ORIGINAL ARTICLE

Comparison of recovery profile in selective spinal anaesthesia using lignocaine and sufentanyl with propofol based general anaesthesia for gynaecological laparoscopy surgery: a randomized controlled study

Mona Arya, MD*, Rakesh Garg, MD, DNB**, CK Dua, MD***

*Specialist, **Ex-senior resident, ***Ex Director, Professor and Head
Department of Anaesthesiology and Intensive Care. Maulana Azad Medical College, New Delhi, India.

Correspondence: Dr Mona Arya, E- 178, Kalkaji, New Delhi. 110019. (India); Phone: +91-9868392737;
E-mail: drrgarg@hotmail.com

ABSTRACT

Objectives: To compare the recovery characteristics of selective spinal anaesthesia (SSA) with propofol based GA for short duration outpatient gynaecological laparoscopic surgeries.

Study Design: Prospective, randomized clinical trial.

Place and duration of Study: Department of Anaesthesiology and Intensive Care, Maulana Azad Medical College, New Delhi, India. Conducted from August 2007 to March 2008.

Methodology: This trial was done in forty adult female patients who were randomized in two groups: Group GA: GA was induced with intravenous fentanyl (2μg/kg) and propofol (2mg/kg). Airway was secured with proseal laryngeal mask airway. Anaesthesia was maintained with titrated propofol infusion (100-150μg/kg/min), nitrous oxide and oxygen(50:50). Group SSA: Patients received subarachnoid block in sitting position with lignocaine 10mg and sufentanyl 10μg to a total volume of 2.5mL with sterile water. Patient remained sitting for 1minute and then in reverse Trendelenburg position for 6-8minutes. Recovery time from the end of surgery and any adverse effects were recorded.

Results: Patients demographic profile and duration of surgery were comparable. The time from the end of surgery to exit from operating room, time to straight leg raising and deep knee bend were significantly prolonged in group GA as compared to group SSA. The time to reach a modified Aldrete score>9 was significantly prolonged in group GA as compared to group SSA. The mean time to first analgesic requirement postoperatively was significantly longer for group SSA as compared with group GA.

Conclusion: SSA could effectively be used for patients undergoing short duration outpatient gynecological laparoscopy as compared to propofol infusion based general anaesthesia.

Key Words: Selective spinal anaesthesia; Laparoscopy surgery; General anaesthesia.

Citation: Arya M, Garg R, Dua CK. Comparison of recovery profile in selective spinal anaesthesia using lignocaine and sufentanyl with propofol based general anaesthesia for gynaecological laparoscopy surgery a randomized controlled study. Anaesth Pain & Intensive Care 2011;15(3):157-160.

INTRODUCTION

Day care surgeries and laparoscopy have rapidly become popular in modern day surgical practice. Evolution has occurred in anaesthetic practice to provide stable haemodynamic, adequate analgesia with minimal

complications, rapid recovery and early ambulation. Though general anaesthesia (GA) has been the choice technique for long but selective spinal anaesthesia (SSA) has been developed and modified to attain selective short duration analgesia, which facilitates ambulation at the end of the surgical procedure.[1-3] Spinal anaesthesia is usually simple and quick, provides good postoperative pain relief and minimizes postoperative nausea.[4] It has to be modified to reduce duration of motor block without compromising analgesia for day case surgeries, involving the use of short acting local anesthetics and combinations of a low dose of local anaesthetic with an analgesic adjuvant, usually an opioid.[5] Also, limiting the spread of spinal anaesthesia, as long as it still provides analgesia for surgery, should reduce the haemodynamic effects and speed up the recovery.

SSA has been defined as the practice of employing minimal doses of intrathecal agents so that only the nerve roots supplying a specific area and only the modalities that require to be anaesthetized are affected.[1] Dorsal column and motor function are essentially preserved with SSA, so that patients are able to ambulate at the end of surgery. The use of hypobaric lignocaine (20 mg) alone for spinal anaesthesia has been shown to be of very short duration and the block may not be dense enough to prevent occasional abdominal discomfort, but addition of an opioid has been found useful in achieving complete surgical anesthesia.[1-3]

We hypothesized that using SSA would provide recovery characteristics comparable to those obtained with short acting anesthetics such as propofol based GA for laparoscopy surgery. We planned this study with an aim to compare the recovery characteristics after SSA and propofol based GA for short duration outpatient gynaecological laparoscopic surgeries.

METHODOLOGY

This randomized, controlled trial was conducted at Department of Anaesthesiology and Intensive Care, Maulana Azad Medical College, New Delhi, India from August 2007 to March 2008. After institutional review board approval, the written informed consent from forty ASA physical class I, adult female patients, in the age group of 18-60 years, scheduled for outpatient laparoscopy was taken. Patients with neurological or neuromuscular disease, hypersensitivity to study drugs, contraindication to subarachnoid block or refusal to participate in the study were excluded.

In the preoperative area, an 18G intravenous cannula was secured and an infusion of Ringer's lactate solution was started. Inj. ranitidine 150 mg and metoclopramide 10 mg were administered intravenously. In the operating room, routine monitors (electrocardiography, pulse oximetry and noninvasive blood pressure monitor) were attached. Patients were than randomized into two groups by a sealed envelope technique:

Group GA (n-20): General anaesthesia was induced with intravenous fentanyl (2μg/kg) and propofol (2 mg/kg). Airway was secured with suitable size Proseal® laryngeal mask airway (PLMA). Anaesthesia was maintained with titrated propofol infusion (100-150 μg/kg/min) along with nitrous oxide and oxygen (50:50). The propofol dose was titrated to maintain a minimum acceptable depth of anaesthesia and to maintain haemodynamic variables within 20% of baseline values. Propofol was discontinued when the laparoscope was removed and nitrous oxide was stopped after the last suture.

Group SSA (n-20): Patient received subarachnoid block in sitting position with a midline approach at L3-4 interspace. After subcutaneous infiltration of lignocaine l%, subarachnoid block was given using a 27 G Whitacre spinal needle and 10 mg preservative free lignocaine (0.5 ml of 2% lignocaine), 10 μg sufentanil (0.2 mL) to a total volume of 2.5 ml with sterile water (1.8ml). Patients remained sitting for 1 minute and then were made to lie down in reverse Trendelenburg (20-30°) position for 6-8 minutes to facilitate cephalad spread of the spinal anaesthetic. Before insufflation of abdomen, patient was made to lie down in horizontal position. Oxygen was supplemented if oxygen saturation was <94%. In case of insufficient surgical anaesthesia, the case was labeled as failure and was managed with general anaesthesia.

Shoulder-tip pain (referred from the effects of carbon dioxide on the peritoneal surface of the diaphragm), discomfort or anxiety was treated with intravenous inj. midazolam (1mg) and inj. fentanyl (0.5μg/kg) boluses. A standardized surgical technique was used for laparoscopy. In both the groups, port site infiltration was done with 0.25% bupivacaine (5mL) prior to incision and inj. diclofenac 75 mg was administered intramuscularly. Hypotension was managed when there was > 20% decrease in systolic blood pressure from baseline with intravenous fluids (20 ml/kg) and mephenteramine (3 mg) in incremental boluses if required. Adverse effects such as nausea, vomiting, sedation, pruritis, urinary retention were recorded. Transient neurologic symptoms (TNS) (defined as pain or dysesthesia in the buttocks or in any part of the lower limbs, either isolated or associated

with back pain after spinal anaesthesia recovery) if present, were also recorded.

Recovery times were determined at 1 minute interval from discontinuation of nitrous oxide to awakening (opening eyes to command), orientation and subsequently at 15 minutes till patient achieved unit's discharge criteria for post anaesthesia care unit (PACU). Patients were discharged if modified Aldrete score was >9.[3] Patients were discharged from the PACU after meeting the following criteria: 1) oriented; 2) vital signs within 20% of baseline; 3) no surgical complications; 4) absence of side effects; 5) adequate pain control with oral analgesics; and 6) resolution of motor block, sensory block at or below S-3.

For a difference of >20% in discharge time was considered to be of clinical significance. Based on this assumption a sample size of 20 patients was chosen in each group with a power of 80% and α error of 0.05. Statistical analysis was performed using SPSS package 16. Normally distributed continuous data are expressed as mean±SD. Demographic parameters, duration of analgesia and hemodynamic parameters were analyzed by student's t test. Ordinal and skewed data (duration of surgery) is summarized as median (range) and compared using Mann Whitney test. P value < 0.05 was considered significant.

RESULTS

Forty eight patients were enrolled for the study but only 40 were randomized in two groups as rest of them did not meet our inclusion criteria. No patient was excluded from the study analysis after randomization. Patient demographic profile and duration of surgery were comparable in both the groups (Table 1). The patients of group SSA remained fully awake and oriented throughout the surgery as compared to patients in group GA which took some time to become fully conscious and oriented after the surgery (Table 2). The time from the end of surgery to exit from operating room, time to straight leg raising (SLR) and deep knee bend were significantly prolonged in group GA as compared to group SSA (p=0.001). The time to reach a modified Aldrete score > 9 was significantly prolonged in group GA as compared to group SSA (p = 0.001). The mean time to postoperative first analgesic requirement was significantly longer for group SSA as compared with group GA , 332±27.1 min vs. 153±16.9 min (p = 0.001).

Patients in both the groups remained haemodynamically stable. The haemoglobin oxygen saturation remained >96% in all the patients in both the groups. Intraoperatively, one patient requested for intraoperative sedation and midazolam was used. Another patient reported mild shoulder discomfort but did not require any analgesia. Postoperatively, two patients in each group reported shoulder pain (p=1). None of the patients reported any abdominal discomfort during the entire procedure in group SSA. There were no subjective differences in surgical conditions between groups. There were no voiding difficulties encountered in either group. No patient had any neurological complaints.

Table 1: Demographic profile in the two groups

	Group GA (n-20)	Group SSA (n-20)	P value
Age (years), Mean±SD	26.7 ± 11. 9	29.9 ± 11.3	0.96
Weight (kg), Mean±SD	54.5 ± 13.5	55.2 ± 10.6	0.86
Duration of surgery (min), Median (range)	35 (25-70)	44 (35-70)	0.47

Table 2: Comparative study parameters in the two groups

Study parameters		Group GA (n-20)	Group SSA (n-20)	P value
Recovery Time (min)	Time to awaken	5.4 ± 1.3	0	
	Time to extubation	6.8 ±1.4	0	
	Time to orientation	9.8 ± 1.0	0	
Times from end of surgery to ; (min)	Exit from operation room	9.1 ± 1.6	6.3 ± 1	<0.001
	SLR	16.1 ± 2.4	3.6 ± 1.3	
	Deep knee bend	18 ± 3.4	3.7 ± 1.3	
	Aldrete score >9	16.9 ± 2.5	6.7 ±1.6	
Exit recovery (min)		34.6 ± 6	21.8 ± 4.2	

Values expressed as Mean±SD

DISCUSSION

We observed from our study that SSA could effectively be used for patients undergoing short duration outpatient gynecological laparoscopy as compared to propofol infusion based general anaesthesia without any additional side effects. The recovery time to exit the operating room and discharge time were significantly shorter in group SSA as compared to group GA. Intraoperative conditions were comparable in both groups. Patients in the group GA also required additional time to emerge from anesthesia.

The addition of the opioid to intrathecal local analgesic solution in group SSA probably led to alleviation of shoulder pain in our study, in spite of the short duration of motor block and thus contributed to the absence of need for intraoperative analgesic supplementation.[3] Intrathecal opioids act synergistically with intrathecal local anesthetics to enhance subtherapeutic doses of local anesthetics, which, as a sole drug, may not provide an adequate block.[3] The dose of spinal lignocaine can be

reduced from 75 mg to 10 mg without compromising intraoperative conditions and achieving more stable haemodynamic profile.[6] With a reduction in intrathecal lignocaine dose, the time to achieve discharge criteria decreased from 162 min to 75-91 min.[1,3] Chilvers and colleagues concluded that spinal anesthesia with small dose hypobaric lidocaine-fentanyl combination was found to be a satisfactory technique for outpatient laparoscopy. Stewart and colleagues in a similar study concluded that compared with GA group, times to leaving the operating room, performing a straight leg raise, performing deep knee bends and achieving an Aldrete score >9 were significantly shorter in SSA group.[4] Another study comparing SSA with desflurane based GA in outpatient gynaecological laparoscopy concluded that SSA was an effective alternative to desflurane because of comparable intraoperative conditions like early awakening following surgery, a significantly shorter time to straight leg raising and ambulation. SSA patients had significantly less postoperative pain than desflurane patients.[3] Recently, levobupivacaine has been compared with lidocaine, along with fentanyl for selective spinal anesthesia for outpatient laparoscopy surgery.[7] The authors concluded that both the combinations are comparable with respect to resolution of sensory block and intraoperative conditions but the peak of maximum sensory block was higher with a longer sensory block in levobupivacaine group.

The incidence of post-spinal headache has been reduced by using non-cutting small-gauge needles. Urinary retention is a possible complication but is rare unless an excessive opioid dose is used. None of our patients had post-spinal headache or urinary retention. The possibility of developing TNS after intrathecal lignocaine is a possibility but the dose and concentration of lignocaine was low in our study.[7] The main risk factor for the development of TNS is the use of lignocaine in doses > 40mg when incidences of 1040% have been reported. [7] The neurotoxicity of lignocaine increases with higher drug concentration, so dilution of the drug has been suggested. The incidence of TNSs with the lowest dose of spinal lignocaine has been reported to be 3.6% after 20 mg; however, there are no reports of TNSs in the literature with 10 mg lidocaine.[7]. The major reason to use lignocaine for SSA is that there is no ideal alternative for short spinal anaesthesia technique. None of our patients had any symptoms suggestive of TNS.

The study has its limitations in that only female gender was included and studied and results may not be applicable to the male patients which needs to be studied further. Also, the study was not powered sufficiently for commenting the side effects like TNS for which we need a larger study and a longer follow-up.

CONCLUSION

In conclusion, selective spinal anaesthesia using lignocaine (10 mg) along with sufentanyl (10 μg) can be used as an alternative to general anaesthesia with propofol for short duration outpatient gynaecological laparoscopic procedures with faster recovery without any added adverse effects.

REFERENCES

1. Chilvers CR, Vaghadia H, Mitchell GWE, Merrick PM. Small-dose hypobaric lidocaine-fentanyl spinal anesthesia for short duration outpatient laparoscopy.II. Optimal fentanyl dose. Anesth Analg 1997;84:65-70.
2. Vaghadia H, Mcleod DH, Mitchell GWE, et al. Small-dose hypobaric lidocaine-fentanyl spinal anesthesia for short duration outpatient laparoscopy. I. A randomized comparison with conventional-dose hyperbaric lidocaine. Anesth Analg 1997;84:59-64.
3. Lennox PH, Vaghadia H, Henderson C, Martin L, Mitchell GWE. Small-Dose Selective Spinal Anesthesia for Short-Duration Outpatient Laparoscopy: Recovery Characteristics Compared with Desflurane Anesthesia. Anesth Analg 2002;94:34650.
4. Stewart AVG, Vaghadia H, Collins L, Mitchell GWE. Small-dose selective spinal anaesthesia for short duration outpatient gynaecological laparoscopy: recovery characteristics compared with propofol anaesthesia. Br J Anaesth 2001;86:570-2.
5. Watson B, Howell V. Spinal Anaesthesia: the savoiur of day surgery. Curr Anaesth Crit Care 2007;18:193-99.
6. Vaghadia H, Viskari D, Mitchell GWE, Berrill

A. Selective spinal anesthesia for outpatient laparoscopy. I: Characteristics of three hypobaric solutions. Can J Anaesth 2001;48:25660.

7. Santiago JD, Yglesias JS, Giron J, Oca FMD, Jimenez A, Diaz P. Low dose 3 mg levobupivacaine plus 10 μg fentanyl selective spinal anesthesia for gynecological outpatient laparoscopy. Anesth Analg 2009;109:456-61.