A COMPARATIVE STUDY OF EPIDURAL VS. GENERAL ANAESTHESIA FOR LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

BACKGROUND
Laparoscopic cholecystectomy has many benefits for patients including reduced postoperative pain, postoperative stay, and fewer wound-related complications. Specifically, obese patients and patients with severe respiratory diseases are benefited with laparoscopic procedures. The procedure is normally performed under general anaesthesia. But off late, this procedure was tried under regional successfully especially under epidural anaesthesia. Various reports in the literature suggest the safety of the use of spinal, epidural, and combined spinal-epidural anaesthesia in laparoscopic procedures. The advantages of regional anaesthesia include: Prevention of airway manipulation, an awake and spontaneously breathing patient intraoperatively, minimal nausea and vomiting, effective postoperative analgesia, and early ambulation and recovery. However, regional anaesthesia maybe associated with a few side effects such as the requirement of a higher sensory level, more severe hypotension, shoulder discomfort due to diaphragmatic irritation, and respiratory embarrassment caused by pneumoperitoneum. Further studies maybe required to establish the advantage of regional anaesthesia over general anaesthesia for its eventual global use in different patient populations.

METHODS
40 patients with the ASA (American Society of Anaesthesiologists) class I and II were enrolled after taking prior written consent for laparoscopic cholecystectomy at King George Hospital, Visakhapatnam. These 40 patients were divided into two groups of equal size and randomised using random numbers. One group was given general anaesthesia and in the other group procedures were performed under epidural anaesthesia. Two patients in the epidural group required general anaesthesia.

RESULTS
40 patients were divided and studied of which the results proved that general anaesthesia was better over epidural anaesthesia except for the disadvantages namely cost factor, PONV, and high risk of general anaesthesia. In case of symptomatic gallstone disease and compromised cardiopulmonary status, regional anaesthesia appears to be a better choice.

CONCLUSIONS
General anaesthesia is the preferred choice for laparoscopic cholecystectomy except under few special circumstances. Our study provided evidence that epidural anaesthesia was beneficial for patients who are high risk for general anaesthesia. Epidural anaesthesia is fast emerging as anaesthesia of choice for laparoscopic cholecystectomy. Patients who received segmental thoracic epidural anaesthesia had shorter discharge time and better patient satisfaction akin to continued postoperative analgesia. Surgeon satisfaction was higher with general anaesthesia group. In conclusion, epidural anaesthesia can be used successfully and effectively for laparoscopic cholecystectomy in healthy patients and in patients who are high risk for general anaesthesia by experienced anaesthetists.

KEYWORDS
Anaesthesia, Regional D000765, Cholecystectomy E04.210.120.172, Laparoscopic E04.210.120.172.140.

INTRODUCTION: Laparoscopic cholecystectomy was first introduced by Philippe Mouret in 1987 and is now generally performed by many surgeons. Unlike previous open surgery, this procedure requires only very little incisions and has benefits such as less pain and shorter hospital stay due to less tissue damage and swift return to everyday life due to fast recovery.[1]

However, considerable difficulties in anaesthetic management could be encountered since wide haemodynamic fluctuation may develop due to pneumoperitoneum and position changes. Pneumoperitoneum induces systemic effects due to the absorption of CO2 and in venous return due to the increase in intra-abdominal pressure. Initially, absorption of CO2 increases its elimination in the expired air in the arterial and venous blood. This carboxemia induces metabolic and respiratory acidosis decreasing arterial and mixed venous PH and arterial PO2. Absorption of CO2 affects negatively the respiratory function, which is not observed with inert gases such as helium and Argon.
Minute ventilation, peak inspiratory pressure, pulmonary vascular resistance, alveolar concentration of CO2, calculated physiological short circuit, central venous pressure, diastolic and systolic blood pressure, systemic vascular resistance, and cardiac index are all increased. In recent years, advanced laparoscopic surgery has targeted older and high risk patients for general anaesthesia. In these patients, regional anaesthesia offers several advantages with improved patient satisfaction. Thus, the aim of this study is to compare discharge time, patient, and surgeon satisfaction between two groups of healthy patients submitted to laparoscopic cholecystectomy under general and epidural anaesthesia.

**MATERIALS AND METHODS:** 40 patients with American Society of Anaesthesiologists Class I and II were enrolled in the study. All patients underwent laparoscopic cholecystectomy at King George Hospital, Visakhapatnam. They were divided into two equal groups (n=20) and randomised. Eventually, two patients in regional anaesthesia group were converted to general anaesthesia making general anaesthesia group larger (n=22). The advantages of regional epidural vs. general anaesthesia techniques were studied for laparoscopic cholecystectomy.

**Anaesthesia Technique Employed for Epidural Anaesthesia:** After written consent, patient was shifted to operation theatre. An intravenous (IV) line was secured and the patient was placed in the sitting position. Under all aseptic and antiseptic precautions, the epidural space was identified using 17-gauge Tuohy needle and loss of resistance technique used in the T9-T10 interspaces or one or two spaces above or below this interspace when it was not possible in this space. An epidural catheter was inserted about 3 cms cephalad beyond the needle tip. The patient was then placed in the supine position and 3 mL of 2% Lidocaine with adrenaline (1:2,00,000) was given as a test dose followed by 10 mL of 0.5% bupivacaine, which was given via the epidural catheter. Thereafter, incremental doses of 3 mL of 0.5% bupivacaine were given till the desired level of block was reached. The upper and lower levels of sensory and motor block were assessed by a pinprick test and the Bromage scale respectively and recorded every 5 minutes until the start of surgery and every 15 minutes intraoperatively. Intraoperative anxiety was treated with midazolam 1-2 mg/kg, abdominal or referred shoulder pain with incremental fentanyl 1-2 ug/kg, hypotension with ephedrine 5-10 ug or as intravenous (IV) bolus as required. The discomfort of the patient during and after the procedure was noted (Pain, Nausea, Itching). Nasogastric tube was inserted in all the patients. Oxygen at the rate of 6 litre/minute was supplied via a facemask to all the patients while monitoring the end-tidal carbon dioxide.

**General Anaesthesia Technique:** The patients were on 12 hrs. fasting before the surgery and the procedure started with informed consent and by securing best vein at forearm and started with 5% dextrose IV solution. The premedication given with atropine 0.2 ug/kg, pentazocine 2 ug/kg body wt. Preoxygenation with bag mask ventilation minimised to avoid gastric distension and nasogastric tube to be placed to deflate the stomach not only to improve the surgical view, but also to avoid gastric injury on trocar insertion. After attaining the required intubating conditions with suxamethonium (2 mg/kg body wt.) a cuffed oral endotracheal tube placed (CETT) and surgical anaesthesia maintained with neuromuscular (NMJ) blocking drugs like vecuronium, later on maintained along with N2O: O2 in 5:3 combination with addition of sevoflurane if at all required to increase the depth of anaesthesia. Reversal was done with neostigmine after attaining the adequate reversal conditions. Monitoring of the patient was done with ETCO2, NIBP, Temperature, and IBP in case of cardiac patients.

**Surgical Technique:** Surgery was performed with the conventional four port technique. Portals were placed one 10 mm above the umbilicus, one 10 mm below the xiphoid, one 5 mm below the right coastal margin along the anterior axillary line, and one depending upon surgeons’ choice. Pneumoperitoneum was established with carbon dioxide at an intra-abdominal pressure (IAP) of 10-15 mmHg whereas in case of epidural anaesthesia, it was maintained at the lower threshold to avoid shoulder pain from diaphragmatic irritation. Operation table tilt to left side and reverse Trendelenburg position of head up was maintained for better access of surgical field. The evaluation criteria were listed in tables (1, 2, 3, 4).

**Inclusion Criteria:**
- a) ASA-Class I and II Aged Between 25 To 35.
- b) Obese Patients.

**Exclusion Criteria:**
- a) Above ASA Grade-III.
- b) Severe Ischaemic Heart Disease.
- c) Valvular Heart Disease.
- d) Significant Renal Dysfunction.
- e) Severe Uncorrected Hypovolemia.
- f) Raised ICP.
- g) Patients with Kyphosis/Scoliosis.
- h) With Gallbladder Malignancy.

**RESULTS:** Nausea and vomiting was found in two patients receiving epidural anaesthesia and 3 patients of general anaesthesia. One patient experienced sore throat postoperatively and was treated accordingly. Two patients from epidural anaesthesia developed urinary retention and required catheterization. With epidural anaesthesia the average operation time was 38.64 minutes (Range 30-47.28 minutes) with general anaesthesia. Total anaesthesia time for epidural anaesthesia was 68.2 minutes (Range 58-89 minutes), and for general anaesthesia, it was 58.4 minutes (Range 48-68.8 minutes). All patients were ambulatory after 6 hours after operation under epidural anaesthesia and general anaesthesia as well.
Mean hospital stay for the patients was one and a half day (Range 1-3 days). Postoperatively, all patients responded positively about the comfort of the operation and average patient satisfaction score assessed after 3 hours after the operation was 8.2 (Range 7-9) for epidural anaesthesia. With general anaesthesia, average patient satisfaction score was 8.9 (Range of 7-9). The average pain score (VAS) was tabulated accordingly. Surgeons did not find much difference between epidural or general anaesthesia regarding relaxation of musculature or surgical technique except for adjustment of CO2 flow to 10 millimetres of mercury and tilting of operation table to left in case of epidural anaesthesia. The cardiovascular effects and complications observed were listed in tables (5 and 6).

**Table 1: Questionnaire Form for Patient.**

1) How comfortable were you during the operation?
   a) Comfortable.
   b) Not so comfortable.
   c) Uncomfortable.

2) Any pain in the shoulders?
   a) Yes.
   b) No.

3) Are you happy with the procedure?
   a) Yes.
   b) No.

4) Would you advise same procedure to your known person?
   a) Yes.
   b) No.

**Table 2: Questionnaire Form for Surgeons.**

1) How was the abdominal relaxation?
   a) Adequate.
   b) Moderate.
   c) Poor.

2) Was there any technical difficulty in relation to patient Position?
   a) A lot.
   b) Minimal.
   c) None.

3) Was there any difference with epidural Anaesthesia?
   a) Yes.
   b) No.

**Table 3: Bromage Scale:**

0) Able to Lift extended leg.
1) Able to flex knees, full ankle movement.
2) No knee moment, some ankle moment.
3) Complete Paralysis.

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<th>Pulse Rate</th>
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**Table 4**

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<td><strong>AFTER 40 MINUTES</strong></td>
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<td>Blood Pressure</td>
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Ciofolo et al and Zharg et al in their retrospective analysis of 100 patients undergoing LC under epidural anaesthesia compared with similar number of patients undergoing LC under general anaesthesia concluded that LC is feasible under epidural anaesthesia and is a safe procedure in selected patients. Jensen et al, evaluated the incidence of urinary retention after local, regional, and general anaesthesia, but we encountered none in our study.11,12 Our patients regarded epidural anaesthesia as a comfortable procedure with lesser cost than those undergoing the same procedure under general anaesthesia.

Sinha et al in their study (n=20) of laparoscopic single site (Less) surgery for cholecystectomy under epidural anaesthesia with a single incision around umbilicus concluded that epidural anaesthesia appears to be a preferred alternative to general anaesthesia for patients undergoing less cholecystectomy with no operative or anaesthetic conversions and less postoperative pain at discharge. Postoperative pain was very much less in epidural anaesthesia compared to general anaesthesia because of the:

- Avoidance of endotracheal intubation-related discomfort.
- A minimal stress response associated with a minimal invasive anaesthetic procedure.
- The presence of adequate level of analgesics in the first few hours after the procedure when the pain was maximum.

However, the epidural anaesthesia has the drawbacks of intraoperative hypotension, shoulder pain, sometimes inadequate muscle relaxation, sparing of segments, etc.

All of the patients and surgeons were satisfied with LC under spinal anaesthesia in Yuksek et al study.12

**CONCLUSION:** General anaesthesia is the preferred choice for laparoscopic cholecystectomy except under few special circumstances. Our study provided evidence that epidural anaesthesia was beneficial for patients who are high risk for general anaesthesia. Epidural anaesthesia is fast emerging as anaesthesia of choice for laparoscopic cholecystectomy. Patients who received segmental thoracic epidural anaesthesia had shorter discharge time and better patient satisfaction akin to continued postoperative analgesia. Surgeon satisfaction was higher with general anaesthesia group. In conclusion, epidural anaesthesia can be used successfully and effectively for laparoscopic cholecystectomy in healthy patients and in patients who are high risk for general anaesthesia by experienced anaesthetists.

**REFERENCES**


