



Comparing Spinal and General Anesthesia in terms of Postoperative Pain in Patients undergoing Hysterectomy

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ABSTRACT

Aims Owing to the effects of anesthesia on pain after hysterectomy as well as different advantages and disadvantages of spinal anesthesia (SA) and general anesthesia (GA), giving priority to one of these techniques over the other still seems controversial. The aim of the present study was to compare SA with GA in terms of pain intensity, the frequency of nausea and vomiting and morphine requirements after abdominal hysterectomy.

Instruments and Methods This double-blind clinical trial was conducted on 40 abdominal hysterectomy candidates with American Society of Anesthesiologists I and II presenting to Kowsar Hospital, Semnan, Iran, in 2015. All the patients were briefed on the pain assessment scale the day before the surgery, randomly divided into two groups of GA and SA and underwent abdominal hysterectomy using the same technique. Postoperative pain was then recorded upon admission to post-anesthesia care unit and 6 and 12h later. Furthermore, frequency of nausea and vomiting as well as intravenous morphine requirements was recorded within the first 12h after the surgery. Data were analyzed using independent t-test and Chi-square by SPSS 16 software.

Findings Postoperative pain was found to be significantly lower upon entering PACU and 6 and 12h later in the SA group compared to that in the GA group, as was the case for the frequency of nausea and vomiting as well as the dose of intramuscular morphine ($p < 0.05$).

Conclusion Generally, postoperative pain in SA is lower than in GA, although different postoperative complications such as nausea and vomiting are observed.

Keywords Postoperative Complications; Hysterectomy; General Anesthesia; Spinal Anesthesia

CITATION LINKS

[1] Miller's ... [2] Perioperative systemic lidocaine for postoperative analgesia and recovery after abdominal surgery: A meta-analysis of ... [3] Challenges in ... [4] The effect of initiating a preventive multimodal analgesic regimen on long-term patient outcomes for outpatient anterior ... [5] Comparison between incidence of postoperative nausea and vomiting after total abdominal hysterectomy in general ... [6] Spinal versus general anesthesia in cesarean sections: The effects ... [7] Misoprostol for the termination of ... [8] Risk factors for chronic pain after hysterectomy ... [9] The comparison of spinal anesthesia with general anesthesia on the postoperative pain scores and analgesic requirements after elective lower abdominal surgery ... [10] Spinal anesthesia versus general anesthesia for elective lumbar spine surgery ... [11] The impact of mode of anaesthesia on postoperative recovery from fast-track abdominal hysterectomy ... [12] Retrospective analysis of high-dose intrathecal ... [13] Superiority of minimally ... [14] Cost-effectiveness of general anesthesia vs spinal anesthesia in ... [15] Comparison of the preventive analgesic effect of rectal ketamine ... [16] Assessing intravenous ketamine and intravenous dexamethasone separately and in combination for early oral intake, vomiting and postoperative pain relief in children ... [17] Spinal vs general anesthesia for laparoscopic cholecystectomy: Interim analysis of a ... [18] Spinal versus general anesthesia for orthopedic surgery: Anesthesia ... [19] General anesthesia versus spinal anesthesia for ... [20] Comparison of spinal anesthesia with general anesthesia on morphine ... [21] The effect of neuraxial versus general anesthesia techniques on postoperative quality of recovery and analgesia after abdominal hysterectomy: A prospective, randomized ... [22] Mode of anesthesia and postoperative symptoms following abdominal hysterectomy in a fast-track ... [23] Comparison study of pain after cesarean section by general and ... [24] Opioid-Sparing effect of spinal vs general anesthesia on postoperative analgesia in percutaneous nephrolithotripsy ...

Introduction

Pain and nausea or vomiting are respectively the most common and second most common postoperative (postop) complaints in patients [1]. Nausea and vomiting after surgeries are more annoying than postoperative pain perceived by patients [1].

Postoperative pain can cause acute complications such as adverse physiological responses or chronic complications such as prolonged recovery and chronic pain, especially if it is not controlled well [1], which may increase efferent sympathetic activity and consequently postpone functional recovery of digestive system activities [1]. Inappropriate pain control may cause shallow breathing and impair cough reflex and ultimately predispose the patient to pulmonary complications [1]. Postoperative pain, which is associated with the duration of anesthesia, is regarded as a discharge criterion and the most important cause of unplanned delay in discharging outpatients and inpatients [1]. Optimizing the treatment method of postoperative pain can enhance health-related quality of life [1].

Controlling chronic postoperative pain can improve long-term recovery or quality of life (self-report). Controlling postoperative pain in its initial stages, especially by continuous epidural infusion or peripheral catheter insertion, may help the patient actively participate in postoperative rehabilitation and improve postoperative short-term and long-term recovery [1]. Managing chronic postoperative pain is a major challenge and concern in lower abdominal surgeries [2, 3]. Conventional methods of pain control do not cause sufficient analgesia in half of the patients and postoperative pain, therefore, delays patients' recovery [4]. Although hysterectomy can be performed, using both general and spinal anesthesia [1], the type of anesthesia chosen based on advantages and disadvantages of the method [1, 5], seems to affect chronic postoperative pain [6, 7]. The method is also reported to affect the incidence of chronic postoperative pain [8]. The patient's consent and ability to endure prolonged surgeries are effective in choosing General Anesthesia (GA) [9]. While better muscle relaxation is an advantage of GA, the need for intubation is a disadvantage of it [5]. On the other hand, the advantages of Spinal Anesthesia (SA) include reduced surgical hemorrhage, reduced cardiac dysrhythmia during and after surgery, fewer episodes of postoperative hypoxia, reduced risk of acid aspiration as well as venous and arterial thrombosis [10] and lower morphine requirement [11]. Furthermore, spinal administration of opioids to achieve appropriate postoperative analgesia is limited by dose, numerous complications, and particularly hypoventilation (Respiratory suppression) [12]. Costs of anesthesia play a key role in selecting the technique; e.g. minor surgeries performed under

spinal anesthesia are reported to cause much lower costs [13, 14]. A review of the literature indicates controversy over priority of GA and SA; some studies postpone the final conclusion to conducting further research [7, 15-19]. Despite the use of GA as a standard method, SA is widely used, therefore, the choice of method is at the discretion of anesthesiologists [9].

The aim of the present study was to compare SA with GA in terms of pain intensity, the frequency of nausea and vomiting and morphine requirements after abdominal hysterectomy.

Materials and Methods

This double-blind clinical trial was conducted on 40 abdominal hysterectomy candidates with American Society of Anesthesiologists I and II presenting to Kowsar Hospital, Semnan, Iran in 2015.

The method of sampling was permuted block randomization and according to the past studies, the sample size was selected [20].

The inclusion criteria include patients who were 30 years old or more, patients were a candidate for hysterectomy caused by benign diseases. The exclusion criteria comprised preferring a special method of anesthesia for the patient, drug and alcohol abuse, a history of nausea and vomiting leading to metabolic alkalosis in previous anesthesia, BMI of over 30Kg/m², being allergic to the medications used, requiring above standard level of tranquilizers defined in the methods section during the surgery, having acute pain during the surgery (According to the patient in SA and to changing hemodynamic status of the patient in GA), having prolonged postoperative intubation or recovery (30min), surgery lasting at least two hours [1], and severe vomiting more than three times and SA conversion to GA for any reason.

All the patients were asked to sign an informed written consent form, then they were randomly divided into SA and GA groups (n=20 in each group). The collected data comprised the obtained pain scores from the visual analogue scale (VAS) as well as frequency/ hours of nausea/ vomiting and the total dose of intramuscular morphine. VAS, a 10cm horizontal line, was explained to all patients a day before admission to the operation room. The leftmost and rightmost end of the line were labeled with 0 and 10, respectively indicating "no pain" and "worst pain ever". The patients were asked to point to the position on the line to rate their pain as numbers [21]. They were also asked to inform the project director whenever they felt pain>3. The project director recorded pain scores 0, 6, and 12h postop. The total dose of intramuscular morphine as well as frequency of nausea and vomiting was recorded within the first 12h postop. After examining the GA group accurately, determining anesthesia risk and airway class between 1 and 4

based on intubation degree of difficulty, they were transferred to the operation room and prepared for GA. After anesthetic monitoring including pulse oximetry, Electrocardiography (ECG) and blood pressure monitoring, premedication was administered by injecting benzodiazepine (Intravenous midazolam, 2mg) and a synthetic narcotic (Intravenous fentanyl, 1mg/kg body weight). GA was induced by injecting intravenous thiopental sodium 5mg/kg body weight (BW), and the muscle relaxant, Atracurium, 0.5mg/kg BW.

After endotracheal intubation, inhalation anesthetic (Including equal proportions of oxygen and Nitrous oxide, 4L/min), and evaporation anesthetic (Halogenated anesthetic: Isoflurane 1.2%, 1 Minimum Alveolar Concentration; MAC) were administered to maintain anesthesia and patients underwent mechanical ventilation using anesthesia ventilators.

The patient was extubated at the end of the operation after discontinuing anesthetics and reversing the effects of the muscle relaxants using anticholinesterases such as neostigmine 40-70µg/kg BW and anticholinergic such as intramuscular atropine 15µg/kg BW. Then, they were transferred to *Post-anesthesia care unit* (PACU; recovery room). Similarly, after accurately examining the SA group and determining anesthesia risk and airway class, they were transferred to the operation room and prepared for SA. After anesthetic monitoring of the patient, including pulse oximetry, ECG and blood pressure monitoring, minimal 500cc crystalloids serum was intravenously administered to prevent hypotension secondary to SA. After placing the patient in a seated position and using povidone-iodine solution for sterilizing the site of lumbar puncture, the L4/L5 intervertebral space was identified. A cutting tipped 25-gauge (Orange) spinal needle was inserted into the intrathecal area, and the accuracy of the technique was ensured by the appearance of cerebrospinal fluid. Then, a total of 3cc hyperbaric bupivacaine solution 0.5% was injected into the subarachnoid space and the patient was placed in supine position. After stabilizing SA, the position was adjusted so as to allow the local anesthetic to move toward the T8 area. A needle or alcohol-soaked cotton was used to identify the anesthetic area and the operation began after this area was stabilized. In case of agitation during operation, 1-2mg of intravenous midazolam was administered, and the patient was transferred to PACU after the operation.

The parametric and non-parametric tests such as independent t-tests and Chi-square were used for quantitative variables. The collected data were analyzed in SPSS 16 software.

Findings

The demographic information of the patients

included age ranging 30-63 years with a mean of 51.25±5.8 years in the GA group and 49.90±6.2 years in the SA group, that suggested no significant differences between two groups (P=0.613).

The statistical means of all the studied variables were significantly less in the SA group than those in the GA group (Table 1).

Table 1) Comparison of the statistical mean of all the studied variables in the studied groups in terms of type of anesthesia (n=20 in each groups)

Variables	Total	GA group	SA group	p-value
Pain* at hour 0**	3.83±2.15	5.40±1.31	2.25±1.61	<0.001
Pain at hour 6	6.43±1.70	7.60±1.18	5.25±1.29	<0.001
Pain at hour 12	3.20±1.40	3.85±1.42	2.55±1.05	<0.01
Morphine (mg)***	7.75±3.70	10.00±3.34	5.50±2.51	<0.001
Nausea and vomiting****	1.08±1.07	1.60±1.14	0.55±0.69	<0.001

*Based on the scores recorded on VAS by the patients; **Upon entrance to PACU; ***Intravenously injected within the first 12h postoperative; ****Frequency within the first 12h postoperative

Discussion

The aim of this study was to compare SA with GA in terms of pain intensity, the frequency of nausea and vomiting and morphine requirements after abdominal hysterectomy.

General and spinal anesthesia have their own advantages and disadvantages [5]. They are basically different in terms of type, method of medication, and other requirements such as the need for endotracheal intubation and mechanical ventilation in the majority of GA cases.

According to the result of the present study, the dose of intravenous morphine, as well as the frequency of nausea and vomiting, was also monitored within the first 12h postoperative. Postoperative pain was found to be significantly lower in the SA compared to the other group at all the time points, i.e. upon entering PACU as well as six and twelve hours later. Wodlin *et al.* reported similar findings, suggesting less severe and shorter pain in the SA group [22]. Massicotte *et al.* also reported significantly lower postoperative pain in the SA group compared to that in the other group within 18 and 48h post-anesthesia, respectively at rest and under stress [20]. Naghibi *et al.* found less pain in the SA group only within the first 4 hours after lower abdominal surgery, while no significant differences were observed afterward [9]. Catro-Alves *et al.* also reported higher pain within the first 24 hours of abdominal hysterectomy in the GA group [21]. Kessous *et al.* observed lower pain scores after cesarean section in the SA group within the first 8 hours after cesarean section and also after 48 hours, while GAs experienced lower pain in 8-48h interval after the surgery [7]. Similarly, Shohani *et al.* found

lower postoperative pain in the SA group in PACU, also within the first 24 hours of the cesarean section after receiving painkillers [23].

The present study found the intravenous need for morphine to be significantly lower in the SA group compared to that in the other group in the first 12 hours after abdominal hysterectomy. Wodlin *et al.* recommended administering spinal anesthetics to reduce the need for opioids after surgery and significantly lower postoperative discomfort in the patients [22]. Massicotte *et al.* found morphine requirements to be twice as much in the GA group as that in the SA group within the first 24 hours after abdominal hysterectomy [20], while Naghibi *et al.* found lower morphine requirement in the SA group only within the first 6 hours after the operation, as they observed no significant differences between the two groups afterward [9]. Catro-Alves *et al.* who compared SA with GA in terms of quality of recovery and analgesia after abdominal hysterectomy, found higher opioid requirements in the GA group and also reported a reverse linear relationship between opioid intake and qualities of recovery [21]. Kessous *et al.* compared cesarean section associated pain under SA with GA, and showed that postoperative meperidine requirements were significantly higher in the GA group than in the SA group in the first 24h [7]. Roodneshin *et al.* found lower opioid requirement in the SA group than in the GA group within the first 24h, the main cause of which was high opioid consumption in the GA group within the first 6h after the operation (The major difference between the two groups was associated with the first 6h) [24]. Borendal *et al.* who studied the effects of anesthetic (Analgesic) techniques on post-hysterectomy recovery suggested lower opioid requirements in the SA group [11, 14].

The present study found significantly lower frequency of nausea and vomiting during the first 12h after the operation in the SA group compared to those in the GA group, while Wodlin *et al.* reported an equal frequency of nausea and vomiting in both groups, although longer vomiting episodes were observed in the SA group in the first 24h [22]. Massicotte *et al.* also reported more severe nausea in the GA group in the first 6h [20]. Moreover, Safaeian *et al.* reported a 71% and 41% incidence of nausea and vomiting after an abdominal hysterectomy, respectively in the SA and GA groups [5]. On the other hand, Roodneshin *et al.* observed no significant differences between the two groups in terms of vomiting and bradypnea [24]. Furthermore, Borendal *et al.* reported higher vomiting frequency in the SA group [11, 14].

According to the present study, generally, Spinal Anesthesia had more advantages compared to General Anesthesia in abdominal hysterectomy. These benefits included lower postoperative pain as the most significant one when numerous potential postoperative complications such as increased

morbidity are taken into account. These are followed by lower sedative (Morphine) requirements and as a result, fewer associated complications as well as significantly less nausea and vomiting.

The limitation of this research was a low number of sample size. Meanwhile, studies with larger sample size are recommended.

Conclusion

Generally, postoperative pain in SA is lower than in GA, although different postoperative complications such as nausea and vomiting are observed.

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Ethical permissions: This double-blind clinical trial was approved by the Thesis Committee of the School of Medicine and Ethics Committee of Semnan University of Medical Sciences, Semnan, Iran. The Declaration of Helsinki and medical ethics were observed in this study. All the patients were asked to sign an informed written consent form.

Conflicts of interests: The authors declare that there is no conflict of interest regarding the publication of this paper

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References

- 1-Eriksson LI. Miller's Anesthesia. Miller RD, Eriksson LI, editors. Amsterdam: Elsevier; 2009.
- 2- Sun Y, Li T, Wang N, Yun Y, Gan TJ. Perioperative systemic lidocaine for postoperative analgesia and recovery after abdominal surgery: A meta-analysis of randomized controlled trials. *Dis Colon Rectum*. 2012;55(11):1183-94.
- 3- Gandhi K, Heitz JW, Viscusi ER. Challenges in acute pain management *Anesthesiol Clin*. 2011;29(2):291-309.
- 4- Reuben SS, Ekman EF. The effect of initiating a preventive multimodal analgesic regimen on long-term patient outcomes for outpatient anterior cruciate ligament reconstruction surgery. *Anesth Analg*. 2007;105(1):228-32.
- 5- Safaeian R. Comparison between incidence of postoperative nausea and vomiting after total abdominal hysterectomy in general and epidural anesthesia. *Razi J Med Sci*. 2001;8(25):308-11. [Persian]
- 6- Kavanagh T, Buggy DJ. Can anaesthetic technique effect postoperative outcome?. *Curr Opin Anaesthesiol*. 2012;25(2):185-98.
- 7- Kessous R, Weintraub AY, Wiznitzer A, Zlotnik A, Pariente G, Polachek H, et al. Spinal versus general

anesthesia in cesarean sections: The effects on postoperative pain perception. *Arch Gynecol Obstet.* 2012;286(1):75-9.

8- Brandsborg B, Nikolajsen L, Hansen CT, Kehlet H, Jensen TS. Risk factors for chronic pain after hysterectomy: A nationwide questionnaire and database study. *Anesthesiology.* 2007;106(5):1003-12.

9- Naghibi K, Saryazdi H, Kashefi P, Rohani F. The comparison of spinal anesthesia with general anesthesia on the postoperative pain scores and analgesic requirements after elective lower abdominal surgery: A randomized, double-blinded study. *J Res Med Sci.* 2013;18(7):543-8.

10- Attari MA, Mirhosseini SA, Honarmand A, Safavi MR. Spinal anesthesia versus general anesthesia for elective lumbar spine surgery: A randomized clinical trial. *J Res Med Sci.* 2011;16(4):524-9.

11- Borendal Wodlin N, Nilsson L, Kjølhed P, GASPI study group. The impact of mode of anaesthesia on postoperative recovery from fast-track abdominal hysterectomy: A randomised clinical trial. *BJOG.* 2011;118(3):299-308.

12- Rebel A, Sloan P, Andrykowski M. Retrospective analysis of high-dose intrathecal morphine for analgesia after pelvic surgery. *Pain Res Manag.* 2011;16(1):19-26.

13- Kunstman JW, Udelsman R. Superiority of minimally invasive parathyroidectomy. *Adv Surg.* 2012;46(1):171-89.

14- Borendal Wodlin N, Nilsson L, Carlsson P, Kjølhed P. Cost-effectiveness of general anesthesia vs spinal anesthesia in fast-track abdominal benign hysterectomy. *Am J Obstet Gynecol.* 2011;205(4):326,e1-7.

15- Heidari SM, Mirlohi SZ, Hashemi SJ. Comparison of the preventive analgesic effect of rectal ketamine and rectal acetaminophen after pediatric tonsillectomy. *Int J Prev Med.* 2012;3(Suppl 1):S150-5.

16- Safavi M, Honarmand A, Habibabady MR, Baraty S, Aghadavoudi O. Assessing intravenous ketamine and intravenous dexamethasone separately and in combination for early oral intake, vomiting and

postoperative pain relief in children following tonsillectomy. *Med Arh.* 2012;66(2):111-5.

17- Tzovaras G, Fafoulakis F, Pratsas K, Georgopoulou S, Stamatiou G, Hatzitheofilou C. Spinal vs general anesthesia for laparoscopic cholecystectomy: Interim analysis of a controlled randomized trial. *Arch Surg.* 2008;143(5):497-501.

18- Gonano C, Leitgeb U, Sitzwohl C, Ihra G, Weinstabl C, Kettner SC. Spinal versus general anesthesia for orthopedic surgery: Anesthesia drug and supply costs. *Anesth Analg.* 2006;102(2):524-9.

19- Imbelloni LE, Fornasari M, Fialho JC, Sant'Anna R, Cordeiro JA. General anesthesia versus spinal anesthesia for laparoscopic cholecystectomy. *Rev Bras Anesthesiol.* 2010;60(3):217-27.

20- Massicotte L, Chalaoui KD, Beaulieu D, Roy JD, Bissonnette F. Comparison of spinal anesthesia with general anesthesia on morphine requirement after abdominal hysterectomy. *Acta Anaesthesiol Scand.* 2009;53(5):641-7.

21- Catro-Alves LJ, De Azevedo VL, De Freitas Braga TF, Goncalves AC, De Oliveira GS Jr. The effect of neuraxial versus general anesthesia techniques on postoperative quality of recovery and analgesia after abdominal hysterectomy: A prospective, randomized, controlled trial. *Anesth Analg.* 2011;113(6):1480-6.

22- Wodlin NB, Nilsson L, Arestedt K, Kjølhed P, 'GASPI' Study Group. Mode of anesthesia and postoperative symptoms following abdominal hysterectomy in a fast-track setting. *Acta Obstet Gynecol Scand.* 2011;90(4):369-79.

23- Shohani M, Rasoli M, Maleki F. Comparison study of pain after cesarean section by general and spinal anesthesia. *J Ilam Univ Med Sci.* 2013;21(3):30-8. [Persian]

24- Roodneshin F, Kamranmanesh MR. Opioid-Sparing effect of spinal vs general anesthesia on postoperative analgesia in percutaneous nephrolithotripsy: A randomized clinical trial. *J Iran Soc Anesthesiol Crit Care.* 2014;35(85):1-9. [Persian]