

Comparison of antiemetic efficacy of intrathecal fentanyl and dexmedetomidine for caesarean section in subarachnoid block

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Abstract

Objective: To compare antiemetic efficacy of fentanyl and Dexmedetomidine as adjuvant to bupivacaine for preventing nausea-vomiting in women undergoing caesarean section under subarachnoid block. **Study Design:** Prospective randomized, double-blinded, placebo-controlled study. **Materials and Methods:** In present study 150 patients posted for elective caesarean section were included. After thorough pre-anaesthetic evaluation, patients were randomly divided into three groups using computer generated randomization technique. Group C: patients received 2 ml of hyperbaric bupivacaine (0.5%) + 0.5 ml of normal saline intrathecally (n=50). Group D: patients received 2 ml of hyperbaric bupivacaine (0.5%) + 5µg of Dexmedetomidine intrathecally (n=50). Group F: patients received 2 ml of hyperbaric bupivacaine (0.5%) + 12.5 µg of fentanyl intrathecally (n=50). Hemodynamic parameters, intraoperative and postoperative emetic episodes were assessed using Belville's score. Perioperative complication like hypotension, sedation, shivering and pruritis were recorded. All data was expressed as Mean ± Standard deviation (SD). Statistically analysis was done by using student's unpaired t-test and ANOVA. p-value <0.05 was considered significant. **Results:** Demographic profile was comparable in all three groups. In the intraoperative and post-delivery period, an emesis free episode occurred in 31 of 50 patients (62%), 24 of 50 patients (48%) and 13 of 50 patients (26%) who had received IT Dexmedetomidine, IT fentanyl or IT placebo respectively. Among Dexmedetomidine and fentanyl groups, retching, nausea and vomiting was less in Dexmedetomidine group than fentanyl group; however, that did not differ significantly (p-value>0.05). Intraoperative rescue antiemetic was required in 7(14%) patients in the control group, however, the requirement was reduced to 3 (6%) in the midazolam group and 2 (4%) patient in Dexmedetomidine group. shivering was mainly seen in control group and pruritis in fentanyl group and bradycardia in Dexmedetomidine group. **Conclusion:** From present study it is concluded that, co-administration of intrathecal fentanyl 12.5 µg or intrathecal midazolam 2.5 mg with 0.5% hyperbaric bupivacaine in the subarachnoid block significantly reduces intraoperative and postoperative nausea-vomiting in cesarean sections.

Key Words: Bupivacaine, Caesarean section, Fentanyl, Dexmedetomidine, Subarachnoid block.

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Received Date: 06/05/2019 Revised Date: 01/06/2019 Accepted Date: 23/07/2019

DOI: <https://doi.org/10.26611/1015121211>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:

04 November 2019

INTRODUCTION

Nausea and vomiting intraoperatively and in early postoperative period during caesarean delivery under subarachnoid block is a common distressing symptoms.¹ Emetic symptoms more frequently occur in the parturient because of high progesterone levels, which decreases gastrointestinal motility, reduces lower esophageal sphincter tone and increases gastrin secretion.² These symptoms are reduced by several antiemetic drugs (like metoclopramide, domperidon, ondansatrom etc), but none have been proved to be effective without significant adverse effects or high cost³. The causes of nausea and

How to cite this article: S K Adil Hasan, Manohar. Comparison of antiemetic efficacy of intrathecal fentanyl and dexmedetomidine for caesarean section in subarachnoid block. *MedPulse International Journal of Anesthesiology*. November 2019; 12(2): 112-115.
<http://medpulse.in/Anesthesiology/index.php>

vomiting are multifactorial and can largely be divided as patient risk factors, anesthetic technique and surgical procedure. Intrathecal (IT) administration of lipophilic Opioids such as fentanyl⁴ and Dexmedetomidine⁵ have been reported to minimize the incidence of intraoperative and early postoperative nausea and vomiting in caesarean delivery under subarachnoid block. Fentanyl, is a synthetic μ opioid receptor agonist. It is preferred as an adjuvant in subarachnoid block because of its rapid onset and short duration of action. It increases both the duration and intensity of spinal anesthesia and decreases the intraoperative nausea and vomiting without having any deleterious effects on the neonate or mothers^{6,7}. Dexmedetomidine is a specific and selective alpha 2 adrenoceptor agonist. Activation of receptors in the brain and spinal cord inhibits neuronal firing and leads to sympatholytic effect, causing hypotension, bradycardia, sedation and analgesia⁸. Therefore, present study was conducted to compare antiemetic efficacy of fentanyl and Dexmedetomidine as adjuvant with bupivacaine for preventing nausea-vomiting in women undergoing caesarean section under subarachnoid block.

Material and Methods

After approval from institutional ethical committee, present prospective randomized, double-blinded, placebo-controlled study was conducted in Department of Anaesthesiology, Kamineni Institute of medical sciences, Narketpally, Nalgonda, during February 2016 to May 2017 in 150 patients posted for elective caesarean section.

Inclusion Criteria:

1. ASA grade I and II women posted for elective cesarean section
2. Age between 18 to 32 years

Exclusion Criteria:

1. ASA grade III and above
2. Emergency surgeries
3. History of hyperemesis gravidarum
4. Patients who had received antiemetic within 24 hours prior to surgery
5. H/o gastrointestinal disease
6. H/o allergy to study drugs
7. Contraindications to regional anaesthesia
8. Refusal for participation

After a thorough pre-anaesthetic evaluation of all patients, a written and informed consent was obtained, both for conduct of study as well as administration of subarachnoid block. They were kept nil by mouth for eight

hours before surgery. Intravenous access was established with a 18G intravenous canula and preloading was done with 15 ml/kg Ringer Lactated solution. Anaesthesia machine, accessories, monitors and drugs were checked. Sample size was calculated using Open Epi, Version 3, open source calculator – SS mean on internet with confidence interval of 99%, power of 95% and ratio of two groups at 1:1; which was minimum 36 participants per group. All patients were randomly divided into three groups using computer generated randomization technique. Under all strict aseptic precautions, in lateral position, subarachnoid block was performed at L3-L4 intervertebral space with a 25G spinal needle.

•Group C: patients received 2 ml of hyperbaric bupivacaine(0.5%)+0.5 ml of normal saline (n=50)

•Group D:patients received 2 ml of hyperbaric bupivacaine (0.5%) + 5 μ g of Dexmedetomidine (n=50).

•Group F: patients received 2 ml of hyperbaric bupivacaine (0.5%) + 12.5 μ g of fentanyl (n=50).

Following parameters were recorded:

Hemodynamic parameters like heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure at 2 minute intervals for 10 minutes, then at 5 minute intervals for next 30 minutes and at 15 minute intervals till 2 hours after giving study drug. ECG and SpO₂ monitored continuously. Intraoperative and postoperative emetic episodes were assessed using to the Belville's score 9. Grade 0 - No nausea, Grade 1- Nausea, Grade 2- Retching Grade 3- Vomiting.at 30 min,1 hours, 2 hours, 4 hours, 6 hours, 12 hours and 24 hours .These emetic episodes were recorded by direct questioning by an anaesthesiologist blinded to study drug the patients have received. Nausea was defined as a subjectively unpleasant sensation associated with awareness of the urge to vomit; retching was defined as the laboured, spasmodic, rhythmic contractions of the respiratory muscles without the expulsion of gastric contents; vomiting was defined as the forceful expulsion of gastric contents from the mouth.¹⁰ If two or more episodes of emesis occurred, another rescue antiemetic (ondansetron 4 mg) was given. Perioperative complication like hypotension, sedation, shivering and pruritis were observed.

Statistical analysis: All data was expressed as Mean \pm Standard deviation (SD). Statistical analysis was done using student's unpaired t-test and ANOVA. p-value <0.05 was considered significant.

RESULTS

Table 1: Distribution according to Demographic profile (N=150)

S.No	Parameters	Group-C (n=50) (Mean ± SD)	Group-F (n=50) (Mean ± SD)	Group-D (n=50) (Mean ± SD)	p-value
1	Age (year)	23.21±3.7	24.5±4.6	24.7±3.6	>0.05
2	BMI (kg/m ²)	24.32±2.2	25.34±3.7	25.56±4.5	>0.05
3	Gestational age (wks)	39.10±1.7	37.85±2.4	38.25±2.15	>0.05

p-value <0.05 is taken as significant

Table 2: Distribution of perioperative emetic episodes in groups according to Belville's score (N=150)

S.No	Belville's score	Group-C (n=50) No. of patients (%)	Group-F (n=50) No. of patients (%)	Group-D (n=50) No. of patients (%)
1	Grade 0 - No nausea	13 (26%)	24 (48%)	31 (62%)
2	Grade 1- Nausea	16 (32%)	14 (28%)	11(22%)
3	Grade 2- Retching	12 (24%)	7 (14%)	5 (10%)
4	Grade 3- Vomiting	9 (18%)	5 (10%)	3 (6%)

Table 3: Comparison of the incidence of emetic symptoms of the three groups

Emetic episode	Group-C vs Group-F		Group-C vs Group-D		Group-F vs Group-D	
	Z-value	p-value	Z-value	p-value	Z-value	p-value
Nausea	1.17	>0.05	2.05	<0.05	0.69	>0.05
Retching	1.67	>0.05	2.17	<0.05	0.41	>0.05
Vomiting	1.11	>0.05	1.23	<0.05	1.07	>0.05
Overall presence of any episode	3.27	<0.05	4.43	<0.05	1.41	>0.05

p-value <0.05 is taken as significant

In the intraoperative and post operative period, an emesis free episode according to Belville's score Grade 0 - No nausea, occurred in 31 of 50 patients (62%), 24 of 50 patients (48%) and 13 of 50 patients (26%) who had received IT Dexmedetomidine, IT fentanyl or IT placebo respectively [Table-II]. Among dexmedetomidine and fentanyl groups, the incidence of retching, nausea and vomiting were less in dexmedetomidine group than fentanyl group; however, that did not differ significantly (p-value>0.05) [Table-III]. Intraoperative rescue antiemetic was required in 7(14%) patients in the control group, however, the requirement was reduced to 3 (6%) in fentanyl group and 2 (4%) patient in the dexmedetomidine group.

Table 5: Comparison of Perioperative Complications (N=150)

S.No	Complication	Group-C (n=50) No. of patients (%)	Group-F (n=50) No. of patients (%)	Group-D (n=50) No. of patients (%)
1	Hypotension	42 (84%)	38 (76%)	42 (84%)
2	Bradycardia	0 (0%)	1 (2%)	4 (8%)
3	Shivering	7 (14%)	4 (8%)	1 (2%)
4	Pruritis	0 (0%)	0(0%)	3 (6%)

Shivering was mainly seen in control group and pruritis in fentanyl group. Hypotension was observed in 42 patients in control group, 38 patients in fentanyl group and 42 patients in dexmedetomidine group. [Table-IV].

DISCUSSION

In present clinical study, we have compared the efficacy of fentanyl and dexmedetomidine to minimize incidence of nausea vomiting when co administered with hyperbaric bupivacaine (0.5%) intrathecally with that of placebo in caesarean section. Factors such as age, history of motion sickness, hormonal changes, hypotension, pain, surgical procedure and anesthetic technique influence emetic symptoms. However, in present study, study groups were similar with regard to maternal demographics and operative management. Therefore, difference in frequency and severity of emetic symptoms can be

attributed to study drugs administered. Nausea and vomiting commonly occur during caesarean section performed under subarachnoid block¹, and is frequently related to intraoperative hypotension, peritoneal traction and exteriorization of uterus. These problems may be accompanied by visceral pain that stimulate vagal afferents, which occurs despite apparently adequate dermatomal sensory blockade². Various pharmacological agents have been used prophylactically, however, either undesirable effects or cost of the agents limited their routine use¹¹. Intrathecal fentanyl and dexmedetomidine as adjuvants with bupivacaine in subarachnoid block for

caesarean section, may provide better intraoperative and postoperative analgesia and thereby decreases discomfort from peritoneal manipulations which may initiate emetic episodes^{2,4,12,13}. Antiemetic effect of dexmedetomidine may be induced by direct antiemetic properties of α_2 agonists through inhibition of catecholamine by parasympathetic tone¹¹. Intrathecal fentanyl improves the quality of spinal anesthesia increasing both the duration and intensity of spinal anesthesia and decreasing the intraoperative nausea and vomiting¹⁴. The results of present study revealed that both IT fentanyl and IT dexmedetomidine significantly decrease the incidence of intraoperative and early postoperative nausea-vomiting in comparison with placebo ($p < 0.05$), which are in agreement with the observations of^{3,7,12-15}. Intraoperative rescue antiemetic was required in 7(14%) patients in the control group, however, the requirement was reduced to 3(6%) in the fentanyl group and 2(4%) patient in the dexmedetomidine group which is similar to^{11,12,15,16}. In present study the incidence of hypotension was also comparable to the observations made by^{12,15}. Hypotension was aggressively treated with I.V. fluids and I.V. ephedrine. Therefore, the low dose of intrathecal agents did not have any deleterious cardiovascular effects on the parturients. Incidence of bradycardia was more in dexmedetomidine group whereas incidence of shivering was more in the control group and pruritis in fentanyl group.

CONCLUSION

From present study it is concluded that, co-administration of intrathecal fentanyl 12.5 μg or intrathecal dexmedetomidine 5 μg with 0.5% hyperbaric bupivacaine in the subarachnoid block significantly reduces intraoperative and postoperative nausea-vomiting in cesarean sections under subarchnoid block. Acknowledgements We express our deep gratitude to all patients for their co-operation.

REFERENCES

1. Lussos S, Bader A, Thomhill M and Datta S. The antiemetic efficacy and safety of prophylactic metoclopramide for elective caesarean delivery during spinal anaesthesia. *RegAnaesth* 1992;17:126-130.
2. Manullang TR, Viscomi CM and Pace NL. Intrathecal fentanyl is superior to intravenous ondansetron for the prevention of perioperative nausea during caesarean delivery with spinal anaesthesia. *Anaesth Analg* 2000; 90: 1162-1166.
3. Biswas BN, Rudra A, and Nath S. A comparison of intrathecal fentanyl with intravenous ondansetron-dexamethasone combination for prevention of

- intraoperative and early postoperative emesis following spinal anaesthesia for caesarean section. *Indian J Anaesth* 2001; 45: 195-197.
4. Gupta M, Shailaja S, Hegde KS. Comparison of intrathecal dexmedetomidine with buprenorphine as adjuvant to bupivacaine in spinal anaesthesia. *Journal of clinical and diagnostic research: JCDR*. 2014 Feb;8(2):114.
5. El-Attar A, Aleem MA, Beltagy R, Ahmed W. A comparative study of intrathecal dexmedetomidine and fentanyl as additives to bupivacaine. *Research and Opinion in Anesthesia and Intensive Care*. 2015 Apr 1;2(2):43.
6. Anjali Bhure, Neelakshi Kalita, Prasad Ingley and Gadkari C.P. Comparative study of intrathecal hyperbaric bupivacaine with clonidine, fentanyl, and midazolam for quality of anesthesia and duration of postoperative pain relief in patients undergoing elective caesarean section. *People's journal of Sc.Res* 2011; 5(1): 19-23.
7. Hunt CO, Naulty JS, Bader AM *et al*. Perioperative analgesia with subarachnoid fentanyl-bupivacaine for caesarean delivery. *Anesthesiology* 1989; 71: 535-540.
8. Rodola F. Midazolam as an antiemetic. *European Review for Medical and Pharmacological Sciences* 2006; 10: 121-126.
9. Belville JW, Bross DJ and Howland WS. A method for clinical evaluation for antiemetic agents. *Anesthesiology* 1959; 20:753-760.
10. Watcha MF and White PF. Post-operative nausea and vomiting : Its etiology, treatment and prevention. *Anesthesiology* 1992;77: 162-184.
11. Routray S, Ravi K, Mishra D. Effect of Intrathecal Dexmedetomidine and Fentanyl as adjuvant to hyperbaric bupivacaine for orthopaedic lower limb and lower abdominal procedures: A double blind control study. *Indian Journal of Clinical Anaesthesia*. 2015;2(4):204-8.
12. Rudra P and Rudra A. Comparison of intrathecal fentanyl and midazolam for prevention of nausea vomiting during caesarean delivery under spinal anaesthesia. *Indian J. Anaesth* 2004; 48(6): 461-464.
13. Dahlgren G, Hulstrand C, Jakobsson J, Norman M, Eriksson EW and Martin H. Intrathecal sulfetanil, fentanyl or placebo added to bupivacaine for cesarean delivery. *Anesth Analg* 1997; 85: 1288-1293.
14. Govindswamy S, Curpod P. A comparative study of intrathecal 0.5% hyperbaric bupivacaine with dexmedetomidine and 0.5% hyperbaric bupivacaine with fentanyl for lower abdominal surgeries. *Sri Lankan Journal of Anaesthesiology*. 2016 Feb 11;24(1).
15. Shaikh SI, Govindaraju C and Hegade G. Comparison of intrathecal fentanyl and midazolam for prevention of nausea-vomiting during cesarean section under spinal anaesthesia. *Anaesth Pain and Intensive Care* 2015;18(2):124-129.
16. Naaz S, Bandey J, Ozair E, Asghar A. Optimal dose of intrathecal dexmedetomidine in lower abdominal surgeries in average Indian adult. *Journal of clinical and diagnostic research: JCDR*. 2016 Apr;10(4):UC09.

Source of Support: None Declared
Conflict of Interest: None Declared