

Efficacy of Spinal Anaesthesia as a Safer Technique in Laparoscopic Cholecystectomy with Better Outcome

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Abstract

Spinal anaesthesia is always a safe, cost effective and a better option in patients where general anaesthesia can be complicated and to fulfill the purpose of post-operative analgesia. After conducting many upper abdominal surgeries and open cholecystectomy under spinal anaesthesia, this study was conducted on single, three and conventional four port laparoscopic cholecystectomy under spinal anaesthesia to assess its efficacy, safety, reliability and as an alternative to general anaesthesia with minimum risk. This study was conducted on 300 patients of either sex belonging to ASA-I & II, age 20-70 years admitted for planned laparoscopic cholecystectomy. Bupivacaine (2.5 to 4ml) was injected indurally in lateral position at the level of L2. Dose of bupivacaine varied according to the feasibility and compatibility of the operating surgeon. Pneumoperitoneum with CO₂ was created with the range of 10-14mmHg intra-abdominal pressure, according to the ease of the surgeon, at the rate of 1 L/min. Patients were sedated with Inj pentazocine 30mg and midazolam 2mg/ diazepam 10mg intravenously after performing spinal anaesthesia. Any discomfort and intensity to the patient due to right shoulder pain was observed and managed accordingly from right shoulder massage to supplementation with propofol 1mg/kg. No patient was converted into general anaesthesia with tracheal intubation. Mean age was 41.7 years. Mean surgical duration was 53.19±12.55 min. Mean duration of sensory block was 157.39±23.47 min and mean duration of motor block was 134.17±19.52 min. Laparoscopic cholecystectomy can be performed under spinal anaesthesia with better outcome and safety without having any major complication.

Keywords: Spinal Anaesthesia; Single; Three & Four Port; Laparoscopic Cholecystectomy; Pneumoperitoneum; CO₂ Insufflation.

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Introduction

With the advancement in surgery, anaesthetist daily meets with new challenges. To counter those challenges, better alternative anaesthetic techniques are taking place. Laparoscopic surgeries has increased and becoming a trend during past few years and replacing conventional open cholecystectomy as the gold standard modality. The reason is it is well

recognized minimal invasive surgery and expedited post-operative recovery with minimum hospital stay [1]. Abdominal insufflations upto 14-16 mmHg with CO₂ is required to perform laparoscopic surgeries, which increases intra-abdominal pressure. The normal intra-abdominal pressure is less than 5 mmHg². Increased intra-abdominal pressure created by pneumoperitoneum leads to systemic absorption of CO₂, enhances venous stasis, produces hypercarbia, systemic acidosis, lowers respiratory compliance,

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increases airway pressure and impairs cardiac functions and hypertensive episodes [3]. A longer operative period causes longer exposure of the patient to the adverse effects of pneumoperitoneum. Till now general anaesthesia was considered for such procedures as a gold standard, but it also has its own deleterious effects.

Nowadays, spinal anaesthesia is becoming popular in laparoscopic surgeries to avoid the associated detrimental effects of general anaesthesia along with the systemic effects of pneumoperitoneum created during laparoscopic surgeries.

Spinal anaesthesia is a form of regional anaesthesia involving the injection of local anaesthetic agent in subarachnoid space through a fine bore needle. It is also called as subarachnoid block, intradural block and intrathecal block. It is an alternative technique to general anaesthesia in some operations to avoid its undesirable detrimental effects or in patients where general anaesthesia can be risky and contra-indicated [3,4]. Spinal anaesthesia allows the patient remain awake during the operation without feeling any pain. Local anaesthetic drug injected intradurally blocks the autonomic, sensory and motor fibres and produces numbness and adequate muscular relaxation to perform surgery. Nowadays spinal anaesthesia is a commonly used technique. It can solely be given alone or can be supplemented with sedation. It is a favourable technique in patients having severe respiratory disease to avoid potential respiratory consequences of intubation and ventilation. It may also be useful in patients with anatomical abnormalities affecting the airway and making the tracheal intubation difficult.

There are few conditions where spinal anaesthesia is contra-indicated

- Patients refusal
- Local infection or sepsis at the site of lumbar puncture
- Bleeding disorders
- Space occupying lesion in the brain and raised ICT
- Anatomical abnormalities of spine
- Hypovolaemia and shock

Risks and complications

- Hypotension
- High block
- Bradycardia and cardiac arrest

- Post-dural puncture headache
- Spinal canal haematoma
- Cauda equina (very rare)

Aims of Study

This study was conducted for the assessment of efficacy, safety and hemodynamic changes during laparoscopic cholecystectomy under spinal anaesthesia.

Material and Method

This study was conducted on 300 patients of either sex belonging to ASA I & II from age 20-70 yr admitted for planned laparoscopic cholecystectomy.

A written informed consent was obtained from the patients and protocol of the study and intraoperative events were explained to the patients during pre-anaesthetic check up. Patients were advised for 6-8 hr fasting and tab alprazolam 0.5mg given night before surgery to alleviate anxiety. Patients who refused for spinal anaesthesia, having any local sepsis in the lumbar region, bleeding disorder and patients with spinal bony deformity were excluded from this study.

A patent running intravenous line was secured with 18 G cannula and patients were preloaded with 1 litre crystalloid fluid (ringer lactate) in operation theatre before performing spinal anaesthesia and monitor was attached to record basal heart rate, blood pressure, oxygen saturation and ECG. Patients were prepared for spinal anaesthesia with all aseptic precautions, infiltration of local anaesthetic was done in L1-L2 interspace. Spinal anaesthesia was given by 23 G spinal needle in lateral position with precaution not damaging the spinal cord. Bevel of the needle was directed cephalic after reaching in the subarachnoid space and bupivacaine 2.5-4 ml (depending upon the surgeon's compatibility) was injected to achieve dense block and prolonged effect [4]. Patients were turned supine and kept for 5-10 minutes with a 15 degree head down tilt (with a 3 inch width pillow under the shoulders) to achieve the block upto the level of T4-T5. Premedication was given with pentazocine 30mg, midazolam 2mg/ diazepam 10mg, ondansetron 4mg and ranitidine 50mg intravenously. Oxygenation was given by ventimask at the rate of 5-6 litre/min. Heart rate, respiratory rate, blood pressure and SpO₂ was monitored frequently after spinal anaesthesia and intra-operatively. Pneumoperitoneum (10-14 mmHg)

was created through umbilical port with CO₂ with a rate of 1 litre/min and laparoscopic cholecystectomy was done by single port, three port or by traditional four ports [5]. Initially hypotension was observed after spinal anaesthesia, which was corrected with intravenous fluids, oxygenation and ephedrine 6mg/mephentermine 6mg intravenously. Once the pneumoperitoneum was created, blood pressure remained stable.

Most of the patients (244 patients) were operated under spinal anaesthesia and sedation without any complaint. 47 patients had experienced right shoulder pain during the middle and during the end moments of surgery, which was relieved with shoulder massage. 9 patients had experienced severe shoulder pain with anxiety and restlessness. They were supplemented with propofol 1mg/kg. Pneumoperitoneum, alongwith excessive smoke due to cauterization aggravates the shoulder pain [6]. Smoke was evacuated intermittently. No incidence of high spinal, cardiac or respiratory arrest was noted. No patient was converted into general anaesthesia with tracheal intubation.

Observations

Two hundred sixty six (266) females had undergone for laparoscopic cholecystectomy shows

cholecystitis and cholelithiasis occurs more in females over age of 40. In this study, Mean age of patients was 41.7 yr. No nausea, vomiting and post-spinal headache was observed. Table shows mean duration of sensory block was 157.39±23.47 min and mean duration of motor block was 134.17±19.52 min (Table 1).

This table shows respiratory rate was increased after CO₂ insufflation, to wash out the absorbed CO₂. EtCO₂ was also raised after insufflation. (Table 2).

Discussion

Whenever we think of spinal anaesthesia, we get scared of hypotension. This study was conducted after a long experience of 15 yrs of upper abdominal, open and single, three and four port laparoscopic surgeries under spinal anaesthesia to observe spinal anaesthesia as an alternative to general anaesthesia as a safe, cost effective technique with better outcome.

In this study it was observed that with few precautions, despite of giving spinal anaesthesia at a higher level, severe hypotension was never been a problem during the procedure, neither there were any hypertensive episodes after creating

Table 1:

Mean Age (in yrs)	41.7
Sex	Males -34 Females- 266
Attempts for spinal	Single attempt
Level of block	T4-T5
Intra-abdominal pressure	10-14 mmHg
Rate of insufflation	1 litre/min
Hypotension	In 81 patients
Respiratory rate/min	22±4.84
Referred shoulder pain	47
Anxiety and restlessness	9
Nausea /vomiting	Nil
Mean Duration of sensory block	157.39±23.47 min
Mean duration of motor block	134.17±19.52 min
Mean surgical duration	53.19±12.55 min
Postdural puncture headache	Nil

Table 2:

Heart rate	67.28±3.17
Mean arterial pressure	86.43±3.71
Respiratory rate Basal	14-17/ min
Respiratory rate after insufflations	21-26/ min
SPO ₂ with oxygen	99-100%
SPO ₂ without oxygen	94-96%
Basal ETCO ₂	13.47±3.86
ETCO ₂ after insufflation	26.31±3.12

pneumoperitoneum, as was observed in previous studies [9,10,11]. Even after achieving a block up to T4- T5, properly hydrated patient needed only single dose of vasoconstrictor agent (ephedrine/mephentermine 6mg IV) to maintain the blood pressure. In this study it was observed that initial fall in blood pressure was during 3-5 mins after spinal anaesthesia, which was corrected with fast running intravenous drip and oxygenation and sometimes vasopressor drug was given to maintain the blood pressure. 67 patients (22.33%) required single dose of vasopressor agent and only 14 patients (4.66%) required second dose to control hypotension [12].

It may be due to hypertensive response of pneumoperitoneum, which would have compensated the incidence of hypotension and would have helped in maintaining the blood pressure during the procedure. Hence, it can be said that hypertensive response of pneumoperitoneum had become an advantage in maintaining the blood pressure in limits [13], which could have been the problem under general anaesthesia.

Incidence of referred shoulder pain was observed in 56 patients (18.66%), which was relieved by gentle shoulder massage in 47 patients and frequent evacuation of smoke produced due to cauterization. 9 patients were found anxious and restless and they were supplemented with 1mg/kg propofol intravenously.

Despite of using 23 G spinal needle, there was no incidence observed of post spinal headache. It may be due to single dural puncture. This study correlates with the study of Jabbari A et al. [14], who observed 0.1-36% incidence of post spinal headache in his study. Spinal anaesthesia had provided numerous advantages like quick washout of CO₂ with no residual effect, prolonged and effective post-operative analgesia, no airway manipulation, less incidence of nausea, vomiting or any other complication and cost effectiveness [12,15,16,17].

Conclusion

On the basis of this study, it can be concluded that spinal anaesthesia can be a better alternative technique to general anaesthesia for laparoscopic cholecystectomy, with minimum respiratory, cardiovascular and other complications, safe, cost effective, with better post-operative analgesia and with better outcome.

References

1. Duncan CB, Riall TS. Evidence-based current surgical practice: calculous gallbladder disease. *J. Gastrointest Surg.* 2012;16:2011-25 (PubMed).
2. Sanchez NC, Tenofsky PL, Dort JM et al. What is normal intra-abdominal pressure? *Am Surg.* 2001;67:243-48.
3. Pursnani KG, Bazza Y, Calleja M, Mughal MM. Laparoscopic cholecystectomy under epidural anaesthesia in patients with chronic respiratory disease. *Surg Endosc.* 1998;12:1082-4 (PubMed).
4. Gramatica L, Jr, Brascesco OE, Luna MA, Martinessi V, Panebianco G, Labaque F, et al. Laparoscopic cholecystectomy performed under regional anaesthesia in patients with obstructive pulmonary disease. *Surg Endosc.* 2002;16:472-5 (PubMed).
5. Ninh T. Nguyen, Bruce M. Wolfe. The physiologic effects of pneumoperitoneum in the morbidly obese. *Ann Surg.* 2005 Feb;241(2):219-26.
6. Hocking G et al. Intrathecal drug spread. *Br. J. Anaesth.* 2004;93(4):568-78.
7. Culp BL et al. Single incision laparoscopic cholecystectomy versus traditional four port cholecystectomy. *Proc (Bayl Univ Med Cent).* 2012 Oct;25(4):319-23.
8. Wu JS, Luttmann DR, Meininger TA, Soper NJ. Production and systemic absorption of toxic byproducts of tissue combustion during laparoscopic surgery. *Surg Endosc.* 1997;11:1075-79.
9. Kar M, Kar Jugal K, Debnath B. Experience of laparoscopic cholecystectomy under spinal anaesthesia with low-pressure pneumoperitoneum- Prospective study of 300 cases. *Saudi Journal of Gastroenterology.* 2011 May-June;17(3):203-07.
10. Sadhu S, Sarkar S, Roy MK. Laparoscopic cholecystectomy in patients with cardiac dysfunction. *Indian J. Surg.* 2011 Apr;73(2):90-95.
11. Sammut MS, Paes ML. Anaesthesia for laparoscopic cholecystectomy in a patient with Eisenmenger's syndrome. *Br. J. Anaesth.* 1997;79(6):810-12.
12. Imbelloni LE, Fornasari M, Fialho JC, Sant'Anna R, Cordeiro JA. General anaesthesia versus spinal anaesthesia for laparoscopic cholecystectomy. *Rev Bras Anesthesiol.* 2010;60:217-27.
13. Bajwa SJS. Anaesthesia for laparoscopic surgery: General vs regional. *Journal of minimal access surgery* 2016 Jan-Mar;12(1):4-9.
14. Jabbari A, Ebrahim A, Rupani AR. Post spinal puncture headache, an old problem and new concepts: review of articles about predisposing factors. *Caspian J. Intern Med.* 2013 Winter;4(1):595-602.
15. Collins LM, Vaghadia H. Regional anaesthesia for laparoscopy. *Anesthesiol Clin North America.* 2001;19:43-55 (PubMed).

16. Turkstani A, Ibraheim O, Khairy G, Alseif A, Khalil N. Spinal versus general anaesthesia for laparoscopic cholecystectomy: A cost effectiveness and side effect study. APICARE. 2009;13:9-14.
17. Yuksek YN, Akat AZ, Gozalan U, Daglar G, Pala Y, Canturk M et al. Laparoscopic cholecystectomy under spinal anaesthesia. Am. J. Surg. 2008;195:533-6 (PubMed).
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