

## The Crucial Role of Anesthesia in Cholecystectomy: A Comprehensive Guide

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**Abstract: Background:** Spinal anaesthesia serves as a substitute for general anaesthesia during cholecystectomy surgeries. **Objective:** This study was aimed to analyse and assess anesthesia effective during and after cholecystectomy surgery. **Patients and methods:** A cross-sectional study was conducted that involved 117 patients who underwent laparoscopic cholecystectomy with anesthesia techniques. To achieve the study's purpose, clinical data were categorized into two groups: GA (50 cases) and SA (67 cases). The study aimed to compare the hospital stay duration and pain levels before and after surgery measured by the VAS scale between the two groups. **Results:** Our clinical findings indicate that males were more likely to receive cholecystectomy to compare with women. Additionally, males exhibited a higher incidence of complications, longer surgical durations, and protracted hospital stays, representing 57.26% of cases compared to 42.74% for females. The postoperative records documented patient complications, revealing that bleeding occurred in 5 cases, infection in 3 cases, and infection of the bile duct during general anaesthesia in 4 cases. On the other hand, bleeding occurred in 4 cases, infection in 1 case, and bile duct infection in 2 cases. Additionally, it was observed that spinal anaesthesia resulted in a shorter hospital stay and less postoperative analgesia requirements in comparison to general anaesthesia. Furthermore, the clinical findings demonstrated that pain levels were better managed in the cohort of patients receiving spinal anaesthesia during the initial three days following surgery in contrast to those given general anaesthesia. **Conclusion:** Spinal anaesthesia is regarded as the optimal form of anaesthesia or the most efficacious method for pain control during cholecystectomy surgery, both intraoperatively and postoperatively.

**Keywords:** Cholecystectomy; Spinal anesthesia, General anesthesia.

### INTRODUCTION

Cholecystectomy is a surgical procedure aimed at resecting and extracting the gallbladder. It is one of the most performed abdominal surgeries in the Western world. Cholecystectomy is performed for symptomatic cholelithiasis, cholecystitis, gallbladder polyps > 0.5 cm, porcelain gallbladder, choledocholithiasis, and biliary pancreatitis, and rarely for gallbladder carcinoma. Over 90% of cholecystectomies are now performed laparoscopically due to shorter recovery time and reduced postoperative pain. Cholecystectomy has a low-risk profile; The most feared complications are vascular and bile duct injuries.

Between 10 and 20% of the world population are affected by gallstones. Each year, 1 to 4% of them develop symptoms. Removal of the gallbladder (cholecystectomy) is the primary treatment for patients who develop symptomatic gallstones. Laparoscopic cholecystectomy (minimally invasive surgery to remove the gallbladder) is the preferred method of intervention. Laparoscopic cholecystectomy is considered less painful than open surgery.

Acute cholecystitis is a common side effect of cholelithiasis. A minority of people are susceptible to cholecystitis for different reasons,

and critically sick patients can acquire it because of biliary peristalsis change.

Most patients over 60 years of age with ASA3 are considered being at high risk of morbidity and mortality, making cholecystectomy the surgical procedure that may be the most common and performed procedure for elderly patients.

Under spinal anesthesia, laparoscopic cholecystectomy combined with low-pressure carbon dioxide pneumoperitoneum is safe to do. Laparoscopic cholecystectomy has not been widely accepted despite increasing evidence that it may be done effectively while under regional anesthesia.

### PATIENTS AND METHODS

A cross-sectional study included 117 patients who underwent laparoscopic cholecystectomy using anesthesia techniques. Gallbladder patients whose ages ranged between 30-57 years and included surgical data were diagnosed. This study provided recorded demographic data for patients that included age, sex, BMI, ASA, smoking, diagnosis, stone size, and grade of cholecystitis. A comparison was made regarding the role of anesthesia techniques, which included spinal anesthesia and general anesthesia, and their effect

on patients who underwent laparoscopic cholecystectomy. The patients were divided into two groups according to the type of anaesthesia. The patients were distributed into two groups (50 patients under general anaesthesia and 67 patients under spinal anaesthesia. As for the surgical results, the patient's initial information was withdrawn, which included age, height, and weight, in addition to the presence of comorbidities and smoking.

Information on the results during surgery was also collected, which included: Duration of laparoscopic surgery, duration of both types of anaesthesia, which included general anaesthesia and spinal anaesthesia, duration of pneumoperitoneum, and negativity. Patient-related effects during surgery.

As for the results after surgery, the patient's quality of life was evaluated according to a special quality of life scale, and the degree of pain was evaluated to determine the effects of anaesthesia and the complications it leaves after surgery. Comparison between types of anaesthesia was also discussed according to the length of stay in the hospital and the degree of patient satisfaction. In addition, multivariate regression was performed for risk factors affecting patients in the postoperative period. This paper was contributed to assess the anaesthesia technique effect on patients who underwent cholecystectomy patients in terms of spinal and general anaesthesia.

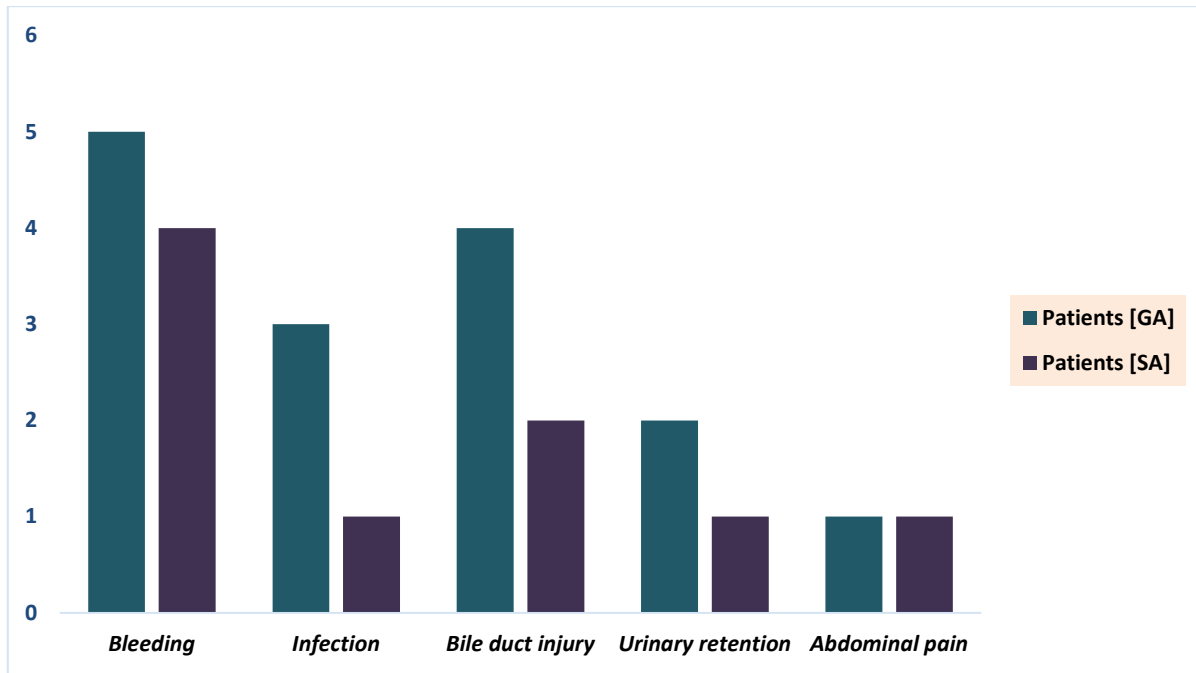
## RESULTS

**Table 1:** Characteristics of demographic data of cholecystectomy patients enrolled in this study.

Variables	Patients Data outcomes, [117]
<b>Age, [years]</b>	44.17 ± 13.7
<b>BMI, [Kg/m2]</b>	30.5 ± 33.18
<b>Sex</b>	
Male	67 [57.26%]
Female	50 [42.74%]
<b>ASA</b>	
I	40 [34.19%]
II	50 [42.74%]
III	27 [23.08%]
<b>Smoking</b>	
Smokers	40 [34.19%]
Non-smokers	77 [65.81%]
<b>Diagnoses</b>	
Cholelithiasis	36 [30.77%]
Acute and chronic cholecystitis	23 [19.66%]
Biliary polyps	20 [17.09%]
Biliary dyskinesia	12 [10.26%]
Choledocholithiasis	15 [12.82%]
Gallstone pancreatitis	7 [5.98%]
Gallbladder tumour	4 [3.42%]
<b>Gallstones sizes</b>	
[15-20] mm	62 [52.99%]
[21-25] mm	37 [31.62%]
[26-30] mm	18 [15.38%]
<b>Cholecystitis Grade</b>	
Grade-1	67 [57.26%]
Grade-2	32 [27.35%]
Grade-3	18 [15.38%]
<b>Types of anaesthesia</b>	
General anaesthesia	50 [42.74%]
Spinal anaesthesia	67 [57.26%]

**Table 2:** Intraoperative outcomes related to Laparoscopic cholecystectomy.

Variables	General anesthesia [50]	Spinal anesthesia [67]	P-value
<i>Duration of surgery [min]</i>	33.40 ± 6.80	35.75 ± 6.24	0.0148
<i>Duration of anesthesia [min]</i>	48.44 ± 7.76	39.84 ± 6.72	0.1989
<i>Duration of pneumoperitoneum [min]</i>	31.61 ± 6.33	33.18 ± 6.63	0.1740
<i>Abdominal pain</i>	8 [16%]	7 [10.45%]	< 0.05
<i>Hypotension</i>	5 [10%]	4 [5.97%]	0.18
<i>Nausea/Vomiting</i>	2 [4%]	3 [4.48%]	0.0438
<i>Anxiety</i>	2 [4%]	2 [2.99%]	0.022



**Figure 1:** Post-operative complications.

**Table 3:** Determine clinical outcomes associated with patients who underwent Laparoscopic cholecystectomy

Variables	General anesthesia [50]	Spinal anesthesia [67]	P-value
<i>Follow-up</i>			
[Days]	10.4 ± 4.6	8.3 ± 3.7	0.12
<i>Length of stay</i>			
[Days]	1.8 ± 1.2	1.3 ± 0.9	0.162
<i>Pain score by VAS scale</i>			
<i>Pre-operative</i>	7.8 ± 1.62	8.2 ± 0.3	0.35
<i>Post-operative</i>			
1 <sup>st</sup> Day	5.1 ± 0.2	3.2 ± 0.33	0.036
2 <sup>nd</sup> Day	3.25 ± 0.05	0.73 ± 0.03	< 0.001
3 <sup>rd</sup> Day	1.041 ± 0.01	0	0.11
<i>Level of satisfaction</i>			
<i>Good</i>	15 [30%]	48 [71.64%]	<0.05
<i>satisfactory</i>	25 [50%]	14 [20.9%]	< 0.05
<i>Poor</i>	10 [20%]	5 [7.46%]	<0.05

**Table 4:** Multivariable regression of the risk factors that affect patients in the postoperative period

Risk factors	OR [95% CI]		P-value
	Patients [GA]	Patients [SA]	
Age	1.01 [0.52 - 1.352]	0.82 [0.80 - 1.071]	0.612
BMI	1.03 [0.90 - 1.21]	1.01 [0.89 - 1.20]	0.225
Sex [female]	0.882 [0.60 - 1.38]	0.851 [0.59 - 1.37]	0.501
Cholelithiasis	1.45 [0.85 - 3.50]	1.43 [0.83 - 3.42]	0.3
Abdominal pain	1.32 [0.89 - 2.15]	1.42 [0.82 - 2.44]	0.15
Bleeding	3.13 [1.71 - 5.80]	2.50 [1.10 - 5.64]	0.0244
Infection	1.232 [1.11 - 1.372]	1.153 [0.91 - 1.40]	0.162
Smoking	0.70 [0.31 - 1.62]	0.74 [0.30 - 1.72]	0.512
Hypotension	1.04 [0.95 - 1.13]	1.01 [0.95 - 1.08]	0.904

## DISCUSSION

We conducted a study that compared spinal anesthesia and general anesthesia in cholecystectomy surgery. Our clinical results found that men were more likely to undergo cholecystectomy, with a higher rate of conversion to laparoscopic cholecystectomy due to anatomical difficulties and adhesions. Men were observed to have a higher prevalence of complications, longer surgical times, and longer hospital stays, with a rate of 57.26% for men compared to men. For women, which was 42.74%. The study showed that smoking has a strong statistical relationship and a significant impact on cholecystectomy patients. Smoking greatly affects patients before surgery and after surgery, as smoking and the risk of developing gallstones, which is a common condition that leads to the removal of the gallbladder.

Smoking has a detrimental effect on the gallbladder. It causes contraction of the gallbladder, similar to the effect of fatty food [Pursnani, K. G. *et al.*, 1998]. Additionally, smoking is associated with an increased risk of developing biliary tract cancers, including extrahepatic bile duct and ampulla of Vater cancers [Gramatica, L. *et al.*, 2002] [Tzovaras, G. *et al.*, 2006]. The risk of these cancers is higher in current smokers compared to never smokers, and there is a dose-response relationship with smoking intensity and duration [Sinha, R. *et al.*, 2009]. However, there is no convincing association between smoking and gallbladder cancer [Sharp, J. R. *et al.*, 1982]. Overall, smoking negatively impacts the gallbladder and increases the risk of certain biliary tract cancers.

Smoking has been found to have a negative impact on the recovery time after gallbladder removal surgery. Multiple studies have shown that smokers are more likely to develop wound complications

after cholecystectomy, regardless of the surgical approach used [Pursnani, K. G. *et al.*, 1998]. Additionally, a systematic review and meta-analysis of cohort studies found that tobacco smoking is associated with an increased risk of gallbladder disease [Gramatica, L. *et al.*, 2002]. Furthermore, research presented at a conference indicated that smokers take longer to recover from surgery compared to those who have quit smoking [Tzovaras, G. *et al.*, 2006]. Two recent studies specifically focused on the postanesthesia care unit (PACU) and found that smoking history was the only independent factor associated with longer PACU stays [Sinha, R. *et al.*, 2009] [Sharp, J. R. *et al.*, 1982]. These findings suggest that smoking can prolong the recovery time after gallbladder removal surgery and emphasize the importance of smoking cessation before surgery to reduce complications and improve outcomes.

Moreover, this study discussed the linear relationship between BMI and the risk of cholecystectomy, as it was observed that overweight patients lose a large amount of blood during cholecystectomy surgery. Likewise, another study showed that underweight patients had a greater risk of death and postoperative bleeding, while grade 3 obese patients had a lower mortality rate but longer operative time, wound infection, and wound dehiscence.

For further results, the surgical data adopted in this study exploring the role of spinal and general anesthesia in cholecystectomy surgery were widely used. Numerous studies have demonstrated that both spinal anesthesia and general anesthesia can result in stable hemodynamics, reduced neuroendocrine stress, and better postoperative analgesia. Spinal anesthesia shows an advantage over general anesthesia, as spinal anesthesia is associated with decreased postoperative pain, less nausea and vomiting, a lower surgical rate, and a shorter hospital stay. It was found that the cases of

patients during surgery who faced abdominal pain reached 7 cases, and high blood pressure reached 4 cases in spinal anesthesia. While abdominal pain was found in 8 cases, and high blood pressure was found in 5 cases. The postoperative data recorded the complications associated with the patients and found that the most common complications were bleeding in 5 cases, infection in 3 cases, and infection of the bile duct in general anesthesia 4 cases while bleeding in 4 cases, infection in 1 case, and infection in the bile duct was 2 cases. Cases.

This study determined the clinical outcomes associated with patients who underwent laparoscopic cholecystectomy. This study found that spinal anesthesia has a shorter hospital stay and lower postoperative analgesia requirements compared to general anesthesia. It was found that the results of pain ratings were more dominant and controlled in the group of spinal anesthesia patients in the first three days after surgery, as they reached three and a half by VAS until reaching the third day of hospitalization, which was completely controlled, while pain could reach 5. or more in the general anesthesia group on the first day and gradually decreased to  $(3.25 \pm 0.05)$  on the second day. The success rate of gallbladder removal, which was excellent, was 71.64%, satisfactory, 20.9%, and poor, 7.46% under spinal anesthesia, while the success rate of gallbladder removal, which was excellent, was 30%, satisfactory, 50%, and poor, was 20%. This study found the risk factors affecting patients' lives through multivariable logistic regression, which were age, gender, smoking, stone size, and complications during or after surgery.

### CONCLUSION:

Spinal anaesthesia is the favoured method for pain management and complication reduction during and after laparoscopic cholecystectomy surgery. Patients under spinal anaesthesia experienced nine fewer complications compared to those under general anaesthesia (15 cases). The most prevalent postoperative complications were bleeding, infection, and bile duct injury. Furthermore, postoperative data regarding the efficacy of surgical interventions for cholecystectomy performed under spinal anesthesia indicated a 98% reduction in pain and successful pain management, which is attributable to the fact that cholecystectomy surgery performed under spinal anesthesia is associated with a shorter hospital stay, a shorter follow-up period and a lower pain rate. The study elucidates that the survival rate of

patients is significantly affected by prominent risk factors such as smoking, obesity, age, complications, and stone size in both the short and long term.

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