

ORIGINAL ARTICLE

Efficacy of prophylactic intravenous administration of ondansetron for prevention of spinal anesthesia induced hypotension in elderly patients

Syed Ali Raza Ali Shah, MBBS, FCPS¹, Syeda Sarah Naqvi, MBBS²,
Muhammad Ali Abbas, MBBS, FCPS³

¹Consultant Anesthesiologist, PFH 7, Nyala, Darfur (Sudan)

²Medical Officer, Armed Forces Institute of Rehabilitation Medicine, Abid Majeed Road, Rawalpindi Cantt. (Pakistan)

³Consultant Anesthesiologist, Department of Anesthesiology, Combined Military Hospital Rawalpindi Cantt. (Pakistan)

Correspondence: Capt Syeda Sarah Naqvi, Armed Forces Institute of Rehabilitation Medicine, Abid Majeed Road, Rawalpindi Cantt. (Pakistan); Phone: +92 323 572 7512; E-mail: draliraza2108@yahoo.com

ABSTRACT

Objective: Hypotension is the commonest side effect associated with spinal anesthesia. Multiple modalities have been tested to find adequate preventive measure. Main objective of this study is to find out the effectiveness of prophylactic administration of inj. ondansetron for prevention of spinal anesthesia induced hypotension in elderly patients.

Study design: Double blind, randomized controlled trial.

Place and duration of study: This study was conducted in our anesthesiology department from 01 July 2014 to 31 December 2014.

Methodology: 100 patients were selected for the study using non-probability sampling technique, and divided into two groups of 50 each using random numbers table. Each patient was preloaded with ringer's lactate solution in a dose of 10 ml/kg. Patients of Group A received 8 mg of ondansetron IV five minutes prior to administration of spinal anesthesia; whereas patients of Group B were injected normal saline IV. Data were collected and analyzed using IBM SPSS version 20. Chi square test was used to compare hypotension between two groups. A p-value < 0.05 was taken as significant.

Results: Mean age of Group A was 64.16 ± 8.47 years, whereas that of Group B was 62.58 ± 8.99 (p value= 0.39). Mean weight of Group A was 72.64 ± 5.82 kg, whereas that of Group B was 70.66 ± 5.96 kg (p - value= 0.295). Hypotension was present in 23 (46%) patients in Group A, where as it was present in 34 (68%) patients in Group B (p value= 0.026). Bradycardia was recorded in 3(06%) vs.11(22%) patients in Group A and B respectively (p=0.021).

Conclusion: We conclude that intravenous administration of 8 mg of ondansetron, 5 minutes prior to subarachnoid block, is effective in decreasing frequency of hypotension and bradycardia in elderly patients.

Key words: Ondansetron; Spinal anesthesia; Hypotension.

Citation: Shah SARA, Naqvi SS, Abbas MA. Efficacy of prophylactic intravenous administration of ondansetron for prevention of spinal anesthesia induced hypotension in elderly patients. *Anaesth Pain & Intensive Care* 2016;20(1):17-20

INTRODUCTION

Spinal anesthesia (SA) is performed very commonly around the globe.¹ When administered to an elderly patient, it helps in decreasing incidence of deep vein thrombosis.² But it is associated with complications too,³ the most common of these being hypotension⁴ with an incidence of 25-80%.⁵

Prevention has always been preferred over cure. And so is the case here. Multiple modalities have been tested in

general population, ranging from fluid preloading to co-loading, and use of drugs like ephedrine and phenylephrine. But these all have their own set of side effects, particularly in case of elderly people. Fluid co-loading or preloading can result in fluid and electrolyte overload, and that can be fatal in elderly patients.⁶ Pharmacological prophylaxis can result in hypertension and tachycardia.⁵ Use of ephedrine can even result in ventricular tachycardia.⁷

With this in mind, it is easy to understand that a balanced

efficacy of prophylactic intravenous administration of ondansetron for prevention of spinal anesthesia

approach is need for elderly patients in whom fluid has to be given very carefully, and pharmacological intervention given is free of adverse cardiovascular side effects. Ondansetron is a 5-HT₃ antagonist which is commonly used for its role in prevention of PONV.⁸ Also, studies compared it to meperidine for prevention of shivering, and found ondansetron to be more effective.⁹ And it has shown its effectiveness in prevention of SA induced hypotension in LSCS.¹⁰

Aim of this study was to find the efficacy of ondansetron for prevention of SA induced hypotension in local population.

METHODOLOGY

This double blinded randomized controlled trial was carried out in main operation theatre of CMH Rawalpindi from 01-07-2014 to 31-12-2014 after approval from Ethical review committee of Hospital. Patients having American society of Anesthesiology (ASA) status of I-III, aged 50-80 years, presenting for elective surgery were included in the study. Patients having contraindication to SA, known history of allergy to the drugs, ischemic heart disease, renal disease, short stature, morbidly obese, or failed spinal block were excluded from the study.

For estimation of sample size, we took into consideration work of Sahoo T¹⁰ and Owczuk R et al¹¹ On the basis of work of Sahoo T, sample size calculated was 52, using WHO calculator with an alpha error of 0.05, and a power of 90%. However, that study was carried out in pregnant patients undergoing LSCS. Study of Owczuk R et al¹¹ is similar to our work. However, if sample is calculated on the basis of hypotension frequency in their study, it gives sample size of 606 with alpha error of 0.05, and a power of 80%; but if it is calculated on the basis of number of patients who received ephedrine for hypotension, it calculates to 84 if power is kept at 80%; and 116 if power is kept at 90%. So we decided to include 100 patients in the study. They were selected using non-probability sampling technique, and divided in two groups of 50, A and B, each using random numbers table. Written informed consent was obtained from patient.

Before start of procedure, patients were weighed and standard monitoring was applied. They were cannulated with 18 G cannula. Group A was given 8 mg of ondansetron diluted in 5 ml normal saline IV 5 min prior to subarachnoid block. Group B was given saline only in the same manner. Staff Nurse prepared the drugs, and anesthetist administering the drugs, was kept blinded. Ringer's lactate was given 10 ml / kg prior to subarachnoid block. Blood pressure and heart rate were noted down. SA was administered using a 25 G Quincke spinal needle in L3-4 space in sitting position. 15 mg of bupivacaine (0.75%) was used for SA. Supine position was adopted

immediately after administration of SA.

Pin prick technique was used every 30 seconds to check level of sensory blockage, while Bromage scale was used to check motor blockade. Sensory blockage at level of T6 with inability to move any leg joint (Bromage scale 3) was considered as effective SA. Blood pressure was monitored every 3 minutes for 21 minutes. Hypotension was defined as a drop in systolic blood pressure > 20 % of the baseline reading or < 90 mmHg. Bradycardia was defined as a heart rate < 60 per minute during this time frame.

Data Analysis Procedure: IBM SPSS version 20 was used to analyze data. Mean and standard deviation were used for age and weight, and independent sample T-test was used to compare if the difference between the two groups was significant. Gender, frequency of bradycardia and hypotension were expressed in percentage, and compared using chi square test. A p - value < 0.05 was taken as significant.

RESULTS

There were two groups of 50 each. Mean age of patients of Group A was 64.16 ± 8.47 years and of Group B was 62.58 ± 8.99 years (p = 0.39). Mean weight of Group A was 72.64 ± 5.82 kg compared to 70.66 ± 5.96 kg in Group B (0.295) (Table 1). Hypotension was recorded in 23(46%) patients in group A, whereas it occurred in 34(68%) patients in Group B (Table 2). Statistically significant higher frequency of hypotension was recorded in Group B (p = 0.026). Bradycardia was noted in 3(6%) patients in Group A as compared to 11(22%) patients in Group B. Statistically lower frequency was found in Group A (p=0.021) (Table 2).

Table 1: Comparison of age and weight of patients in both groups (Mean ± SD)

Parameter	Group A	Group B	P value
Age (years)	64.16 ± 8.47	62.58 ± 8.99	0.39
Weight (kg)	72.64 ± 5.82	70.66 ± 5.96	0.295

Table 2: Comparison of hypotension between both Groups

Parameter	Group A N (%)	Group B N (%)	P value
Hypotension	23 (46.0)	36 (72.0)	0.026
Bradycardia	03 (06.0)	11 (22.0)	0.021

DISCUSSION

SA is considered pretty much safe in elderly population, and it is also known that increasing age has an impact on left atrial function.^{12,13} Hence in this population of

patients hypotension caused by SA may prove catastrophic due to already compromised cardiac function. Adequate preventive measures, therefore, become a very important step. Different studies have been conducted for different age groups. Generally, patients are preloaded with crystalloids or colloids, however, it has been demonstrated that even if there is no prehydration results are similar.¹⁴ Rather fluid administration may even result in fluid and electrolyte overload.⁶ Ephedrine has been proved to be better when compared to colloids, however, tachycardia is significantly higher in ephedrine group,¹⁵ and it can even result in ventricular tachycardia.⁷ So it has its own set of disadvantages. Even different solutions were used for prevention of spinal induced hypotension, like fentanyl was added to hyperbaric bupivacaine in order to reduce dose of bupivacaine, however, no difference was noted in frequency of hypotension.¹⁶

It has been stated that Bezold-Jarisch reflex (BJR) may have a role in hypotension and bradycardia,¹¹ and so administration of 5-HT₃ antagonists like ondansetron can prove helpful. Ondansetron has been used for prevention of PONV.⁸ In addition, it proved very effective in reducing the frequency of shivering associated with SA, which in itself can put further burden on cardiovascular system in elderly.⁹ Also studies have shown that it can decrease the frequency of post dural puncture headache.¹⁷ And its role in prevention of spinal induced hypotension in LSCS has been studied by many researchers.^{10,18,19} Its role has been established in general surgery cases as well.^{20,21}

However, only one study has been performed in case of elderly patients till now.¹¹ The researchers included 53 patients in their study, who were aged above 70 years. They kept power of study at 80%. They did not hydrate

any of their patients before procedure, and a maximum of 200 ml of normal saline was given during study period. Hypotension was observed in 13(48.1%) patients in placebo group and 10(38.5%) in those given ondansetron. P-value was 0.477, which means that difference was not significant. However, difference was significant in case of diastolic blood pressure and mean arterial pressure.

We differed from them in regards to sample size, as we included 100 patients. But we included patients ranging from 50-80 years in age. We infused ringer's lactate solution 10 ml/kg over a period of five minutes prior to subarachnoid block. This may have had its effect on less hypotension seen in regards to systolic blood pressure in our study. Some Polish and Indian authors also found that ondansetron has significant effect on systolic blood pressure. Our study supports this viewpoint.

CONCLUSION

We conclude that inj. ondansetron 8 mg IV can reduce the frequency of hypotension in spinal anesthesia in elderly patients. Keeping in view the known effects of ondansetron, e.g. reduced PONV, shivering and post dural puncture headache, its property to reduce the frequency of hypotension as well as bradycardia in patients receiving spinal anesthesia, gives us an added advantage.

Conflict of interest: None declared by the authors

Author contribution:

SARAS: Concept, conduction of the study work and manuscript editing

SSN: Manuscript editing. Data analysis

MAA: Conduction of the study

REFERENCES

1. Yeoh SB, Leong SB, Heng AS. Anesthesia for lower-segment caesarean section: Changing perspectives. *Indian J Anaesth.* 2010 Sep;54(5):409–14. [PubMed] [Free full text] doi: 10.4103/0019-5049.71037
2. Kanonidou Z, Karystianou G. Anesthesia for the elderly. *Hippokratia.* 2007 Oct; 11(4):175–7. [PubMed] [Free full text]
3. Agarwal A, Kishore K. Complications and controversies of regional anesthesia: a review. *Indian J Anaesth.* 2009 Oct;53(5):543–53. [PubMed] [Free full text]
4. Kyokong O, Charuluxananan S, Pothimamaka S, Leerapun R. Hypotension in spinal anesthesia for cesarean section: a comparison of 0.5% hyperbaric bupivacaine and 5% hyperbaric lidocaine. *J Med Assoc Thai.* 2001 Jun;84 Suppl 1:S256-62. [PubMed]
5. Yap JC, Critchley LA, Yu SC, Calcroft RM, Derrick JL. A comparison of three fluid-vasopressor regimens used to prevent hypotension during subarachnoid anesthesia in the elderly. *Anaesth Intensive Care.* 1998 Oct; 26(5):497-502. [PubMed]
6. Besen BA, Gobatto AL, Melro LM, Maciel AT, Park M. Fluid and electrolyte overload in critically ill patients: An overview. *World J Crit Care Med.* 2015 May 4;4(2):116–129. [PubMed] [Free full text] doi: 10.5492/wjccm.v4.i2.116.
7. Pareek M, Hansson NH, Grove EL. Ventricular tachycardia induced by weight loss pills. *Case Rep Med.* 2013;2013:712383. [PubMed] [Free full text] doi: 10.1155/2013/712383.
8. Shivanand PT., Vasantha KJ, Ravi R. Efficacy of ondansetron as antiemetic agent in preventing the incidence of PONV in LSCS under subarachnoid block. *Int J Res Med Sci.* 2013 Nov;1(4):354-358. [Free full text] doi: 10.5455/2320-6012.ijrms20131108
9. Abdollahi MH, Forouzannia SK, Bagherinasab M, Barzegar K, Fekri A, Sarebanhassanabadi M, et al. The effect of ondansetron and meperidin on preventing shivering after off-pump coronary artery bypass graft. *Acta Med Iran.* 2012; 50(6):395-8. [PubMed] [Free full text]
10. Sahoo T, SenDasgupta C, Goswami A, Hazra A. Reduction in spinal-induced hypotension with ondansetron in parturients undergoing caesarean section: a double-blind randomised, placebo-controlled study. *Int J Obstet Anesth.* 2012 Jan; 21(1):24-8. [PubMed] doi: 10.1016/j.ijoa.2011.08.002
11. Owczuk R, Wenski W, Twardowski P, Dylczyk-Sommer A, Sawicka W, Wujtewicz MA, et al. Ondansetron attenuates the decrease in blood pressure due to spinal anesthesia in the elderly: a double blind, placebo-controlled study. *Minerva Anesthesiol.* 2015 Jun;81(6):598-607. [PubMed]
12. Luger TJ, Kammerlander C, Gosch M, Luger MF, Kammerlander-kanuer U, Roth T, et al. Neuroaxial versus general anesthesia in geriatric patients for hip fracture surgery: does it matter? *Osteoporos Int.* 2010 Dec;21(Suppl 4):S555-72. [PubMed]
13. Jeevanantham V, Chughtai H, Little WC, Morgan T, Kitzman DW, Hamilton CA, et al. Aging reduces left atrial performance during adrenergic stress in middle aged and older patients. *Cardiol J.* 2012;19(1):45-52. [PubMed] [Free full text]
14. Buggy D, Higgins P, Moran C, O'Brien D, O'Donovan F, McCarroll M. Prevention of spinal anesthesia-induced hypotension in the elderly: comparison of preanesthetic administration of crystalloids, colloids, and no prehydration. *Anesth Analg.* 1997 Jan;84(1):106-10. [PubMed]
15. Singh S, Shah TD, Gupta R, Kaur P, Walia CS, Sehrawat S. Postspinal hypotension in elderly patients undergoing orthopedic surgery, prophylactic ephedrine versus polygeline 3.5. *Anesth Essays Res.* 2014 Sep-Dec;8(3):334–338. [PubMed] [Free full text] doi: 10.4103/0259-1162.143132
16. Martyr JW, Clark MX. Hypotension in elderly patients undergoing spinal anesthesia for repair of fractured neck of femur. A comparison of two different spinal solutions. *Anaesth Intensive Care.* 2001 Oct;29(5):501-5. [PubMed]
17. Fattahi Z, Hadavi SM, Sahmeddini MA. Effect of ondansetron on post-dural puncture headache (PDPH) in parturients undergoing cesarean section: a double-blind randomized placebo-controlled study. *J Anesth.* 2015 Oct;29(5):702-7. [PubMed] doi: 10.1007/s00540-015-2000-5
18. Wang M, Zhuo L, Wang Q, Shen MK, Yu YY, Yu JJ, et al. Efficacy of prophylactic intravenous ondansetron on the prevention of hypotension during cesarean delivery: a dose-dependent study. *Int J Clin Exp Med.* 2014 Dec 15;7(12):5210-6. [PubMed] [Free full text]
19. Trabelsi W, Romdhani C, Elaskri H, Sammoud W, Bensalah M, Labbene I, et al. Effect of ondansetron on the occurrence of hypotension and on neonatal parameters during spinal anesthesia for elective caesarean section: A prospective, randomized, controlled, double-blind study. *Anesthesiol Res Pract.* 2015; 2015:158061. [PubMed] [Free full text] doi: 10.1155/2015/158061.
20. Marashi SM, Soltani-Omid S, Soltani Mohammadi S, Aghajani Y, Movafegh A. Comparing two different doses of intravenous ondansetron with placebo on attenuation of spinal-induced hypotension and shivering. *Anesth Pain Med.* 2014 Mar 18;4(2):e12055. [PubMed] [Free full text] doi: 10.5812/aapm.12055.
21. Owczuk R, Wenski W, Polak-Krzeminska A, Twardowski P, Arszufowicz R, Dylczyk-Sommer A, et al. Ondansetron given intravenously attenuates arterial blood pressure drop due to spinal anesthesia: a double-blind, placebo-controlled study. *Reg Anesth Pain Med.* 2008 Jul-Aug;33(4):332-9. [PubMed] doi: 10.1016/j.rapm.2008.01.010.

