

Effect of general and spinal anesthesia on cardiopulmonary parameters in caesarean sections: A comparative study from a nursing perspective

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ABSTRACT **Objective:** The study was come to determine the effect of spinal anesthesia and general anesthesia on cardiopulmonary parameters. By comparing the effect of general and spinal anesthesia on cardiopulmonary parameters. **Methodology:** a descriptive study was conducted for the period from (2024/2/21) to (2024/4/11). the target group was patients of Imam Hassan Al-Mujtaba (peace be upon him) hospital and the obstetrics and gynecology teaching hospital and a convenience sample of 100 patients. the content validity of the tool was determined by (5) experts. a set of statistical methods were used, namely (frequency, percentage, cumulative percent, and also Paired Sample T-Test). **Results:** indicated the most of the study sample with age group (from 21 to 30) years with percentage (53%) and the most sample was lived in city and the percentage (65%). when compeering mean of cardiopulmonary parameter before and after general or spinal anesthesia to see the effect on cardiopulmonary parameter show that the spinal anesthesia is more safe and decrease the effect than general anesthesia. there is a statistically significant difference in many of these parameters across these two different times for each general and spinal anesthesia period at p-value of <0.05 except in (systolic, diastolic, heart rate, and mean arterial pressure). **Conclusions:** after performing our research, we have determined that, when it comes to cesarean deliveries, it's better option to use spinal anesthesia than general anesthesia. this is due to the fact that it not only removes the risks that come with general anesthesia, such as the possibility of intubation complication, medication effect and side effect that go along with it, but it also makes recovery and restoration of normal cardiac and pulmonary function faster and more effective in management, all of which will improve mothers' quality of life.

KEYWORDS general anesthesia, spinal anesthesia, cardiopulmonary parameter, caesarean section

1. INTRODUCTION

General anesthesia can induce by drugs and can cause a reversible state that preserves physiological stability while causing unconsciousness, forgetfulness, pain alleviation, and immobility. To create the anesthetic state, anesthesia care management typically entails administering a combination of many drugs [1].

The potential of respiratory failure and/or airway blockage is the main threat to a sedated patient's safety. Carefully selecting drugs, adhering to dosage guidelines, and identifying high-risk individuals are essential to lowering the likelihood of respiratory and airway problems. When respiratory depression or airway blockage is detected with proper planning and monitoring, there is an opportunity to intervene and avoid more serious consequences. The clinical state of the patient and surgical factors, such as the type and length of therapy, are used to determine the anesthetic. Higher rates of morbidity are associated with endotracheal intubation and general

anesthesia [2].

Benefits of general anesthesia include quick onset, decreased hypotension, cardiovascular stability, and improved respiratory and airway control. Acid aspiration and airway control issues (failed intubation) are the main problems with general anesthesia in obstetric patients. Nowadays, only true emergencies where there is not enough time to deliver a regional approach are treated with general anesthetic. Because of improvements in anesthetic, the mortality rate for pregnant women who had a caesarean section has decreased in recent decades [3], [4].

Despite the lack of readily available outcome data, spinal anesthesia (SA) is a feasible alternative to general anesthesia (GA) for lumbar spine surgeries, including sophisticated instrumented fusion [4]–[6], [8].

For short medical procedures, spinal anesthesia works best. For lengthier or more intrusive procedures that could impair breathing, general anesthesia is usually recommended. As mentioned in the introduction, spinal anesthesia is frequently

utilized for lower abdominal surgeries. Only the lumbar region—more specifically, the mid- to low-lumbar levels—is used to provide spinal anesthesia. This is done to protect the spinal cord and make sure that drugs administered intrathecal don't damage the cervical and upper thoracic areas [9].

Therefore, the importance of the research emerges by comparative study to evaluating the effect of general and spinal anesthesia on cardiopulmonary parameter in caesarean sections.

2. METHODOLOGY

A quantitative and descriptive design, which uses an assessment approach to detect the effect of general and spinal anesthesia on cardiopulmonary parameter in caesarean sections in the Obstetrics and Gynecology Hospital and Imam Hassan Al-Mujtaba Hospital. This was done through the current study in order to achieve the objectives stated early. They started studying from 20/1/2024 to 29/2/ 2024.

Prior to collection data of the study, formal administrative approval was obtain to conduct the study from: (1) Al-Zahra University for Girls / College of Technology and Medicine, Department of Anesthesiology, (2) Ministry of Health / Karbala Health Department / Training and Human Development Center to accept conducting the study, (3) Finally, the samples (women undergoing caesarean section) approval was obtained in accordance with the study standards also to participate in the study.

The effect of general and spinal anesthesia on cardiopulmonary parameter in caesarean sections was assessed in the following stages. In first step of the data collection method, a survey was conducted by researchers to evaluation of the number range assessment of women that undergoing elective or emergency caesarean section in the Obstetrics and Gynecology Hospital and Imam Hassan Al-Mujtaba Hospital.

Developing an instrument to assess how spinal and general anesthesia effect on cardiopulmonary parameters during cesarean sections: The researchers created a questionnaire to evaluate the effect of spinal and general anesthesia on cardiovascular parameters during caesarean sections.

Researchers created a two-part questionnaire with the intention of gathering information. Part I: the demographic characteristics sheet, that consisted of (15) items: include (type of anesthesia, age, place of sample collection, place of residence, educational level, profession, number of previous operations, type of operation, classification of operation, number of pregnancies, number of live births, number of miscarriages, smoking. Duration of smoking, type of smoking. Also the chronic diseases or diseases during pregnancy).

Part II: was the cardiopulmonary parameter assessment, this part is concerned with cardiopulmonary parameter assessment Before and after general or spinal anesthetic. Such as systolic and diastolic blood pressure, heart rate (HR), mean arterial pressure (MAP) , pulse pressure, respiratory rate, and SPO₂.

Data were collected from (100) sample divided in to: (51) patients participating in the Women's Obstetrics Hospital

and (49) patients from Imam Hassan Al-Mujtaba Hospital, and they participated in the study. They were selected after obtaining their consent based on the study criteria. Data were collected during the implementation of the study using the following techniques:

3. RESULTS AND DISCUSSION

Regarding socio-demographic characteristic as show in Table 1 indicated the most of the study sample with age group (from 21 to 30) years with percentage (53%). This result is agreement with (Ismail, S.,2023) that he stated that the most sample of study was with age from 20-29 with percentage (54%). Also this results closely similar with results of [8] that stated that the most of the study sample with age that most sample was (from 25-35) years with percentage (61%).

TABLE 1. Distribution of women undergoing caesarean sections that are participated in the study with their demographic characteristic

Age			
	Freq.	Percent	Cumulative Percent
less than 20 years	18	18	18
from 21 to 30 years	53	53	71
from 31 to 40 years	29	29	100
Total	100	100	
Hospital			
Maternity Hospital	51	51	51
Al-Hassan Al-Mujtba Hospital	49	49	100
Total	100	100	
Resident			
City	65	65	65
Rural	35	35	100
Total	100	100	
Level of education			
Don't read and wright	11	11	11
Primary	47	47	58
Secondary	31	31	89
Diploma	11	11	100
Total	100	100	
Work			
Employ	6	6	6
Hose wife	87	87	93
student	7	7	100
Total	99	99	
Total	100	100	
No of surgery			
1	32	32	32
2	15	15	47
3	19	19	66
4	9	9	75
5	2	2	77
None	23	23	100
Total	100	100	
Type of surgery			
Emergency	41	41	41
Elective	59	59	100
Total	100	100	
Classifications of surgery			
Major surgery	38	38	38
above major surgery	62	62	100
Total	100	100	
Type of smoking			
None Smoking	20	20	20
Passive Smoking	80	80	100
Total	100	100	
Freq. =frequency, % = percentage, cum. % =cumulative percent			

TABLE 2. Compeering mean of cardiopulmonary parameter before and after general or spinal anesthesia to see the effect of general or spinal anesthesia on cardiopulmonary parameter in women undergoing caesarean sections

	Type of	Sys before	Sys After	Dia. Before	Dia. After	HR Before	HR After	
	General	128.10	128.30	72.90	75.92	101.88	98.66	
	Spinal	131.74	124.18	76.44	69.30	109.86	95.94	
	Total	129.92	126.24	74.67	72.61	105.87	97.30	
Type of Anesthesia	PP Before	PP After	CO Before	CO After	Map Before	Map After	SPO2 before	SPO2 after
General	55.20	52.38	11253.6	10343.2	91.3	93.3	98.96	98.14
Spinal	55.30	54.88	12316.6	10560.6	94.8	87.5	99.00	98.86
Total	55.25	53.63	11785.1	10451.9	93.08	90.4	98.98	98.50

Sys.; Systolic, Dia.; Diastolic, HR; Heart rate, CO; cardia output, MAP; Mean arterial pressure and SPO2; saturation of oxygen.

And according to Resident show in Table 1 the most sample was lived in city and the percentage (65%). This result disagreement with [8] that stated that the most of study sample with resident in rural with the percentage (50.9). Also disagreement with [10] stated that the most of study sample with resident in rural area the percentage (54%) and urban (46%).

While according to the women level of education was with primary education with percentage (47%) This agreement with [10] that stated that the most of study sample with level of education was Primary with percentage (25%).

The result in Table 1 show that the most of the study sample with previous cesarean section was (one) operation of cesarean section with percentage (32%). This results were disagreement with [11]–[15] that most sample with previous cesarean section was No previous cesarean section 760 with percentage (61.6%).

And according the type of surgery the most of the study sample with elective surgery with percentage (59%). This result was disagreement with [12], [16] that stated that the most of study sample with emergency in percentage (69%).

According to the results of Table 2 that shows the (general anesthesia, the results of systolic blood pressure before the surgery were 128.10 and after the surgery was 128.30). While (spinal anesthesia, the systolic blood pressure results before the surgery were 131.74, and after the surgery it was 124.18). So, according to these results, spinal anesthesia is better than general anesthesia for systolic blood pressure.

According to (general anesthesia, the diastolic blood pressure results before the surgery were 72.90, and after the surgery it was 75.92). According to (spinal anesthesia, the diastolic blood pressure results before the surgery were 76.44, and after the surgery it was 69.30). According to these results, spinal anesthesia is better effect than general anesthesia for diastolic blood pressure.

According to (general anesthesia, the heart rate results before the surgery were 101.88 and after the surgery it was 98.66). while (spinal anesthesia, the heart rate before the surgery was 109.86 and after the surgery was 95.94). According to these results, spinal anesthesia is better effect than general anesthesia for heart rate.

According to (general anesthesia, the pulse pressure results before the surgery were 55.20, while after the surgery it was 52.38). While (spinal anesthesia, the pulse pressure results

before the surgery were 55.30 and after the surgery was 54.88). According to these results, general anesthesia is better effect than spinal anesthesia for pulse pressure.

According to (general anesthesia, the cardiac output results before the surgery were 11253.6 and after the surgery it was 10343.2). While (spinal anesthesia, the cardiac output results before the surgery were 12316.6, while after the surgery it was 10560.6). So, according to these results, general anesthesia is better effect than spinal anesthesia with to cardiac output.

According to (general anesthesia, the mean arterial pressure results before the surgery were 91.3 and after the surgery it was 93.3). While (spinal anesthesia, the mean arterial pressure results before the surgery was 94.8 and after the surgery was 87.5). According to these results, spinal anesthesia is better effect than general anesthesia regard to mean arterial pressure.

While (spinal anesthesia, the mean arterial pressure results before the surgery was 94.8 and after the surgery was 87.5). According to these results, spinal anesthesia is better effect than general anesthesia regard to mean arterial pressure.

According to (general anesthesia, the oxygen saturation results before the surgery were 98.96, while after the surgery it was 98.14). While with spinal anesthesia (with O2 assistance), the oxygen saturation results before the surgery were 99.00 and after the surgery were 98.86). According to these results, general anesthesia and spinal anesthesia are equally effective on oxygen saturation.

Finally in overall compeering between effect of general and the effect of spinal anesthesia was found according the results of Table 2 the results shows that when compeering mean of cardiopulmonary parameter before and after general or spinal anesthesia to see the effect of general or spinal anesthesia on cardiopulmonary parameter in women undergoing caesarean sections, the difference in the mean of cardiopulmonary parameters scores clearly show that the spinal anesthesia is more safe and decrease the effect than general anesthesia.

In Table 3 the results in shows that the Paired Samples T-Test was used to determine the difference in the mean and the p-value according to Paired T-Test of cardiopulmonary parameters scores by the effect of general and spinal Anesthesia for each before and after period.

The result in Table 3 shows that there is a statistically significant difference in Systolic blood pressure in spinal Anesthesia with p-value (0.006) was highly significant and

in non-significant general Anesthesia with p-value (0.118).

TABLE 3. Effect of general and spinal anesthesia on cardiopulmonary parameter in caesarean sections by using (paired samples T-Test)

Type of Anesthesia	Parameters	Mean	N	Std. Deviation	P-Value	Sig.
1. General	Sys. before	128.1	50	17.515	0.118	N.S
	Sys. After	128.3		13.408		
2. Spinal	Sys. before	131.74	50	25.864	0.006	S
	Sys. After	124.18		20.899		
3. General	Dia. Before	72.9	50	12.851	0.025	S
	Dia. After	75.92		10.829		
4. Spinal	Dia. Before	76.44	50	16.914	0	S
	Dia. After	69.3		15.163		
5. General	HR. Before	101.88	50	13.944	0.019	S
	HR. After	98.66		14.095		
6. Spinal	HR. Before	109.86	50	23.347	0.007	S
	HR. After	95.94		13.928		
7. General	PP. Before	55.2	50	15.491	0.233	N.S
	PP. After	52.38		13.01		
8. Spinal	PP. Before	55.3	50	16.329	0.092	NS
	PP. After	54.88		19.465		
9. General	CO. Before	11253.64	50	3473.825	0.481	N.S
	CO. After	10343.28		2990.134		
10. Spinal	CO. Before	12316.6		4880.99	0.223	NS
	CO. After	10560.64		4088.086		
11. General	Map. Before	91.3	50	12.61109	0.029	S
	Map. After	93.38		10.024		
12. Spinal	Map. Before	94.87	50	18.82	0	S
	Map. After	87.59		14.65		
13. General	SPO2 before	98.96	50	0.947	0.247	N.S
	SPO2 after	98.14		1.457		
14. Spinal	SPO2 before	99	50	1.069	0.892	NS
	SPO2 after	98.86		0.969		

Sys.: Systolic, Dia.: Diastolic, HR: Heart rate, CO: cardia output, MAP: Mean arterial pressure and SPO2; saturation of oxygen., Std.: Stander, Sig: significant

Also there is a statistically significant difference in Diastolic blood pressure in spinal Anesthesia with p-value (0.000) was highly significant and in significant general Anesthesia with p-value (0.025), and that mean the effect of spinal is better than general anesthetic with C.S operation.

And there is a statistically significant difference in Heart rate in spinal Anesthesia with p-value (0.007) was highly significant and significant in general Anesthesia with p-value (0.019). And that mean the effect of spinal is better than general anesthetic with C.S operation.

And there is a statistically significant difference in Mean arterial pressure in spinal Anesthesia with p-value (0.000) was highly significant and significant in general Anesthesia with p-value (0.029).

All previous results compeering with accepted significant stander P-value 0.05. Many of these parameters across these two different times for each general and spinal Anesthesia period at p-value of <0.05 except in (Systolic, and MAP.).

4. CONCLUSIONS

The study showed a statistically highly significant difference in spinal Anesthesia in the cardiopulmonary parameters: Systolic blood pressure in with p-value (0.006), Diastolic blood pressure with p-value (0.000), Heart rate with p-value (0.007), Mean arterial pressure with p-value (0.000).

Finally, after performing this research, we have determined that, when it comes to cesarean deliveries, spinal anesthesia is the better option than general anesthesia. This is due to the fact that it not only removes the risks that come with general anesthesia, such as the possibility of intubation complication, medication effect and side effect that go along with it, but it also makes recovery and restoration of normal cardiac and

pulmonary function faster and more effective in management, because the side effect of general anesthetic medication cause several complication on different body system all of which will improve mothers' quality of life.

RECOMMENDATION

The most useful anesthesia should use is spinal anesthesia in women undergoing caesarean sections if to decrease the effect of general anesthesia on cardiopulmonary function. if that choice is suitable with elective or there is enough time to it.

Advise other researchers to carrying out additional studies about the effect of general and spinal anesthesia on pain after surgery, bowel and GIT function restoration, sleep pattern change, anxiety, stress, and wound healing.

Provide poster and folder about the benefit of spinal Anesthesia in decreasing risk and complication on mother health and giving for both mother and all medical team in operation room or surgery unit.

REFERENCES

- [1] Abboud, Therese K., et al. "Comparison of the effects of general and regional anesthesia for cesarean section on neonatal neurologic and adaptive capacity scores." *Anesthesia & Analgesia* 64.10 (1985): 996-1000.
- [2] Al-Husayn, Ali Jabbar Abd, Safi Alzeyadi, and Hassan Abdullah Athbi. "Commitment of lung cancer patients with self-care in Al-Imam hussein oncology center at Karbala governorate." *Indian Journal of Public Health Research & Development* 9.8 (2018): 1075-1079.
- [3] Al-Husayn, Ali Jabbar Abd, et al. "Adherence to self-care managements among patients with end stage renal disease at Habib Ibn-Mudaher in Kerbala City." *Indian Journal of Public Health Research & Development* 9.8 (2018): 1057-1061.
- [4] Al-Husayn, Ali Jabbar Abd, et al. "Determine of diarrhea risk factor in children under 6 years at kerbala pediatric teaching hospital in karbala governorate." *Indian Journal of Public Health Research & Development* 9.8 (2018): 1104-1108.
- [5] Abdallah, Mai Wedad, et al. "A comparative study of general anesthesia versus combined spinal-epidural anesthesia on the fetus in cesarean section." *Egyptian Journal of Anaesthesia* 30.2 (2014): 155-160.
- [6] Al-Husayn, Ali Jabbar Abd, et al. "Risk factor of herniated disc among adult patient at Al-Hussein medical City in Kerbala City." *Indian Journal of Public Health Research & Development* 9.8 (2018): 1163-1167.
- [7] Al-Husayn, Ali Jabbar Abd, et al. "Determine of diarrhea risk factor in children under 6 years at kerbala pediatric teaching hospital in karbala governorate." *Indian Journal of Public Health Research & Development* 9.8 (2018): 1104-1108.
- [8] Ghaffari, Sina, et al. "The effect of spinal versus general anesthesia on quality of life in women undergoing cesarean delivery on maternal request." *Cureus* 10.12 (2018).
- [9] Attari, Mohammad Ali, et al. "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 (2011): 524.
- [10] Havas, Fadil, et al. "Spinal anesthesia for elective cesarean section is associated with shorter hospital stay compared to general anesthesia." *Agri* 25.2 (2013): 55-63.
- [11] Kim, W. H., et al. "Comparison between general, spinal, epidural, and combined spinal-epidural anesthesia for cesarean delivery: a network meta-analysis." *International Journal of Obstetric Anesthesia* 37 (2019): 5-15.
- [12] Mancuso, Alfredo, et al. "General versus spinal anaesthesia for elective caesarean sections: effects on neonatal short-term outcome. A prospective randomised study." *The Journal of Maternal-Fetal & Neonatal Medicine* 23.10 (2010): 1114-1118.
- [13] Petropoulos, G., et al. "Spinal and epidural versus general anesthesia for elective cesarean section at term: effect on the acid-base status of the mother and newborn." *The Journal of Maternal-Fetal & Neonatal Medicine* 13.4 (2003): 260-266.

- [14] Pu, Xiang, and Jian-ming Sun. "General anesthesia vs spinal anesthesia for patients undergoing total-hip arthroplasty: a meta-analysis." *Medicine* 98.16 (2019): e14925.
- [15] Saygi, Anıl İçel, et al. "Comparison of maternal and fetal outcomes among patients undergoing cesarean section under general and spinal anesthesia: a randomized clinical trial." *Sao Paulo Medical Journal* 133.3 (2015): 227-234.
- [16] Sung, Tae-Yun, et al. "Comparison of the effect of general and spinal anesthesia for elective cesarean section on maternal and fetal outcomes: a retrospective cohort study." *Anesthesia and Pain Medicine* 16.1 (2021): 49.