MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.11.110.114

OPEN ACCESS

Key Words
Cholecystectomy, laparoscopic cholecystectomy, spinal anaesthesia an D general anaesthesia, COPD, extubation, intubation

Corresponding Author
Dhrubajyoti Maulik,
Department of General Surgery, Bankura Sammilani Medical College and Hospital

Author Designation
[1]Senior Resident
[2]Associate Professor

Received: 17 September 2023
Accepted: 11 October 2023
Published: 12 October 2023

Citation: Arnab Mondal and Dhrubajyoti Maulik, 2023. Laparoscopic Cholecystectomy under Spinal Anaesthesia. Res. J. Med. Sci., 17: 110-114, doi: 10.59218/makrjms.2023.11.110.114

Laparoscopic Cholecystectomy Under Spinal Anaesthesia

[1]Arnab Mondal and [2]Dhrubajyoti Maulik
[1,2]Department of General Surgery, Bankura Sammilani Medical College and Hospital, India

ABSTRACT
The present study was performed to study the feasibility of performing laparoscopic cholecystectomy under spinal anaesthesia. A prospective observational single center cohort study from 2022 March-April 2023 at Bankura Sammilani Medical College and Hospital. 100 patients diagnosed with gall stone disease. In our study females are more young than males. Three instances had their spinal anesthesia changed to general anesthesia. Majority of patients needed minimal post-operative analgesics. Two instances had their laparoscopic cholecystectomy procedures changed to open ones. Ten and 13.3% of patients, respectively, required intraoperative analgesia and sedation. The majority of patients did not need any analgesics in the post-operative time. Incidence of lung complication are less, less cough in this procedure. Post-operative Oxygen requirementless. This is cost effective than general anaesthesia. Spinal Anaesthesia is better in COPD and hypertensive patients. In general anaesthesia there are increase of blood pressure during Intubation and Extubation but in case of Spinal Anaesthesia there is no such episode. Headache (15.0%) and mild backache (5%) complications were treated conservatively. For post-operative urine retention, about 5% of patients needed urinary catheterization. Under spinal anesthesia, laparoscopic cholecystectomy can be done safely and with little morbidity. Spinal anaesthesia involves less cost and is better in terms of post-operative pain control. The incidence of various post-operative complications are less and manageable.

INTRODUCTION

Traditionally, general anaesthesia was used for laparoscopic surgery[1]. This practice is still in use today. Owing to the requirement for endotracheal intubation with a cuffed tube to prevent aspiration of gastric contents owing to pneumoperitoneum, general anesthesia was selected. Due to the lungs' diminished functional capacity and shunting, there was also a risk of hypercapnia and hypoxemia, which required controlled hyperventilation and positive end expiratory pressure ventilation[2]. Other concerns included decreased cardiac preload and increased sympathetic stimulation associated with CO2 pneumoperitoneum[3]. In a laparoscopic cholecystectomy, the cystic triangle and gall bladder fossa are the only areas that are dissected. Bowel handling is often very little. Laparoscopic cholecystectomy under regional anesthesia may be a viable alternative if the procedure is carried out with modest insufflation pressures. Better analgesia comes naturally with regional anesthesia, which is less invasive. Few occurrences of regional anesthesia for laparoscopic surgery in patients with concurrent pulmonary disease who were rated high risk for general anesthesia have been documented in the last ten years[4,5]. The fact that these high-risk patients' procedures could be completed without incident was regarded as a breakthrough. Studying the viability of carrying out laparoscopic surgeries under regional anesthesia has been sparked by this. The effectiveness and safety of regional anesthesia during laparoscopic cholecystectomy on healthy participants were the focus of a small number of research[6,7].

Authors hypothesized that laparoscopic cholecystectomy could be safely performed under spinal anaesthesia based on limited experience reported by various centers. The aim of this study was to evaluate the outcomes of laparoscopic cholecystectomy under spinal anaesthesia.

MATERIALS AND METHODS

The study was conducted after obtaining approval from the institutional ethics committee. All patients were enrolled in the study after taking written informed consent.

Study design and population: A prospective observational single center cohort study from 2022 March-April 2023 at Bankura Sammilani Medical College and Hospital. 100 patients diagnosed with gall stone disease. Patients who met the inclusion and exclusion criteria and had a diagnosis of symptomatic gall stone disease were invited to participate in the trial and enrolled after giving their consent. All patients received information about the disease the surgical options (laparoscopic and open cholecystectomy), the types of anesthesia available (spinal and general anesthesia), the benefits and drawbacks of each type of anesthesia, the intraoperative and postoperative complications related to each type of anesthesia, the risk of conversion from spinal anesthesia to general anesthesia, The results of the study covered intraoperative events (hypotension, bradycardia, abdominal discomfort, shoulder pain and need for sedation), causes for conversion (from laparoscopic to open cholecystectomy and from spinal to general anesthesia), post-operative pain and complications.

Inclusion and exclusion criteria: All adult patients who consented were included in the study. Patients with diagnosis of empyema of gall bladder and suspected gall bladder malignancy were excluded from the study. Patients with spinal deformities and contraindications to spinal anaesthesia were also excluded from the study. Patients who were sensitive to local anaesthetics and body mass index of more than 35 kg m^{-2} were not included in the study.

RESULT AND ANALYSIS

dMajority of the patients in this study were females 75 (75.0%). Males constituted about 25 (25.0%) of study population. Chi square test suggested that females had 1.9 times more risk for the disease than the males (Relative risk = 1.9, 95% Confidence interval = 1.1-3.0, Odds ratio = 3.2, 95% Confidence interval = 1.5-7.1, p-value = 0.004). Majority of the patients belonged to the age group of 31-40 years. The mean age of the study population was 35.6±7.4 years. The mean age of female patients was 34.6±6.9 years whereas the mean age in male patients was 39.2±8.1 years. This result was significant on t-test with p-value of 0.041 (Table 1).

On preoperative ultrasound majority of patients had multiple calculi and gall bladder was distended in majority. Among the study population, 60 (60.0%) patients were hypertensive, 5 (5.0%) patients were diabetic, 5 (5.0%) patients were hypothyroid, 2 patient 2 (2.0%) had chronic obstructive pulmonary disease and 2 patient had coronary artery disease 2 (2.0%) (Table 2).

Intra operative hypotension occurred in five patients (5%) which responded to intravenous fluid administration. Intra operative bradycardia occurred in three patients (3.0%) which corrected on lowering abdominal insufflation pressure. Ten patient (10%) experienced abdominal pain during surgery which was managed by administering intravenous injection fentanyl. Five patients (5%) experienced mild shoulder pain and were managed conservatively with shoulder massage. Additional sedation with intravenous

Table 1: Demographic details co morbidities and pre-operative ultrasound findings of study population

Characteristics	Frequency No.	Percentage
Gender		
Female	75	75.0
Male	25	25.0
Age group years		
Total	100	
≤20	3	3.0
21-30	10	10.0
31-40	60	60.0
41-50	20	20.0
51-60	7	7.0
Total	100	
Co morbidities		
Hypertension	60	60.00
Diabetes	5	5.00
Hypothyroidism	8	8.33
Chronic obstructive pulmonary disease	2	2.00
Coronary artery disease	2	2.00
Total	100	
Pre operative ultrasound finding		
Contracted gall bladder with multiple calculi	18	18.00
Contracted gall bladder with single calculus	10	10.00
Distended gall bladder with multiple calculi	50	51.00
Distended gall bladder with single calculus	20	20.00
Total	100	

Table 2: Frequency distribution of intra operative and post-operative events and hospital stay post-surgery

Intra operative event incidence	Percentage
Hypotension	5.0
Bradycardia Abdominal pain analgesia	3.0
Shoulder pain	10.0
Requirement for sedation	5.0
Bile spillage	13.0
Post operative events	
Headache	15.0
Urinary retention requiring catheterization	5.0
Low back pain	5.0
Nausea and vomiting	Nil
Wound infection	1.0
Hospital stay post surgery (days)	
1	75.0
2	15.0
3	5.0
4	1.0

injection midazolam was required in thirteen patients (13.0%). Bile spillage occurred in five patients (5%). There were no events of significant intra operative bleeding, bile duct injury or visceral injury in the study population.

In the post-operative period, majority of the patients did not experience any significant pain and was managed with regular dressing. No patient experienced post-operative nausea and vomiting. The mean duration of hospital stay was 1.32±0.651 days. Most of the patients (75.0%) were discharged one day after surgery.

Post spinal headache occurred in 15 patients (15.0%) who were managed conservatively. Urinary retention requiring catheterization occurred in three patients (5%). Low back pain was experienced by 5 patients (5%) but it was tolerable and persisted only for 24 hrs. Only one patient (1.0%) had wound infection in the post-operative period when measured on visual analogue scale at 1, 6, 12 and 24 hrs after surgery. Those patients who experienced significant pain were administered intravenous injection of tramadol 100 mg. The proportion of patients requiring analgesic injection was lowest in the immediate post-operative period (1 hrs post-surgery). Six hours post-surgery 17% of patients required analgesia which was highest followed by 12 hrs after surgery where 9.0% of patients required analgesia and 24 hrs post-surgery where only 8% of patients required analgesia (Table 3.)

DISCUSSIONS

Gall stone disease is an increasing major healthcare burden all over the world due to increasing sedentary life and unhealthy diets[8]. As in previous studies the incidence of gall stone disease was more in females when compared to males in the present study. This could be due to the effect of female sex hormone estrogen[9]. This could also explain the early age of onset of disease in females as seen in this study where the mean age of female patients was significantly less when compared to male patients. Even though several case reports and studies demonstrated that laparoscopic cholecystectomy can be performed safely under spinal anaesthesia it has not been adopted so far[10].

Spinal anaesthesia has inherent advantages when compared to general anaesthesia. It is less invasive and easy to administer. 18 Spinal anaesthesia requires less monitoring and no complex equipment is required for the purpose. The time required for administering spinal anaesthesia was less when compared to general anaesthesia in previous studies[11]. As it does not involve endotracheal intubation the chance of injury to the upper gastrointestinal and airway structures is nil. The incidence of post-operative nausea and vomiting after spinal anaesthesia was less when compared to general anaesthesia in previous studies[12]. These factors make spinal anaesthesia more economical than general anaesthesia in developing countries.

However, spinal anaesthesia is not without difficulties. One patient in our study required conversion from spinal to general anaesthesia due to hypoxemia and respiratory difficulty. Positive pressure ventilation during general anaesthesia deals better with the respiratory compromise due to pneumoperitoneum. Another patient in our study required conversion to general anaesthesia due to failure of neuraxial blockade. In another case conversion into general anaesthesia was required as surgery required significant bowel handling due to dense adhesions between gall bladder and duodenum. Intra operative hypotension during spinal anaesthesia is a feared complication. The incidence was 4.3% in a study by Sandhu *et al*.[13] The incidence of hypotension in our study was 5% but all were managed by intravenous fluid administration. Liberal preoperative fluid loading may help in reduction of intra operative hypotensive events. Intra operative abdominal pain was experienced in 10% of the patients in our study

Table 3: Post-operative pain on visual analogue scale and requirement for analgesia

Pain on visual analogue scale	Post 1 hr of surgery	Post 6 hrs of surgery	Post 12 hrs of surgery	Post 24 hrs of surgery
0	52	46	53	55
1	7	5	3	2
2	1	5	1	1
3	0	2	1	2
4	0	2	2	0
5 and above	0	0	0	0
Median score	0	0	0	0
Mode	0	0	0	0
Percentage of patients requiring analgesic medication	1.67%	17%	9.0%	8%

but all were managed with intravenous analgesics and none required conversion to general anaesthesia in view of pain. Referred pain to shoulder was a common event noted in previous studies of laparoscopic compared with retrospective studies as control population was not considered in this study.

Laparoscopic cholecystectomy can be performed safely under spinal anaesthesia with minimum morbidity. Spinal anaesthesia involves less cost and is better in terms of post-operative pain control. The incidence of various post-operative complications are less and manageable. However, randomized control trials comparing laparoscopic cholecystectomy under spinal and general anaesthesia with larger sample size are required to set a strong base for adoption of this practice.

Consent for publication has been taken for publication of results and data from all the participants. Cholecystectomy under regional anaesthesia ranging from 25-43%[14]. However, intra operative spraying of xylocaine between liver bed and diaphragm was done in this study with drop in the shoulder pain incidence to 5% as in the previous study by Chauhan *et al*.[15].

In the post-operative period, the proportion of patients requiring analgesia for significant pain was less as in previous studies[15]. This is attributable to the persistence of the analgesic effect of spinal anaesthesia in the immediate post-operative period and also attributable to low pressure pneumoperitoneum used during surgery when compared to standard pressure pneumoperitoneum[15]. However, low pressure pneumoperitoneum was associated with technical difficulties during surgery in previous studies[15]. Other post-operative complications of spinal anaesthesia like headache and low backache can be managed conservatively as in this study. Urinary retention may require temporary urinary catheterization. The limitation of this study was small sample size and the sample size was not based on power factor calculation.

We found that majority of patients needed minimal post-operative analgesics.

Incidence of lung complication are less, less cough in this procedure. Post-operative Oxygen requirementless. This is cost effective than general anaesthesia. Spinal Anaesthesia is better in COPD and hypertensive patients. In general anaesthesia there are increase of blood pressure during Intubation and Extubation but in case of Spinal Anaesthesia there is no such episode.

CONCLUSION

We conclude that the study results were compared with retrospective studies as control population was not considered in this study. Laparoscopic cholecystectomy can be performed safely under spinal anesthesia with minimum morbidity. Spinal anesthesia involves less cost and is better in terms of post-operative pain control. The incidence of various post-operative complications are less and manageable. However, randomized control trials comparing laparoscopic cholecystectomy under spinal and general anesthesia with larger sample size are required to set a strong base for adoption of this practice.

REFERENCES

1. Johnson, A., 1997. Laparoscopic surgery. Lancet, 349: 631?635.
2. Kim, J.Y., C.S. Shin, H.S. Kim, W.S. Jung and H.J. Kwak, 2009. Positive end-expiratory pressure in pressure: Controlled ventilation improves ventilatory and oxygenation parameters during laparoscopic cholecystectomy. Surg. Endosc., 24: 1099-1103.
3. Srivastava, A. and A. Niranjan, 2010. Secrets of safe laparoscopic surgery: Anaesthetic and surgical considerations. J. Minimal Access Surg., 6: 91-94.
4. Gramatica, L., O.E. Brasesco, A.M. Luna, V. Martinessi and G. Panebianco et al., 2001. Laparoscopic cholecystectomy performed under regional anesthesia in patients with chronic obstructive pulmonary disease. Surg. Endosc., 16: 472-475.
5. Kim, B.S., 2013. Laparoscopic cholecystectomy in patients with anesthetic problems. World J. Gastroenterol., 19: 4832-4835.
6. Hamad, M.A. and O.A.I. El-Khattary, 2003. Laparoscopic cholecystectomy under spinal anesthesia with nitrous oxide pneumoperitoneum: A feasibility study. Surg. Endosc., 17: 1426-1428.
7. Tzovaras, G., F. Fafoulakis, K. Pratsas, S. Georgopoulou, G. Stamatiou and C. Hatzitheofilou,

2006. Laparoscopic cholecystectomy under spinal anesthesia. Surg. Endosc., 20: 580-582.
8. Shaffer, E.A., 2005. Epidemiology and risk factors for gallstone disease: Has the paradigm changed in the 21st century? Curr. Gastroenterol. Rep., 7: 132-140.
9. Cirillo, D.J., 2005. Effect of estrogen therapy on gallbladder disease. JAMA, 293: 330-339.
10. Tzovaras, G., 2008. Spinal vs general anesthesia for laparoscopic cholecystectomy. Arch. Surg., 143: 497?501.
11. Chauhan, A., S. Tiwari, P. Chaterjee and M. Alam, 2013. Laparoscopic cholecystectomy under spinal anaesthesia: A prospective, randomised study. J. Minimal Access Surg., 9: 65-71.
12. Sinha, R., A.K. Gurwara and S.C. Gupta, 2008. Laparoscopic surgery using spinal anesthesia. JSLS., 12: 133?138.
13. Sandhu, T., S. Yamada, V. Ariyakachon, T. Chakrabandhu, W. Chongruksut and W. Ko-iam, 2008. Low-pressure pneumoperitoneum versus standard pneumoperitoneum in laparoscopic cholecystectomy, a prospective randomized clinical trial. Surg. Endosc., 23: 1044-1047.
14. Van Zundert, A.A.J., G. Stultiens, J.J. Jakimowicz, D. Peek, W.G.J.M.V. Ham, H.H.M. Korsten and J.A.W. Wildsmith, 2007. Laparoscopic cholecystectomy under segmental thoracic spinal anaesthesia: A feasibility study. Br. J. Anaesth., 98: 682-686.
15. Joshipura, V.P., S.P. Haribhakti, N.R. Patel, R.P. Naik and H.N. Soni et al., 2009. A prospective randomized, controlled study comparing low pressure versus high pressure pneumoperitoneum during laparoscopic cholecystectomy. Surg. Laparosc. Endosc. Percutan. Tech. 19: 234?240.