Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Anesthesia

Comparison between Neuraxial & General Anesthesia

Dr. Rumana Salam[1*], Dr. Md. Abdullah Abbasi[2], Dr. Md. Minhaj Sharif[3]

[1]Junior Consultant, Department of Anesthesia, NICVD, Dhaka, Bangladesh
[2]Junior Consultant, Department of Anesthesia, Upazilla Health Complex, Daganbhuiya, Feni, Bangladesh
[3]Junior Consultant, Department of Anesthesia, Upazilla Health Complex, Sonagazi, Feni, Bangladesh

DOI: 10.36347/sjams.2023.v11i01.005 | **Received:** 28.11.2022 | **Accepted:** 02.01.2023 | **Published:** 07.01.2023

***Corresponding author:** Dr. Rumana Salam
Junior Consultant, Department of Anesthesia, NICVD, Dhaka, Bangladesh

Abstract **Original Research Article**

Introduction: Anesthetics are used every day in thousands of hospitals to induce loss of consciousness. Neuraxial anesthesia results from pharmacologic denervation at the level of the spinal cord and many receptors, molecular targets, and neuronal transmission pathways contribute to general anesthesia. This study aimed to compare the overall outcome along with the advantages and disadvantages of neuraxial and general anesthesia. ***Methods:*** This prospective observational study was conducted at the Department of Anesthesia, NICVD, Dhaka, Bangladesh. The study was carried out from October 2021 to September 2022. A total of 100 patients were selected as study subjects as per inclusion criteria. For the study purpose, the subjects were divided into two groups, group A (those who underwent neuraxial anesthesia) and group B (those who underwent general anesthesia). ***Result:*** Out of 100 study subjects, 70.0% of patients underwent neuraxial anesthesia (Group A) and 30.0% of patients underwent general anesthesia (Group B). Regarding intraoperative advantages, 1.0% of patient needed oxygen in group A and 100.0% of patients needed oxygen in group B, none needed endotracheal intubation in group A and 100.0% of patients needed this in group B, only 1.0% of patients needed muscle relaxant in group A and 100.0% of patients needed muscle relaxant in group B, consciousness was intact in all patient in group A, and none in group B, 1.0% of patients experienced laryngospasm in group A and 60.0% of patients experienced it in group B, moreover, hypotension was occurred in 10.0% of patients in group A and 50.0% of patients in group B, potential change in surgical approach was possible in 8.0% of patients in group B and none in group A, 1.0% of patients needed opioid analgesic in group A and 99.0% of patients needed opioid analgesic in group B. Concerning postoperative complications, 1.0% of patients experienced delayed reversal from anesthesia in group A while 20.0% of patients experienced it in group B, postoperative apnea was seen in 5.0% of patients in group B and none in group A, 6.0% of patients had nausea & vomiting and in group A 10.0% of patients had nausea & vomiting in group B, 15.0% of patients had postoperative headache in group A and none had postoperative headache in group B. In terms of deep vein thrombosis formation, there was no deep vein thrombosis in 20.0% of patients, 15.0% of patients developed it in group A and 65.0% in group B. Regarding cardiac arrest, only 1.0% patient developed cardiac arrest in group B and none developed cardiac arrest in group A. Concerning maternal mortality and morbidity, 2 patients showed some morbidities in group A whereas, 1 patient died and 6 patients showed some morbidities in group B. ***Conclusion:*** The study suggested that neuraxial anesthesia was associated with lower complications within 30 days of surgery compared to general anesthesia. This study showed that neuraxial anesthesia was superior to general anesthesia. Concerning better perioperative hemodynamic stability without increasing adverse effects. Moreover, regional anesthesia provided better intraoperative and postoperative outcomes.

Keywords: Neuraxial Anesthesia, General Anesthesia, Intraoperative, Postoperative.

INTRODUCTION

Neuraxial anesthesia results from pharmacologic denervation at the level of the spinal cord by using highly concentrated local anesthetics and is usually achieved by the epidural or spinal approach which comprises profound sensory analgesia, and motor and sympathetic blockade as well [1]. The start of modern anesthesia, through the use of inhaled volatile anesthetics 150 years ago, dramatically revolutionized modern medicine. Until now, many receptors, molecular targets, and neuronal transmission pathways contribute to general anesthesia. Among these molecular targets, ion channels are the predominant candidates for general anesthetic effect, in particular γ-aminobutyric acid type A (GABAA), potassium and sodium channels, and ion channels activated by

acetylcholine, amino-3-hydroxy-5-methyl-4-isoxazolpropionic acid or N-methyl-D-aspartate [2]. Neuraxial anesthetic techniques are the method of choice for C-section delivery because they are associated with lower morbidity, though mortality and neonatal outcomes are similar as compared to general anesthesia [3]. Moreover, for children, regional anesthetic techniques have recently shown a justified revival in popularity. Intraoperative blockade of the neuraxis, whether by the spinal or epidural route, provides outstanding analgesia with minimal physiologic change and, with an indwelling catheter, can provide unceasing pain relief for many days postoperatively. As a complement to general anesthesia, local anesthetic blockade of the neuraxis lowers the total amount of general anesthetic required for surgery, accelerates emergence, and allows for a better postoperative experience by providing a pain-free emergence from general anesthesia [4]. Neuraxial anesthesia is usually augmented by general anesthesia (preferably with inhalation agents to take advantage of their effect on myocardial protection) just deep enough to sustain unconsciousness and amnesia. This amalgamation of regional anesthesia supplemented by a light plain of general anesthesia facilitates early extubation [1]. Moreover, in patients undergoing percutaneous nephrolithotomy (PNL), spinal-epidural anesthesia and analgesia gave greater patient gratification, shorter times for PACU and home readiness, and less postoperative pain. Spinal-epidural anesthesia is a striking alternative to general anesthesia in these patients [5]. Regarding thromboembolism, there is increased circulation in the lower extremities, less tendency for intravascular clotting to occur, and more efficient fibrinolysis in association with continuous epidural anesthesia. The decrease in blood loss associated with epidural anesthesia with lower transfusion requirements also might play a role. Epidural analgesia prolonged into the postoperative period, in addition to other appropriate thromboprophylaxis measures, should be of value in patients undergoing operations associated with a high risk of thromboembolic complications [6]. Although there are multiple factors including the patient, the surgery, the method of regional and general anesthesia, and the quality of perioperative care, all influence the surgical outcome, various advantages of neuraxial anesthesia over general anesthesia can be seen, including reduced pulmonary complications, intraoperative blood loss, perioperative cardiac ischemic incidents, hypoxic episodes, arterial and venous thrombosis, and decreased incidence of postoperative cognitive dysfunction, all of which suggests advantages of RA over GA in certain orthopedic procedures [7, 8]. Furthermore, the incidence of cardiac arrest is also higher in general anesthesia according to many studies [9]. Surgery on the lower thoracic and lumbar spine can be safely performed under general or regional anesthesia. Patients' gratification and the aptitude to carry out prolonged operations in the prone position without airway compromise are advantages of using general anesthesia (GA). Alternatively, the most important advantages of regional anesthesia are the decrease in intraoperative blood loss and subsequently improved operating conditions [10].

OBJECTIVE

General Objective

- To compare neuraxial anesthesia and general anesthesia.

Specific Objectives

- To see intraoperative outcomes of neuraxial and general anesthesia.
- To see postoperative outcomes of neuraxial and general anesthesia.
- To see the chances of maternal mortality and morbidity in neuraxial and general anesthesia.

METHODS

This prospective observational study was conducted at the Department of Anesthesia, NICVD, Dhaka, Bangladesh. The study was carried out from October 2021 to September 2022. A total of 100 patients were selected as study subjects as per inclusion criteria. Evaluation of all patients was done by medical history and physical examination. All necessary investigations were done before applying anesthetic and analgesic medication and surgical procedures. Informed written consent was obtained from all study subjects. Perioperative outcomes were noted routinely. For the study purpose, the subjects were divided into two groups, group A (those who underwent neuraxial anesthesia) and group B (those who underwent general anesthesia). All data were kept confidential and used only for this study purpose. Ethical clearance was obtained from the ethical committee of Statistical analysis of the results was obtained by using Statistical Packages for Social Sciences (SPSS-25) software.

Inclusion Criteria

- Patients who underwent surgery and were suitable for neuraxial or general anesthesia
- Patients without any significant co-morbidity.
- Patients of obstetrics cases.
- Patients who had given consent to participate in the study.

Exclusion Criteria

- Patients having any chronic disease.
- Obstetric cases having significant complications.
- Patients having contraindications of neuraxial or general anesthesia.

RESULTS

Out of 100 study subjects, 70.0% of patients underwent neuraxial anesthesia (Group A) and 30.0% of patients underwent general anesthesia (Group B) [Table 1]. Regarding intraoperative advantages, 1.0% of patient needed oxygen in group A and 100.0% of patients needed oxygen in group B, none needed endotracheal intubation in group A and 100.0% of patients needed this in group B, only 1.0% of patients needed muscle relaxant in group A and 100.0% of patients needed muscle relaxant in group B, consciousness was intact in all patient in group A, and none in group B, 1.0% of patients experienced laryngospasm in group A and 60.0% of patients experienced it in group B, moreover, hypotension was occurred in 10.0% of patients in group A and 50.0% of patients in group B, potential change in surgical approach was possible in 8.0% of patients in group B and none in group A, 1.0% of patients needed opioid analgesic in group A and 99.0% of patients needed opioid analgesic in group B [Table 2]. Concerning postoperative complications, 1.0% of patients experienced delayed reversal from anesthesia in group A while 20.0% of patients experienced it in group B, postoperative apnea was seen in 5.0% of patients in group B and none in group A, 6.0% of patients had nausea & vomiting and in group A 10.0% of patients had nausea & vomiting in group B, 15.0% of patients had postoperative headache in group A and none had postoperative headache in group B [Table 3]. In terms of deep vein thrombosis formation, there was no deep vein thrombosis in 20.0% of patients, 15.0% of patients developed it in group A and 65.0% in group B [Figure 1]. Regarding cardiac arrest, only 1.0% patient developed cardiac arrest in group B and none developed cardiac arrest in group A [Figure 2]. Concerning maternal mortality and morbidity, 2 patients showed some morbidity in group A whereas, 1 patient died and 6 patients showed some morbidity in group B [Figure 3].

Table 1: Distribution of respondents according to the anesthesia used (N=100)

Groups	N	%
Group A (Neuraxial anesthesia)	70	70.00
Group B (General anesthesia)	30	30.00

Table 2: Distribution of respondents according to intraoperative advantages and disadvantages of both groups (N=100)

Traits	%	
	Group A	Group B
Oxygen exposure	1.0	100.0
Endotracheal intubation	0.0	100.0
Muscle relaxant	1.0	100.0
Intact consciousness	100.0	0.0
Laryngospasm	1.0	60.0
Hypotension	10.0	50.0
Potential change in surgical approach (laparoscopic vs open)	0.0	8.0
Opioid requirement	1.0	99.0

Table 3: Distribution of respondents according to postoperative complications (N=100)

Complications	%	
	Group A	Group B
Delayed reversal	1.0	20.0
Postoperative apnea	0.0	5.0
Nausea & Vomiting	6.0	10.0
Headache	15.0	0.0

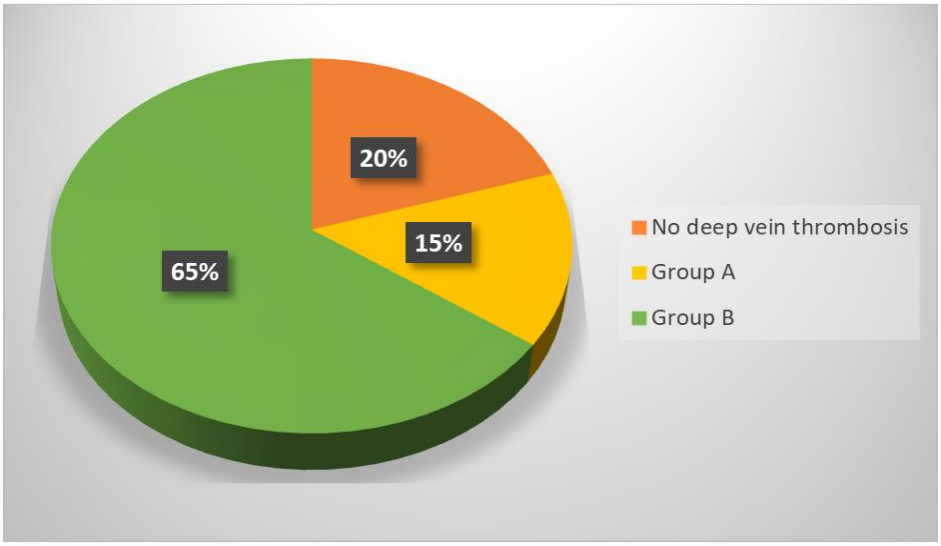

Figure 1: Distribution of patients according to the formation of deep vein thrombosis (N=100)

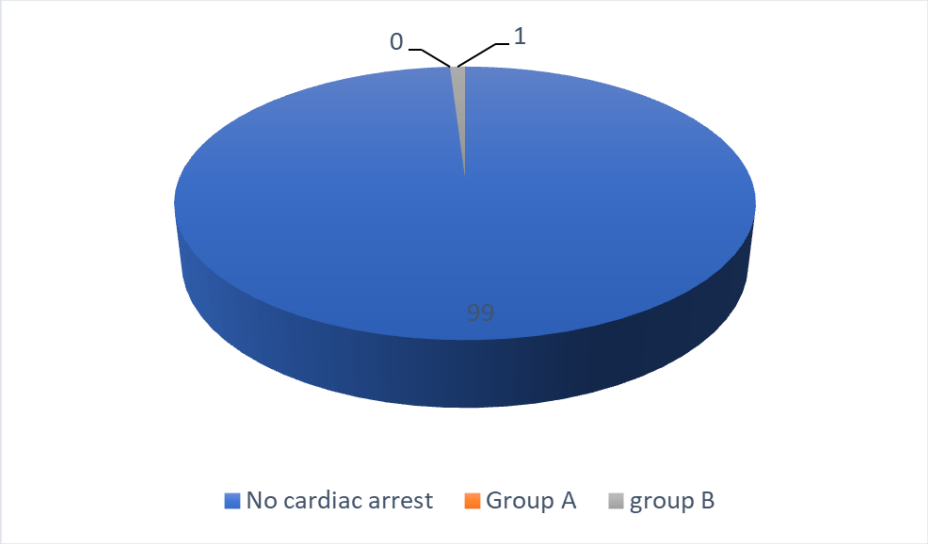

Figure 2: Distribution of respondents according to the incidence of cardiac arrest (N=100)

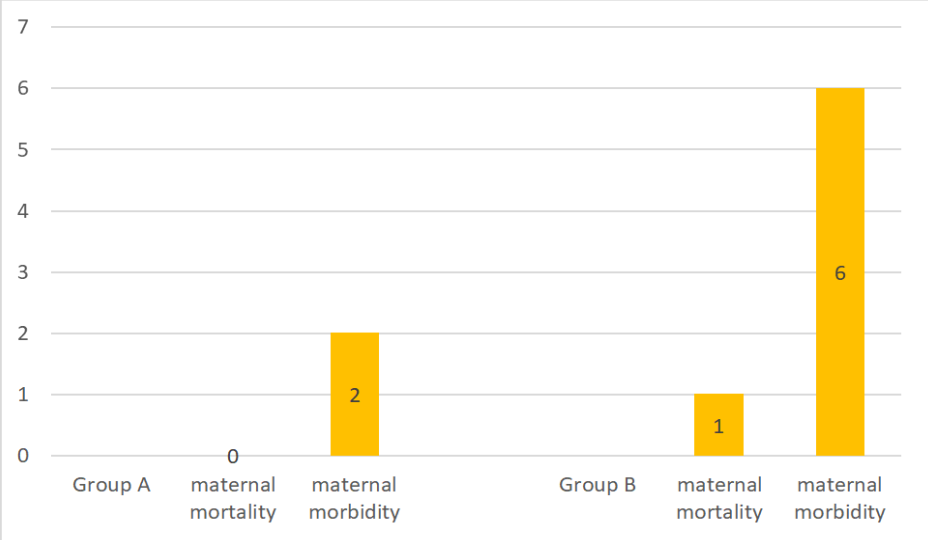

Figure 3: Outcome in both groups concerning maternal mortality and morbidity (n=10)

DISCUSSION

Regarding intraoperative advantages, out of 100 patients, 1.0% of patient needed oxygen in group A and 100.0% of patients needed oxygen in group B, none needed endotracheal intubation in group A and 100.0% of patients needed this in group B, only 1.0% of patients needed muscle relaxant in group A and 100.0% of patients needed muscle relaxant in group B, consciousness was intact in all patient in group A, and none in group B, 1.0% of patients experienced laryngospasm in group A and 60.0% of patients experienced it in group B, moreover, hypotension was occurred in 10.0% of patients in group A and 50.0% of patients in group B, potential change in surgical approach was possible in 8.0% of patients in group B and none in group A, 1.0% of patients needed opioid analgesic in group A and 99.0% of patients needed opioid analgesic in group B. A study stated that, neuraxial blocks can offer many intraoperative and postoperative advantages over general anesthesia, including, decreased stress response, preservation of immune response, fewer major and minor complications, a rapid recovery with decreased hospital admission, and reduced costs [11]. Another study revealed potential advantages of spinal anesthesia including a shorter anesthesia duration, decreased nausea, antiemetic and analgesic requirements, and fewer complications [12]. A study showed that there were marginal advantages for regional anesthesia compared to general anesthesia for hip fracture patients in terms of early mortality and risk of deep vein thrombosis. In this study, there was no deep vein thrombosis in 20.0% of patients, 15.0% of patients developed it in group A, and 65.0% in group B which was quite relatable [13]. Significantly lower frequencies were found in another study following epidural anesthesia than after general anesthesia in deep venous thrombosis involving the popliteal and femoral veins (13% and 67%, respectively), deep venous thrombosis

involving both calf and thigh veins (40% and 77%), and pulmonary embolism (10% and 33%) [6]. Concerning postoperative complications, 1.0% of patients experienced delayed reversal from anesthesia in group A while 20.0% of patients experienced it in group B, postoperative apnea was seen in 5.0% of patients in group B and none in group A, 6.0% of patients had nausea & vomiting and in the group, A 10.0% of patients had nausea & vomiting in group B, 15.0% of patients had a postoperative headache in group A and none had a postoperative headache in group B. A study showed, regional anesthesia (RA) is associated with multiple postoperative benefits compared to general anesthesia, including reduced morbidity and mortality which was quite similar to this study [14]. Moreover, a study reported the frequency of arrest for patients during regional anesthesia to be 1.5 per 10,000, which was less than the reported frequency of arrest for patients receiving general anesthesia [9] Postoperative opioid was needed in general anesthesia according to a study which portrayed the same scenario of the present study [15]. Regarding hemodynamic stability, neuraxial anesthesia provided better results according to another author [16]. The present study showed a higher rate of maternal mortality and morbidity in group B (general anesthesia) which was quite understandable according to another study [17, 18].

Limitations of the Study

The study was conducted in a single hospital with a small sample size, for a short duration. So, the results may not represent the whole community. Furthermore, routine follow-up for a long period was not possible for all subjects of this study.

CONCLUSION

The study suggested that neuraxial anesthesia was associated with lower complications within 30 days of surgery compared to general anesthesia. This study showed that neuraxial anesthesia was superior to general anesthesia. Concerning better perioperative hemodynamic stability without increasing adverse effects. Moreover, regional anesthesia provided better intraoperative and postoperative outcomes.

Funding: No funding sources.

Conflict of Interest: None declared.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

RECOMMENDATION

There is growing concern regarding the impact of general anesthesia on children, obstetric cases, and obese patients. However, regional anesthesia also poses some restrictions, e.g. duration of action in the subarachnoid block. More studies should be conducted to get robust data about the benefits and disadvantages of both groups of anesthesia. With the complexities and nuances of different anesthetic methods, patients, and procedures, the planning and execution of anesthesia for all patients should be monitored strictly to minimize adverse effects.

REFERENCES

1. Kowalewski, R., Seal, D., Tang, T., Prusinkiewicz, C., & Ha, D. (2011). Neuraxial anesthesia for cardiac surgery: thoracic epidural and high spinal anesthesia-why is it different? *HSR Proceedings in Intensive Care & Cardiovascular Anesthesia*, 3(1), 25.
2. Zhou, C., Liu, J., & Chen, X. D. (2012). General anesthesia mediated by effects on ion channels. *World journal of critical care medicine*, 1(3), 80.
3. Navarro, J. R. (2012). Regional versus general anesthesia for cesarean section delivery. *Colombian Journal of Anesthesiology*, 40(3), 203-6.
4. Pullerits, J., & Holzman, R. S. (1993). Pediatric neuraxial blockade. *Journal of Clinical Anesthesia*, 5(4), 342-54.
5. Karacalar, S., Bilen, C. Y., Sarihasan, B., & Sarikaya, S. (2009). Spinal-epidural anesthesia versus general anesthesia in the management of percutaneous nephrolithotripsy. *Journal of endourology*, 23(10), 1591-7.
6. Modig, J., Borg, T., Karlström, G., Maripuu, E., & Sahlstedt, B. (1983). Thromboembolism after total hip replacement: role of epidural and general anesthesia. *Anesthesia and Analgesia*, 62(2), 174-80.
7. Gulur, P., Nishimori, M., & Ballantyne, J. C. (2006). Regional anesthesia versus general anesthesia, morbidity, and mortality. *Best practice & research Clinical anaesthesiology*, 20(2), 249-63.
8. De Rojas, J. O., Syre, P., & Welch, W. C. (2014). Regional anesthesia versus general anesthesia for surgery on the lumbar spine: a review of the modern literature. *Clinical neurology and neurosurgery*, 119, 39-43.
9. Kopp, S. L., Horlocker, T. T., Warner, M. E., Hebl, J. R., Vachon, C. A., Schroeder, D. R., Gould, Jr A. B., & Sprung, J. (2005). Cardiac arrest during neuraxial anesthesia: frequency and predisposing factors associated with survival. *Anesthesia & Analgesia*, 100(3), 855-65.
10. Attari, M. A., Mirhosseini, S. A., Honarmand, A., & Safavi, M. R. (2011). Spinal anesthesia versus general anesthesia for elective lumbar spine surgery: A randomized clinical trial. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, 16(4), 524.
11. Mingus, M. L. (1995). Recovery advantages of regional anesthesia compared with general anesthesia: adult patients. *Journal of clinical anesthesia*, 7(7), 628-33.

12. McLain, R. F., Kalfas, I., Bell, G. R., Tetzlaff, J. E., Yoon, H. J., & Rana, M. (2005). Comparison of spinal and general anesthesia in lumbar laminectomy surgery: a case-controlled analysis of 400 patients. *Journal of Neurosurgery: Spine*, 2(1), 17-22.
13. Urwin, S. C., Parker, M. J., & Griffiths, R. (2000). General versus regional anesthesia for hip fracture surgery: a meta-analysis of randomized trials. *British journal of anesthesia*, 84(4), 450-5.
14. Brull, R., McCartney, C. J., Chan, V. W., & El-Beheiry, H. (2007). Neurological complications after regional anesthesia: contemporary estimates of risk. *Anesthesia & Analgesia*, 104(4), 965-74.
15. Chan, V. W., Peng, P. W., Kaszas, Z., Middleton, W. J., Muni, R., Anastakis, D. G., & Graham, B. A. (2001). A comparative study of general anesthesia, intravenous regional anesthesia, and axillary block for outpatient hand surgery: clinical outcome and cost analysis. *Anesthesia & Analgesia*, 93(5), 1181-4.
16. Sternbach, Y., Illig, K. A., Zhang, R., Shortell, C. K., Rhodes, J. M., Davies, M. G., Lyden, S. P., & Green, R. M. (2002). Hemodynamic benefits of regional anesthesia for carotid endarterectomy. *Journal of vascular surgery*, 35(2), 333-9.
17. Hawkins, J. L., Chang, J., Palmer, S. K., Gibbs, C. P., & Callaghan, W. M. (2011). Anesthesia-related maternal mortality in the United States: 1979–2002. *Obstetrics & Gynecology*, 117(1), 69-74.
18. Deneux-Tharaux, C., Carmona, E., Bouvier-Colle, M. H., & Bréart, G. (2006). Postpartum maternal mortality and cesarean delivery. *Obstetrics & Gynecology*, 108(3), 541-8.