.

Table 3. Comparison of the incidence of nausea and vomiting in surgery ward

<i>Nausea</i>	<i>Yes</i>		<i>No</i>	
	<i>Numbers</i>	<i>Percent</i>	<i>Numbers</i>	<i>Percent</i>
<i>Intervention Group</i>				
Intervention	4	6/6	57	93/4
Control	4	6/8	55	93/2
Total	8	6/7	112	93/3

P=0.961

CONCLUSION

Results show conformance of groups. Patients were matched for parity, age and receiving medications and anesthesia method and these factors show balancing effects effective on nausea and vomiting after surgery. During studying on patients SPO2 no differences found. In different papers every change of Systolic pressure and ischemia and hypoxia mentioned as effective factors on nausea and vomiting but in the current research no meaningful difference found and it is good for the results.

According to the independent Chi square test no meaningful difference found between the groups for nausea and vomiting indication during surgery, in recovery and in Obstetrics and gynecology surgery ward in the other word there was no meaningful difference from beginning of surgery and six hours after surgery. Some researches confirmed it but Golfam, Sadrosadat and friends, Grif, Rincon and Wald reported positive effects of using supplemental oxygen for prevention of nausea and vomiting. Although our research protocol is same as Seyyedi but the results are different.

They found no meaningful difference in nausea and vomiting indication during surgery but they reported meaningful differences in recovery ward and 6 hours after surgery. Qods said: oxygen therapy can't decrease nausea and vomiting for 60% after cesarean. Porhanden and friends compared using 30% and 80% oxygen and then 30% and 50% oxygen in Laparoscopy patients and they reported supplemental oxygen can't decrease nausea and vomiting after surgery.

Ordic and Roy were first researchers who offered supplemental oxygen idea and two years later Grif and friends found about effects of supplemental oxygen on vomiting and then they reported positive effects of supplemental oxygen on decrease of nausea and vomiting after surgery in Laparoscopy. Gul confirmed that but later researches did not confirm it. Mucader and friends reject positive effects of Secretion of serotonin on decrease of nausea and vomiting after abdominal surgeries. Tatanja Simorina and friends in a research on 120 Laparoscopy patients prescribed 30%, 50% and 80% oxygen in early 2 hours of surgery and the supervised them till 24 hours and she reported that 50% and 80% oxygen without anti-nausea medication could not decrease or prevent nausea and vomiting but only high concentrated oxygen can prevent early vomiting. So even high concentrated oxygen can't be recommended as an anti-nausea medication in surgeries such as gynecology laparoscopy. Dolaresem and friends researched on 30% and 80% oxygen in patients with general anesthesia and found no meaningful difference. Heydari and friends researched on orthopedic surgery patients under spinal anesthesia using 20%, 30% and 70% oxygen and they reported no meaningful difference.

Other studies reported meaningful difference for 80% oxygen and in other studies using supplemental oxygen under 80% no meaningful differences reported. So we can say that oxygen under 80% can't prevent nausea and vomiting and using high concentrated oxygen for long terms has its bad complications. The different results might be for different methods of anesthesia. For example in surgeries with less abdominal manipulation oxygen had less effect. Our study includes abdominal surgery under spinal anesthesia and finally nausea and vomiting got controlled we also used venture mask for being sure about oxygen concentration. So according to the current study 60% supplemental oxygen can prevent vomiting. We also recommend more studies on different types of surgery. Our research has been carried out on elective cesarean in an educational hospital and the results of the current study can't be generalized to all patients under surgery.

ACKNOWLEDGEMENT

This study is a research plan under No 89/81 from Deputy of Research and Technology University of Medical Sciences of Lorestan. So we are grateful for all supports and for funds and supplying costs by the deputy. We also thank Gynecologist and anesthesia experts and operating room staff and women ward of Asali educational hospital. We also thank Ms Azadeh Karamimehr and Shahin Mohammadiani for helping us gather samples and all patients cooperating in this research.

REFERENCES

- [1] Dolores M. McKeen, MD, Ramiro Arellano, Colleen O'Connell. (2009). Supplemental oxygen does not prevent postoperative nausea and vomiting after gynecological laparoscopy. *Can J Anesth/J Can Anesth.*, 56, 651–657.
- [2] Fan et al. (1997). Acupressure treatment for prevention of postoperative nausea and vomiting. *Anesthesia & Analgesia*, 84, 712-4.
- [3] Tramer, M. R. (2003). Treatment of postoperative nausea and vomiting. *BMJ*, 327, 762-3.
- [4] Miller, R. D. (2000). *Anesthesia* (5th Edition; pp. 2210-2318). Philadelphia: Churchill Livingstone.
- [5] Ku, C. M., & Ong, B. C. (2003). Postoperative nausea and vomiting review of current literature. *Singapore Med J.*, 44, 366-74.
- [6] Berggren, R. B. (2003). Current concepts on reducing postoperative nausea and vomiting. *Journal of Same-day Surgery*, Feb,1-4.
- [7] Purhonen et al. (2003). Supplemental oxygen for prevention of nausea and vomiting after breast surgery. *BJA*, 91, 284-7.
- [8] Greif et al. (1999). Supplemental oxygen reduces the incidence of postoperative nausea and vomiting. *Anesthesiology*, 91, 1246-1252.
- [9] Goll et al. (2001). Ondansetron is no more effective than supplemental intraoperative oxygen for prevention of postoperative nausea and vomiting. *Anesthesia & Analgesia*, 92(1), 112-117.
- [10] Pan, P. H., & Moore, C. H. (1996). Intraoperative antiemetic efficacy of prophylactic ondansetron versus droperidol for cesarean section patients under epidural anesthesia. *Anesthesia & Analgesia*, 83, 982-986.
- [11] Vanvlymen, J. M., & White, P. F. (2000). *Outpatient Anesthesia*. In: Miller RD. *Anesthesia* (5th Edition; p.2213). Philadelphia: Churchill Livingstone.
- [12] Feeley, T. W., & Macario, A. (2000). *The Post anesthesia Care Unit*. In: Miller RD. *Anesthesia*. 5thed. Churchill Livingstone; PP.2302.
- [13] Gold, B. S., Kitz, D. S., Lecky, J. H., et al. (1989). Unanticipated admission to the hospital following ambulatory surgery. *JAMA*; 262:3008-10.
- [14] Meridy, H. W. (1982). Criteria for selection of ambulatory surgical patients and guidelines for anesthetic management: a retrospective study of 1553 cases. *Anesthesia & Analgesia*, 61, 921-6.
- [15] Korttila, K., Ostman, P., Faure, E., et al. (1990). Randomized comparison of recovery after propofol-nitrous oxide versus thiopentone, isoflurane, nitrous oxide anesthesia in patients undergoing ambulatory surgery. *Acta Anaesthesiol Scand.*, 34, 400-3.
- [16] Abramowitz, M. D., Oh, T. H., Epstein, B. S., Ruttimann, U. E., & Friendly, D. S. (1983). The antiemetic effect of droperidol following outpatient strabismus surgery in children. *Anesthesiology*, 59(6), 579-582.
- [17] Greif, R., Akça, O., Horn, E.-P., Kurz, A., & Sessler, D. I. (2000). Supplemental perioperative oxygen to reduce the incidence of surgical wound infection: Outcomes research group. *N Engl J Med.*, 342, 161-167.

- [18] Abtahi, D., MD; Ashari A., MD; Lotfi M., BSc. (1384). Acupressure treatment in postoperative nausea and vomiting prevention. *Tabib Shargh*, 3, 205-212. [In Persian]
- [19] Ghods, A. A., Soleimani, M., & Narimani, M. (2006). Effect of postoperative oxygen therapy on nausea and vomiting following cesarean section. *The journal of Qazvin Univ of Med Sci.*, 9(4), 81-86. [In Persian]
- [20] Seidy et al. (2010). Effect of Supplemental oxygen on the incidence and severity of nausea and vomiting in the patients after cesarean surgery under spinal anesthesia. *The journal of Kurdistan Univ of Med Sci.*, 15(Summer), 26-35. [In Persian]
- [21] Squadrone, V., Cocha, M., & Cerutti, E. (2005). Continuous positive airway pressure for treatment of postoperative hypoxemia: a randomized controlled trial. *JAMA*, 293, 589-595.
- [22] Chura, J. C., Boyd, A., & Argenta, P. A. (2007). Surgical site infections and supplemental perioperative oxygen in colorectal surgery patients: A systematic review. *Surgical Infections*, 8, 455-461.
- [23] Smetana, G. W., Lawrence, V. A., & Cornell, J. E. (2005). Preoperative pulmonary risk stratification for noncardiothoracic surgery: systematic review for the American College of Physicians. *Ann Intern Med.*, 144, 581-59.
- [24] Pecora, F. S. T., Malbouisson, L. M., & Torres, M. L. A. (2009). Supplemental oxygen and the incidence of perioperative nausea and vomiting in cesarean sections under subarachnoid block. *Rev Bras Anesthesiol.*, 59, 558-569.
- [25] Habib, A. S., Itchon-Ramos, N., Phillips-Bute, B. G., & Gan, T. J. (2006). Transcutaneous acupoint electrical stimulation with the Relief Band for the prevention of nausea and vomiting during and after cesarean delivery under spinal anesthesia. *Anesth Analg.*, 102, 581-584.
- [26] Gan, T. J. (2006). Risk factors for postoperative nausea and vomiting. *Anesthesia & Analgesia*, 102(6), 1884-1898.
- [27] Balki, M., & Carvalho, J. C. (2005). Intraoperative nausea and vomiting during cesarean section under regional anesthesia. *Int J Obstet Anesth.*, 14, 230-241.
- [28] Apfel, C. C., & Roewer, N. (2003). Risk assessment of postoperative nausea and vomiting. *Int Anesthesiol Clin.*, 41, 13-32.
- [29] Sadrolsadat, S., Shoroghi, Farahbakhsh, F., Moharreri, R., Sheikhvatan, M., & Abbasi, A. (2008). The effect of supplemental 70% oxygen on postoperative nausea and vomiting in patients undergoing inguinal hernia surgery. *Hernia*; 12, 167-171. [In Persian]
- [30] Golfam, W., Golfam, P., & Golfam, B. (2009). The effect of excess oxygen in reducing nausea and vomiting after breast surgery. *Scientific Medical University of Ilam Winter*, 17, 31-35. [In Persian]
- [31] Heydari, S., Kashefyi, P., Rahimi, M., & Eskandari, M. (2007). The effect of different concentrations of oxygen on nausea and vomiting after surgery using spinal anesthesia. *Journal of Shahrekord University of Medical Sciences*; 8: 98.[In Persian]
- [32] Phillips, T. W. Jr, Broussard, D. M., Sumrall, W. D. & 3rd Hart, S. R. (2007). Intraoperative oxygen administration does not reduce the incidence or severity nausea or vomiting associated with neuraxial anesthesia for cesarean delivery. *Anesthesia & Analgesia*, 105, 1113-1117.

- [33] Smeltzer, S. C., & Bare, B. G. (2008). *Textbook of medical surgical nursing. 11th ed*, Lippincott (pp. 602-607). Philadelphia, PA: Lippincott Williams & Wilkins.
- [34] Warden, C. R., Moreno, R., & Daya, M. (2008). Prospective evaluation of ondansetron for undifferentiated nausea and vomiting in the prehospital setting. *Prehosp Emerg Care*; 12, 87-91.
- [35] Tatjana et al. (2010). Effects of high intraoperative inspired oxygen on postoperative nausea and vomiting in gynecologic laparoscopic surgery. *J Clin Anesth.*, 22(7), 492-498.
- [36] Rincon, D. A., & Valero, J. F. (2008). Supplemental oxygen for prevention of postoperative nausea and vomiting: Meta – analysis of randomized clinical trials. *REV ESP Anesthesiol Reanim.*, 55(2), 101-109.
- [37] Purhonen, S., Niskanen, M., Wustefeld, M., Hirvonen, E., & Hynynen, M. (2006). Supplemental 80% oxygen does not attenuate postoperative nausea and vomiting after breast surgery. *Acta Anaesthesiol Scand.*, 50, 26-31.
- [38] Joris et al. (2003). Supplemental oxygen does not reduce postoperative nausea and vomiting after thyroidectomy. *Br J Anaesth.*, 91(6), 857-861.
- [39] Overdyk, F. J., & Roy, R. C. (1997). If nitrous oxide induces emesis, maybe 100% oxygen is an antiemetic. *Anesthesia & Analgesia*, 84(1), p.231.
- [40] Purhonen, S., Turunen, M., Ruohoaho, U.-M., Niskanen, M., & Hynynen, M. (2003). Supplemental oxygen does not reduce the incidence of postoperative nausea and vomiting after ambulatory gynecologic laparoscopy. *Anesthesia & Analgesia*, 96, 91–96.
- [41] Apfel et al. (2004). A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. *N Engl J Med.*, 350, 2441–2451.
- [42] Turan et al. (2006). Does the efficacy of supplemental oxygen for the prevention of postoperative nausea and vomiting depend on the measured outcome, observational period or site of surgery? *Anaesthesia*, 61(7), 628–633
- [43] Orhan-Sungur, M., Kranke, P., Sessler, D., & Apfel, C. C. (2008). Does Supplemental Oxygen Reduce Postoperative Nausea and Vomiting? A Meta-Analysis of Randomized Controlled Trials. *Anesthesia & Analgesia*, 106(6), 1733-1738.