

Comparison of Effect of Two Treatment Methods: Oxygen Therapy with Face Mask and Nasal Catheter on Nausea and Vomiting and Comfort in Cesarean section under Spinal Anesthesia

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Background: Receiving Oxygen during Cesarean section under spinal anesthesia can be a good way to prevent from nausea and vomiting of mothers and hypoxemia of fetus. This study aimed to compare the effect of two treatment methods of Oxygen therapy with facemask and nasal catheter on vomiting and nausea and patient's comfort during Cesarean section under spinal anesthesia.

Methods: This clinical trial study was conducted on 50 candidate patients for elective cesarean section, recruited via convenience sampling, were divided into two groups. For the first group, 8 liters of Oxygen per minute with face mask and for the second one, 4 liters of Oxygen per minute with nasal catheter was administered during cesarean section and after that in recovery unit. Nausea, vomiting and comfort were recorded during the first 30 min of surgery and in recovery unit. Data were analyzed by Mann-Whitney test, independent t test, Fisher's exact test and Chi-square tests.

Results: No significant difference was observed between two groups in terms of nausea and vomiting during surgery and after that. Moreover, there was no significant difference between two groups in terms of comfort during ($p=0.14$) and after surgery ($p=0.12$). In terms of clinical treatment, patients who received Oxygen through nasal catheter felt more comfort.

Conclusion: Nasal catheter by administering lower dose of oxygen had a similar effect to face mask on nausea and vomiting. Therefore, since patients feel more comfort when using nasal catheter, it is preferable in preventing the nausea and vomiting in Cesarean section during spinal anesthesia.

Keywords: Oxygen Mask, Nasal Catheter, Nausea, Vomiting, Comfort, Caesarean, Spinal Anesthesia

Introduction

Nowadays Cesarean section is one of the most common gynecological surgeries (1). Two general and spinal anesthesia are used for Cesarean. Type of anesthesia depends on the type of surgery, degree of urgency and mother request. Anesthetist by selecting a method with high level of safety for mothers and the lowest adverse effects on infants can help the gynecologist to do Cesarean section with no delay. Due to the risks of general anesthesia (problematic intubation, aspiration of gastric contents), local anesthesia is widely used in the world (2). One of its most common side effects is nausea and vomiting during Cesarean section under spinal anesthesia; its prevalence in some medical literature has been cited by 80% (3). Several factors contribute to nausea and vomiting after surgery under spinal anesthesia; however, the most important one is excessive vagal stimulation due to sympathetic inhibition. Other factors such as low blood pressure block level higher than the fifth thoracic segment, medications/ drugs, obesity, and anxiety also can lead to vomiting. Nausea and vomiting is a kind of stress for the patient, nurse and anesthetist and it results in distress, hatred, increased anxiety and dysfunction of the patients. If it continues, it leads to low blood pressure, decreased heart rate, fatigue, abdominal pain, irritability, and insomnia (1). Various medications are used in order to prevent and treat this side effect; although these drugs are relatively efficient, they could not remarkably reduce its outbreak; moreover, these drugs impose other side effects on the mothers and their infants and increase the treatment costs (1, 4, 5). Using supplemental Oxygen is one of the easy and inexpensive methods that have recently considered in literature to prevent nausea and vomiting. The research data show that the use of supplemental oxygen during surgery prevents postoperative nausea and vomiting (4, 7, 6). The main mechanism of the Oxygen effect is not clear, nevertheless, reduction in intestinal ischemia during and after surgery, and preventing the release of some mediators such as serotonin from the intestines that play a major role in occurrence of vomiting and nausea are regarded as the

probable mechanism (8). Oxygen prophylaxis during Cesarean section with spinal anesthesia can be a technique for the prevention of nausea and vomiting of mother, fetus and maternal hypoxemia. There are variety methods for administering supplemental Oxygen: health care service providers use face mask for Oxygen administration due to its disposability and reduction in infection costs (9). Another method is the use of nasal catheter for administering oxygen. It can produce 22-44% by administering 1-6 liters of oxygen per minute FIO₂ (Fraction of inspired Oxygen). However, if more than 6 liter is administered, it poses the patient swallow air and not only does not increase FIO₂, but also it causes nasal irritation (10). In various studies, for evaluation, different methods of administering Oxygen have been proposed and amongst face mask was the one that induced fear of enclosed space. In addition, face mask does not provide for the patient enough oxygen because the patient takes the mask off at the time of oral care, speaking to others, feeling discomfort, vomiting and nausea; as a result, oxygen flow stops and leads to hypoxia (11). On the other hand, nasal catheter is not good for the people with oral problem and results in irritation and bleeding in nasal mucosa when administering the Oxygen that is not moist enough (12, 13). Comfort increases patient's satisfaction and is of great importance in providing inpatient services (14) and has a positive effect on patients' recovery (15). This study aimed to compare the effect of two treatment methods of Oxygen therapy with face mask and nasal catheter on vomiting and nausea and patient's comfort during Cesarean section under spinal anesthesia in Shohada-ye Gonbad Hospital.

Methods

This clinical trial study was carried out on 50 candidate patients in Shohada-ye Gonbad Hospital for elective cesarean section in 2014. Convenience sampling method and random allocation were used for selecting the samples in groups. The inclusion criteria were elective Cesarean section, spinal anesthesia, class 1 of The American Society of Anesthesiologists (healthy patient), low risk gestational age range of 18-35 year old (17), no preoperative

intravenous drugs, having preoperative SPO₂ (saturation of peripheral Oxygen) higher than 95% and hemoglobin higher than 11. Exclusion criteria included changing the spinal anesthesia into general anesthesia during surgery and need for any surgical accessories except Caesarean section for the patient and long term bleeding during surgery. Data collection instruments were demographic data sheet, visual scale for nausea, vomiting record checklist and visual scale for comfort.

Vomiting was measured with visual analogue scale (VAS) during and after surgery. All patients were trained to score their vomiting based VAS. This objective tool included a 100 mm line with the areas that had specified beginning, end and domain and patients marked their nausea on it; zero represented the best state and lack of nausea and 100 for the worst situation. Nausea score above 70 was indicated for severe, 35-70 for moderate and less than 35 for mild nausea. Vomiting was in the form of severe abdominal irritation with leakage of stomach contents out of the body [1], during and after surgery, and was measured in recovery unit and was recorded in checklist. Occurrence of vomiting more than five times was severe, between 3-5 was moderate and less than three was mild (18). For assessment of patient's comfort, oxygen administration during Caesarean section was conducted and in recovery, 10-point visual criteria was used (full comfort: 10, very comfortable: 8, good feeling: 6, mild discomfort: 4, discomfort: 4, lack of comfort and need help: 0) (19, 20).

The visual scale used in determining the severity of nausea is a standard and it has been frequently used in various studies (21 - 22). In order to assess patient's comfort, 10-point scale was used. The use of visual scales to measure subjective perception of pain and comfort has been repeatedly demonstrated in different studies (23).

After entering the patient to the operating room for elective Caesarean, the process was explained to them at the beginning of the research. After obtaining informed consent, the patients were enrolled in the study. Then, for all patients, Caesarean by a gynecologist, an intervention by an anesthesia nurse and

spinal anesthesia by an anesthesiologist were considered, and the data was recorded by the researcher. The patient lay in sitting position in operation room and all connections including intravenous route and bladder catheter were checked. One-liter normal saline solution was routinely administered, and Pulse Oximeter system and manometer was connected. Anesthesia drug was administered through the middle line in 4 and 5 lumbar vertebrae (24). All patients under spinal anesthesia underwent a gradual dose of lidocaine up to thoracic vertebrae 4 (T4). After spinal anesthesia, the patients were asked to lie down on the bed immediately. In addition to Pulse Oximeter system and manometer, non-invasive monitoring was connected to the patient and then, immediately before initiation of operation, one of the Oxygen administration methods, face mask or nasal catheter, was used. During Caesarean section, the patient was in the supine position and the uterus was leaning to the left. The Patients with the face mask received 8 liters of oxygen per minute and patients with nasal catheter received 4 liters of oxygen per minute in two stages, immediately after the spinal anesthesia administration and after surgery in recovery unit. During surgery, the researcher was cautious that nasal catheter was not removed. At the end of the surgery and in recovery room, before discharging from operation room, they were asked about nausea feeling with visual scale of VAS. The number of observed vomiting during and after surgery was recorded. Evaluating the patients' comfort during and after operation were conducted with 10 score criterion. It is noteworthy that in case of severe vomiting, routine treatment was performed for patient; however, in our study none of the patients had severe vomiting.

Data were analyzed using SPSS-16 software. For describing the observations of quantitative and qualitative variables, average central index and diffusion index of standard deviation were used; independent T test was used for analysis of normally distributed variables and for the variables that are not normally distributed, Mann-Whitney test was used. For describing the qualitative data,

Table 1: Comparison of nausea severity during and after Caesarean section in two groups of Oxygen therapy with a face mask and nasal catheter in patients undergoing Caesarean section with spinal anesthesia in the Shohada-ye Gonbad hospital

Variable	Under study groups (n=25)		p-value	df
	Mask (n/percentage)	Catheter (n/percentage)		
nausea severity during surgery	mild	19 (79%)	1	2
	moderate	5 (20%)		
	sever	1 (4%)		
	total	25 (100%)		
Nausea severity after surgery	mild	22 (88%)	1	1
	moderate	3 (12%)		
	sever	-		
	total	25 (100%)		

Table 2: Comparison of vomiting frequency during and after Caesarean section in two groups of oxygen therapy with a face mask and nasal catheter in patients undergoing Caesarean section with spinal anesthesia in the Shohada-ye Gonbad hospital

Variable	Under study groups (n=25)		p-value	df
	Mask (n/percentage)	Catheter (n/percentage)		
vomiting during surgery	mild	25 (100%)	0.49	2
	moderate	0		
	sever	0		
	total	25 (100%)		
vomiting after surgery	mild	25 (100%)	1	1
	moderate	0		
	sever	0		
	total	25 (100%)		

Table 3: Comparison of comfort during and after Caesarean section in two groups Oxygen therapy with a face mask and nasal catheter in patients undergoing Caesarean section with spinal anesthesia in the Shohada-ye Gonbad hospital

Variable	Under study groups (n=25)		p-value	df
	Mask Mean ±SD	Catheter Mean ±SD		
mild	25 (100%)	23 (92%)	0.49	2
moderate	0	2 (8%)		

percent and frequency and for comparing two groups, Fisher's exact test and chi-square test were used. This research was approved in ethics committee of Golstan University of Medical Sciences and were registered in Iranian Registry of Clinical Trials (IRCT) with code IRCT2014080218649N1.ep model).

Results

The results showed that the highest percentage of patients in both groups had mild nausea during surgery (79% with face mask and 80% with nasal catheter) and only 4% of both groups, had severe nausea during surgery. The highest percentage of both groups (88%) had mild nausea in recovery unit and no one had nausea in both groups. For comparing the severity of nausea between two groups, Fisher's exact test was used and

results showed that there was no significant difference between two groups during and after surgery in recovery unit (Nausea severity during surgery P=1, severity of nausea in recovery unit, P=1) (Table 1).

Concerning the nausea severity, results showed that all patients with face mask (100%) and 92% of the patients with nasal catheter (the highest percentage) had mild vomiting during surgery and 100% of the patients with face mask and 96% of the patients with nasal catheter (the highest percentage) had mild vomiting during surgery. Using Fisher's exact test, no significant difference was observed in comparison of the frequency of vomiting between the two groups during and after surgery in the recovery unit (frequency of

vomiting during surgery $P=0.49$ and vomiting in recovery ($P=1$) (Table 2).

The mean and SD of comfort during surgery in patients with face mask was 4.8 ± 2.39 and in patients with the nasal catheter was 5.84 ± 2.82 ($P=0.14$). There was no significant difference between the two groups in terms of comfort (Mann-Whitney test). SD of comfort in the recovery unit for the group with face mask was 4.68 ± 2.49 and for the group with nasal catheter was 5.88 ± 2.83 , ($P=0.12$). There was no significant difference between the two groups in terms of comfort in recovery unit (Mann-Whitney test). (Table 3).

Discussion

In this study, nausea was categorized into three categories: mild, moderate and severe. During the surgery, one patient of each group reported severe nausea; however, no patient had severe nausea in recovery unit. Generally, there was no significant difference between two groups in terms of nausea. These observations are consistent with the study of AyhanHatyk et al. (2009) and Kogliano et al. (2002) (11, 25). In the study by AyhanHatyk et al. (2009), the patients with comfort reported more severe nausea compared to the patients in this study; however, there was no significant difference in terms of this variable in two groups of patients with face mask and nasal catheter. There was no significant difference in terms of vomiting in two groups of patients before and after surgery in recovery unit. In fact, patients were divided into three categories in terms of vomiting: mild, moderate and severe. No patient reported severe vomiting (more than five times) during and after surgery in recovery, and all cases were less than three times. The Patients with nasal catheter also experienced no severe vomiting. During and after surgery, two patients with severe vomiting and one with moderate vomiting were observed. These observations are consistent with the results of AyhanHatyk et al. (2009) and Kogliano et al. (2002) (11, 25). There was no significant statistical difference between two groups during and after surgery. However, by comparing these results with comfort criteria used, the comfort mean in the patients who received Oxygen through nasal catheter was

near to Feeling OK that is scored as 6; and the comfort mean in the patients who received Oxygen through face mask was near to Mild Comfort that is scored as 4. Thus, the group with nasal catheter feels more comfort, and these results are consistent with those of AyhanHatyk et al. (2009), Krosbyet a. (1992) and Tirovipaty (11, 27, and 26). In the study by AyhanHatyk et al. (2009), the patients with nasal catheter reported more satisfaction; however, the comfort mean was relatively different compared to the patients in this study. In a study by Krosby et a. (1992), the mean comfort with the nasal catheter was 9.13 ± 1.31 and with a face mask 6.72 ± 3.59 and the patients were more satisfied with nasal catheter. According to Tyropatyet al., (2010) the patients with nasal catheter showed more tolerance. However, in the study by Kogliano et al. (2002), there was no significant difference between the groups in terms of comfort (25).

According to KU and Ong studies (2003), Goll (2001), Greif (1999) and Becroft (2006), the use of supplemental Oxygen prevents nausea and vomiting after surgery and the Oxygen prophylaxis during Caesarean section with spinal anesthesia can be a good technique for the prevention of maternal nausea and vomiting [9,7,6,4]. Jamal catch (2010) and Purhonen (2003) showed usefulness of oxygen administration in the process of improving nausea and vomiting (28, 29).

With respect to AyhanHatyk et al. (2009), Zafarghandi et al., and Tokai, comfort is one of important criteria that should be taken into consideration in analyzing the health care system; moreover, the increase of patient's satisfaction, as a customer, is of great importance and affects her recovery (11, 14, and 15).

Conclusion

The most important aspect of the Oxygen therapy is usefulness in improving peripheral blood oxygen saturation as normal. Therefore, with respect to the lack of difference in blood Oxygen saturation, low chance of vomiting and patients comfort in selecting the best method for Oxygen therapy is important. There was no significant difference between two groups in terms of vomiting and nausea.

Although no significant statistical difference was observed between two groups, clinically, in terms of comfort criterion used in the study, the patients who received the Oxygen via nasal catheter felt more comfort.

As a result, in an equal condition in terms of peripheral blood oxygen saturation, nausea and vomiting, the patient's comfort and the price of instrument are particularly important for oxygen therapy. On the other hand, the patients who received nasal catheter felt more comfort and there was no significant difference between two groups in terms of

References

1. Montazeri S, Pour Mahdi Z, Latifi S.M, Aghaei M. The effectiveness of acupressure on nausea and vomiting during and after cesarean section under spinal anesthesia. Ahwaz Scientific Medical Journal. 42;November 2004.P:68-76. (in Persian)
2. Afolabi BB, Lesi F, Merah NA. Regional versus general anaesthesia for caesarean section. Cochrane Database Syst Rev. 2006;4.
3. Stein DJ, Birnbach DJ, Danzer BI, Kuroda MM, Grunebaum A, Thys DM. Acupressure versus intravenous metoclopramide to prevent nausea and vomiting during spinal anesthesia for cesarean section. *Anesthesia & Analgesia*. 1997;84(2):342-5.
4. Ku C, Ong B. Postoperative nausea and vomiting: a review of current literature. *Singapore medical journal*. 2003;44(7):366-74.
5. Purhonen S, Turunen M, Ruohoaho U-M, Niskanen M, Hynynen M. Supplemental oxygen does not reduce the incidence of postoperative nausea and vomiting after ambulatory gynecologic laparoscopy. *Anesthesia & Analgesia*. 2003;96(1):91-6.
6. Goll V, Akça O, Greif R, Freitag H, Arkiliç CF, Scheck T, et al. Ondansetron is no more effective than supplemental intraoperative oxygen for prevention of postoperative nausea and vomiting. *Anesthesia & Analgesia*. 2001;92(1):112-7.
7. Greif R, Laciny S, Rapf B, Hickie RS, Sessler DI. Supplemental oxygen reduces the incidence of postoperative nausea and vomiting. *Anesthesiology*. 1999;91(5):1246.
8. Heidari M kP, rahimi M, eskandari M. The effect of different concentrations of oxygen on postoperative nausea and vomiting after spinal anesthesia. *J Shahrekord Univ Med Sci*. 2006;8(2):9-15.
9. Beecroft JM, Hanly PJ. Comparison of the OxyMask and Venturi mask in the delivery of supplemental oxygen: pilot study in oxygen-dependent patients. *Canadian respiratory journal: journal of the Canadian Thoracic Society*. 2006;13(5):247.
10. Ruth C, Constance H, Sharon J. *Fundamentals of nursing*. Seventh edition ed. Philadelphia: Wolters Kluwer, Lippincott, Williams & Wilkins; 2013.
11. Ayhan H, Iyigun E, Tastan S, Orhan ME, Ozturk E. Comparison of two different oxygen delivery methods in the early postoperative period: randomized trial. *Journal of advanced nursing*. 2009;65(6):1237-47.
12. Dinesen T, McDonald L, McDonald S, DuVall D. A comparison of the OxyArm oxygen delivery device and standard nasal cannulae in chronic obstructive pulmonary disease patients. *Respiratory care*. 2003;48(2):120-3.
13. Ling E, McDonald L, Dinesen TR, DuVall D. The OxyArm™—a new minimal contact oxygen delivery system for mouth or nose breathing. *Canadian Journal of Anesthesia*. 2002;49(3):297-301.
14. Zafarghandi Mr, Rezaii Sa, Khalkhali H. Mizane rezaiate bimarane bastari az faraiande pazireshe bimar dar bimarestanhaie daneshgahe ulumpezeshkie tehran. *Hakim*. 2005;8(3):31-7.
15. Tokai H, Imazu Y, Kogure S, Takahashi S. The Oxy Arm—A New Minimal Contact Oxygen Delivery System. *Journal of Clinical Anesthesia*. 2003;27(11):1803-7.
16. Miller R, Manuel Pardo J. *Basics Of Anesthesia*. 6 ed. Philadelphia: ELSEVIER SAUNDERS; 2011.
17. Gunningham F.G, Leveno K.J, Bloom S.L, Hauth J.C, Rouse D.J, Spong C.Y. *Williams Obstetrics*. translated by: Valadani M, Razaghi S, Fathollahi A, Mansouri Rad A. 2010.
18. Brown DL. *Atlas of regional anesthesia*: Elsevier Health Sciences; 2010.
19. Roca O, Riera J, Torres F, Masclans JR. High-flow oxygen therapy in acute respiratory failure. *Respiratory Care*. 2010;55(4):408-13.
20. Chooi C, White A, Tan S, Dowling K, Cyna A. Pain vs comfort scores after Caesarean section: a randomized trial. *British journal of anaesthesia*. 2013;110(5):780-7.
21. Agarwal A, Bose N, Gaur A, Singh U, Gupta MK, Singh D. Acupressure and ondansetron for postoperative nausea and vomiting after laparoscopic cholecystectomy. *Canadian Journal of Anesthesia*. 2002;49(6):554-60.
22. Nunley C, Wakim J, Guinn C. The effects of stimulation of acupressure point p6 on postoperative nausea and vomiting: a review of literature. *Journal of PeriAnesthesia Nursing*. 2008;23(4):247-61.
23. Rezaei M, Ahmadi F, Fatehi A, Mohammadi I, JafarAbadi M. Effects of positioning on patient's back

pain and comfort after coronary angiography. SHAHREKORD UNIVERSITY OF MEDICAL SCIENCES JOURNAL. 2007.

24. Siddiqi R, Jafri SA. Maternal satisfaction after spinal anaesthesia for cesarean deliveries. J Coll Physicians Surg Pak. 2009;19(2):77-80.

25. Cogliano M, Graham A, Clark V. Supplementary oxygen administration for elective Caesarean section under spinal anaesthesia. Anaesthesia. 2002;57(1):68-9.

26. Crosby ET, Halpern SH. Supplemental maternal oxygen therapy during caesarean section under epidural anaesthesia: a comparison of nasal prongs and facemask. Canadian journal of anaesthesia. 1992;39(4):313-6.

27. Tiruvoipati R, Lewis D, Haji K, Botha J. High-flow nasal oxygen vs high-flow face mask: a randomized crossover trial in extubated patients. Journal of critical care. 2010;25(3):463-8.

28. Seydi J, Farhadifar F, Zandvakili F, Roshani D, Teyfuri L, Amani S. Effect of supplemental oxygen on the incidence and severity of nausea and vomiting in the patients after cesarean surgery under spinal anesthesia Scientific Journal of Kurdistan University of Medical Sciences 2010;15(2):26-35.

29. Purhonen S, Niskanen M, Wüstefeld M, Mustonen P, Hynynen M. Supplemental oxygen for prevention of nausea and vomiting after breast surgery. British journal of anaesthesia. 2003;91(2):284-7.