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Research Article

Anesthesia

Laparoscopic appendicectomy under spinal anesthesia, a cost effective and efficient approach

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Introduction: Appendicitis is common surgical emergency in developing countries. One out of every 2000 people has an appendicectomy sometime during their lifetime. It can be done by open method or by laparoscopic method. Open method leads to long hospital stay and more chances of infection. On the other hand laparoscopy has advantage of shorter hospital stay, less pain and better cosmetic results. **Objective:** Laparoscopic appendicectomy can be done under general anaesthesia or spinal anaesthesia. General anaesthesia is costly and has its own complication. Use of spinal anesthesia is increasing day by day for laparoscopic procedure because of cost effectiveness and less complication rate, appendicectomy is common procedure which is perform laparoscopically in our set up. Objective of this study was to evaluate feasibility of laparoscopic appendicectomy under spinal anaesthesia. **Method:** This prospective observational study was conducted in Bundelkhand Medical College Hospital from August 2015 to March 2017. We have chosen 50 patients of laparoscopic appendicectomy (LA) for our study. All patients were explained about appendicectomy and spinal anaesthesia in detail. We prefer spinal anaesthesia (SA) over general anaesthesia (GA) despite of common practice of general anaesthesia for all laparoscopy. All were given injection midazolam, pentazocin and ketamine(MPK) after spinal anaesthesia but before pneumoperitonium. **Result:** None of them were required to convert to general anaethsesia with endotracheal intubation or open surgery. All tolerated the procedure well. **Conclusion:** So it can be concluded that it is cost effective and efficient approach

Keywords: Laparoscopic appendicectomy, Spinal anaesthesia

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Introduction

In laparoscopic appendicectomy (LA) surgeon access appendix via small ports made on anterior abdominal wall [1] until recently it used to be done in general anaesthesia with endotracheal intubation which has got it own complication like hemodynamic instability, need of analgesia, post operative nausea vomiting, complication of intubation and extubation and post operative sore throat [2,3].

By applying regional anesthetic technique we can avoid above mentioned complications but spinal anesthesia has its own complication like shoulder pain secondary to pneumoperitonium, patient anxiety and discomfort and inadequate sedation.

To asses and evaluate overall efficacy and complication rate, we have designed a study of laparoscopic appendicectomy undergoing spinal anaesthesia.

Material & Methods

This prospective observational study was conducted in Bundelkhand Medical College Hospital from August 2015 to March 2017. Written informed consent was obtained from 50 patients with an American Society of Anesthesiologists physical status score of I and II undergoing LA before the study began.

The exclusion criteria were as follows: (1) infection at the spinal anesthesia injection site, (2) coagulopathy or other bleeding diathesis, (3) spinal deformity or severe back pain, (4) history of bradyarrhythmia, (5) obesity (body mass index > 30 kg/m2), (6) patients < 20 or > 65 years old, (7) history of allergy or hypersensitivity to local anesthetics, and (8) perforated appendicitis(10)other major systemic illness like uncontrolled diabetes or uncontrolled hypertension.

All patients were informed about the possibility of conversion to general anesthesia preoperatively.

On the patient's arrival in the operating room, routine monitoring, including noninvasive automated blood pressure, pulse oximetry, and electrocardiography, was begun without premedication. Oxygen was administered at 6 L/min via a face mask, and end-tidal carbon dioxide monitoring was applied. Before induction of spinal anesthesia, 500 ml of crystalloid fluid were administered via a peripheral vein with an 18-gauge intravenous catheter.

Spinal anesthesia was induced in the right lateral decubitus position using a 25-gauge Quincke spinal needle positioned at the midline between L4-5. Upon confirmation of the intrathecal position of the needle by leakage and slight aspiration of cerebrospinal fluid, the intrathecal anesthetics (hyperbaric bupivacaine 0.5% with) were introduced.

The amount of hyperbaric bupivacaine 0.5% was determined empirically by the anesthesiologist according to the height, weight, and age of the patient and in consideration of our target sensory level of anesthesia (T4). After administration of the intrathecal anesthetics, the patient's position was immediately changed to supine.

The sensory block level was assessed by the pinprick test using a 24-gauge hypodermic needle, while the motor block level was assessed by the modified Bromage scale (0 = no paralysis; 1 = unable to raise extended leg; 2 = unable to flex knee; 3 = unable to flex ankle) and recorded 10 min after placement in the supine position.

Simultaneously with the spinal block procedure patient were given 1mg of midazolam ,30 mg of pentazocin and 25 mg of ketamin intravenously. Hypotension was defined as either > 30% decrease in systolic blood pressure compared with preanesthetic pressure or systolic blood pressure < 90 mmHg and was treated with 50-100 ml of intravenous crystalloid fluid replacement and a 7.5 mg mephentermine bolus.

Bradycardia was defined as a heart rate of less than 50 bpm and was treated with 0.5 mg of intravenous atropine. All patients' complaints and side effects were recorded (e.g., referred shoulder pain, abdominal discomfort, hypotension, nausea, headache, etc.)

Result

Out of 50, 36 were male, remaining were female. Mean age was 36 years. A sensory level of T3, T4, T5, and T6 was obtained in 2, 24, 11, and 13 patients, respectively. A modified Bromage scale score of 3, 2, and 1 was obtained in 32, 16, and 2 patients respectively. The mean volume of intrathecal hyperbaric bupivacaine 0.5% administered was 14.1 ± 1.4 mg (range, 11-16 mg).

The mean operative duration was 42.6 ± 11.0 min (range, 25.0-70.0 min).

The mean anesthesia duration was 64.6 ± 11.0 min (range, 50.0-85.0 min). During the operation, the intra-abdominal CO_2 gas pressure was maintained at 12, 10, 9, and 8 mmHg in 4, 36, 4, and 6 patients, respectively.

Table 1: complication observed in study

Type of complication	No of patients
Referred shoulder pain	8(16%)
Abdominal discomfort	6(12%)
Hypotension	3(6%)
Bradycardia	7(14%)
Nausea/vomiting	1(2%)
Anxiety	0
Respiratory depression	0

Hypotension occurred in three patients, two of whom received 7.5 mg of ephedrine; one received 6 mg. Bradycardia occurred in seven patients, and all were corrected by 0.5 mg of atropine. One patient complained of nausea before intra-abdominal carbon dioxide pneumoperitoneum, but this subsided with 8 mg of ondansetron and fluid administration.

No patient required conversion to general anesthesia and all operations were completed laparoscopically without conversion to open surgery.

Discussion

In present study, 50 patients underwent LA under spinal anesthesia. Eight and six patients experienced referred shoulder pain and abdominal discomfort, respectively. Bradycardia was observed in seven patients. There were no conversions to general anesthesia or open surgery.

Proper management of pain, discomfort, and anxiety during intra-abdominal carbon dioxide pneumoperitoneum is a major concern during the use of regional anesthesia for laparoscopic surgery. In particular, preventing and managing carbon dioxide pneumoperitoneum-induced shoulder pain is important during laparoscopic surgery under regional anesthesia.

Postoperative shoulder tip pain resulting from diaphragm irritation after general anesthesia can be easily reduced by removing intra-abdominal residual carbon dioxide gas, which can be accomplished by applying active aspiration via the trochars [4] or the lung recruitment maneuver at the end of surgery [5]. However, intraoperative shoulder tip pain during regional anesthesia is a leading cause of conversion to general anesthesia.

In comparison to previous studies [6,7], LA under spinal anesthesia differed markedly from laparoscopic hernia repair under regional anesthesia. During laparoscopic hernia repair, carbon dioxide gas is introduced into the extra peritoneal space, not the intra-abdominal cavity. In addition, the head-down tilt position is not required for surgery.

Both intra-abdominal carbon dioxide gas insufflations and the head-down tilt position can cause and aggravate abdominal discomfort and referred shoulder tip pain [8]. Therefore, we used midazolam 1mg plus pentzocin 30 mg plus ketamine 25 mg combination to alleviate anxiety, reduce discomfort and treat pain. which showed excellent result

In the present study, we used supplemental intravenous ketamine (25mg) not only for its sedative effect but also its analgesic effect. Although midazolam or pentazocin alone can be used for sedation during regional anesthesia, but may not be sufficient to treat discomfort and pain.

Ketamine usually increases blood pressure, heart rate, and cardiac output [9]. Furthermore, the incidence of ketamine-related adverse effects, including emergence reactions, hallucinations, and nausea and vomiting decreased significantly with midazolam-ketamine-pentazocin.

The low incidence of hypotension and high incidence of bradycardia in the present study may have been due mainly to the effects of pneumoperitoneum. At intra-abdominal pressures of < 15 mmHg, venous return, cardiac filling pressure, and cardiac output are increased as blood is squeezed from the splanchnic venous bed and by sympathetically mediated peripheral vasoconstriction [10].

In addition, insertion of the Veress needle or trocar and pneumoperitoneum-induced peritoneal stretching can cause vagal stimulation, which can lead to significant bradycardia [11].

In this study, only one patient complained of nausea during anesthesia and none of the patients reported PONV. This result supports the findings of Sinclair et al [12], who found that patients receiving regional anesthesia had an 11-fold decreased risk for PONV compared with those receiving general anesthesia.

There were several limitations to this study. First, this preliminary study was initially designed to assess the feasibility and safety of performing LA under spinal anesthesia with intravenous supple

Mental sedatives; therefore, it did not include a placebo or comparison group. Further studies with a placebo or comparison group are needed to compare the efficacy of or reduce the problems related to spinal anesthesia with MPK combination; second, we excluded obese patients (body mass index > 30 kg/m2).

Regional anesthesia may be more suitable than general anesthesia in these patients because obese patients often have co morbidities such as ischemic heart disease, hypoventilation syndrome, and metabolic disorder. However, obese patients have a high incidence of gastroesophageal reflux disease, which can be aggravated by increased intra-abdominal pressure. Obese patients were therefore excluded from our study because of concern regarding the potential for aspiration of gastric contents.

Tzovaras et al [13] concluded that low pressure CO2 pneumoperitonium can be successfully used with spinal anaesthesia for laparoscopic cholecystectomy and that is in accordance with present study

Pursnani et al [14] performed series of 6 COPD patient under epidural anaesthesia for laparoscopic cholecystectomy, like this study only 2 out of 6 required intraoperative supplementation. On the other hand, in the series of Hamad et al [15], 10 Laparoscopic Cholecystectomy were done with patients under SA, and one patient had to be given GA because of intolerable shoulder pain Jun et al [16] concluded that laparoscopy under SA with dexmedetomedine infusion can be done satisfactorily. their only 17% patient required supplemental fentanyl or ketamine. Sinha et al performed large series of 4645 patients and found spinal anaesthesia satisfactory for all type of laparoscopic surgery

This study has shown that spinal anesthesia with injection midazolam-pentazocin-ketamine (MPKcombination) may be applicable to LA and help to avoid intubation-related complications. However, supplemental analgesic and sedative management during pneumoperitoneum and careful attention to the potential development of bradycardia are needed for successful anesthesia.

The conclusion of present study is, spinal anaesthesia for laproscopic appendicectomy is cost effective and efficient approach

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