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COMPARISON OF FEASIBILITY AND SAFETY OF LAPAROSCOPIC APPENDICECTOMY UNDER SPINAL ANAESTHESIA VS GENERAL ANAESTHESIA

General Surgery

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ABSTRACT

Background: Laparoscopic appendectomy (LA) has been generally performed under general anesthesia. It is rarely performed under regional anesthesia and studies regarding use of regional anaesthesia for laparoscopic abdominal surgeries are very limited. Therefore, present study was designed to compare the feasibility and safety of laparoscopic appendicectomy under spinal anaesthesia VS general anaesthesia. **Method:** A total 50 patients of either sex, aged between 18–65 years, who underwent laparoscopic appendicectomy, were randomly allocated into two groups: the spinal anaesthesia (Group I; n=25) and general anaesthesia (Group II; n=25) group. Perioperative and postoperative adverse events, postoperative pain level (VAS scores), and patient satisfaction were compared between the groups. **Results:** Both the groups were comparable and found no significant difference with respect to patient characteristics (p>0.05), intra and post operative adverse events, (p>0.05), except total procedure time (p=0.023). There were significantly lower postoperative VAS scores in the group I immediately after the operation and at 12 and 24 h after the surgery (p<0.001). However, the VAS score at 6 h was not significantly different (p=0.591). None of the patients needed conversion to an open procedure or conversion from spinal to general anaesthesia. **Conclusion:** Spinal anesthesia is effective and safe in patients undergoing laparoscopic appendicectomy. It is cost effective and efficient approach. Less postoperative pain, less postoperative nausea, vomiting, and shoulder pain are the advantages of spinal anaesthesia compared to general anaesthesia.

KEYWORDS

Appendicectomy; Laparoscopy; Spinal anaesthesia; General anaesthesia; VAS scores

INTRODUCTION

Appendicectomy is commonly performed by laparoscopic method now-a-days because of its promising benefits over open method. In laparoscopic appendicectomy (LA) surgeon access appendix via small ports made on anterior abdominal wall [1]. It became a popular surgical procedure recently, now accounting for 38.1% of all appendectomies [2, 3]. Fewer wound infections and hospitalization days, less postoperative pain, faster recovery, and better cosmetic results are the accepted advantages of LA compared to open conventional appendectomy [4, 5].

Until recently it used to be done in general anaesthesia with endotracheal intubation which has got its own complication like hemodynamic instability, need of analgesia, post operative nausea vomiting, complication of intubation and extubation and post operative sore throat [6]. 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 [7]. However, the studies regarding use of regional anaesthesia for laparoscopic abdominal surgeries are very limited. Hence the present study was designed to compare the feasibility and safety of laparoscopic appendicectomy under spinal anaesthesia VS general anaesthesia.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Surgery, at Tertiary Care Centre from August 2021 to August 2022. During this study period, a total 50 patients of either sex, aged between 18–65 years, ASA physical status I and II, with acute appendicitis and who underwent laparoscopic appendicectomy were included in the study. Diagnosis of acute appendicitis was confirmed using clinical examination and investigations like ultrasound abdomen, total counts, and differential counts. The patients with previous history of abdominal surgeries, in whom general anesthesia was contraindicated and patients with appendicular mass were excluded from the study.

Institutional Ethical Committee approval and written informed consent was obtained from 50 patients undergoing laparoscopic appendicectomy before the study began. The patients were randomly selected based on computer generated numbers and divided into 2 groups. Group I (25 patients): Patients undergoing laparoscopic appendectomy under spinal anesthesia. Group II (25 patients): Patients undergoing laparoscopic appendectomy under general anesthesia.

Perioperative and postoperative adverse events, postoperative pain level, and patient satisfaction were compared between the groups. Surgical field pain level was evaluated with the Visual Analogue Scale (VAS; 0 = no pain, 10 = severe pain). VAS levels were first recorded in the postoperative recovery room with the cooperation of patients (VAS0) and at 6 (VAS6), 12 (VAS12) and 24 (VAS24) h after the operation. Undesirable postoperative events such as headache, nausea/vomiting, right shoulder pain, anxiety, abdominal discomfort, and urinary retention were recorded from both groups. All patients were asked to evaluate their satisfaction with the procedure as good, normal, or bad.

STATISTICAL ANALYSIS

Statistical analysis was performed using Statistical Package for Social Sciences, version 17.0. Quantitative variables were evaluated as mean ± standard deviation (SD) and compared in both groups using One-Way ANOVA. Categorical variables were evaluated as patient numbers and percentages and compared in both groups using chi-square test. A p-value of <0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

Fifty patients with acute appendicitis who underwent laparoscopic appendicectomy were included this prospective study. They were randomly allocated to two groups: the spinal anaesthesia (Group I; n=25) and general anaesthesia (Group II; n=25) group. There was no significant difference between the two groups with respect to patient characteristics (p>0.05), except total procedure time (p=0.023) (Table 1).

Table 1: Comparison of patient characteristics

Patient characteristics		Group I	Group II	P value
Demographic data	Mean age in years	29.8±7.5	28.4±6.9	0.495
	Gender (Male/female)	20/05	22/03	0.440
	Mean BMI (kg/m2)	23.9 ±3.2	23.6 ±3.4	0.749
	ASA (I: II)	23:02	24:01	0.551
Surgery time (min)	25.8±4.7		24.7±6.6	0.501
Total procedure time (min)	49.8±4.2		46.5±5.6	0.023*
Hospital stays (days)	2.34±3.5		2.47±4.4	0.908

Diagnosis	Acute appendicitis	22 (88.0%)	23 (92.0%)	0.637
	Perforated appendicitis	03 (12.0%)	02 (8.0%)	
Surgical complications	Abdominal abscess	00 (0.0%)	01 (4.0%)	-
	Trocar site skin infection	02 (8.0%)	02 (8.0%)	1.000
Patient satisfaction	Good	18 (72.0%)	16 (64.0%)	0.566
	Moderate	04 (16.0%)	07 (28.0%)	
	Poor	03 (12.0%)	02 (8.0%)	

Both the groups were comparable and found no significant difference with respect to intraoperative adverse events, (p>0.05) as shown in table 2.

Table 2: Comparison of intraoperative adverse events

Intraoperative adverse events	Group I	Group II	P value
Shoulder pain	05	00	-
Abdominal discomfort	04	00	-
Anxiety	04	01	0.157
Hypotension	02	01	0.551
Nausea/vomiting	01	00	-
Bradycardia	00	00	-
Respiratory discomfort/depression	00	00	-

All surgical and anesthetic adverse events were observed and recorded in postoperative 24 h, although there was no significant difference between two groups as shown in Table 3.

Table 2: Comparison of intraoperative adve

Intraoperative adverse events	Group I	Group II	P value
Shoulder pain	05	00	-
Abdominal discomfort	04	00	-
Anxiety	04	01	0.157
Hypotension	02	01	0.551
Nausea/vomiting	01	00	-
Bradycardia	00	00	-
Respiratory discomfort/depression	00	00	-

All surgical and anesthetic adverse events were observed and recorded in postoperative 24 h, although there was no significant difference between two groups as shown in Table 3.

Table 3: Comparison of postoperative adverse events

Post-operative adverse events	Group I	Group II	P value
Shoulder pain	02 (8.0%)	07 (28.0%)	0.065
Headache	05 (20.0%)	01 (4.0%)	0.081
Urinary retention	02 (8.0%)	00 (0.0%)	-
Postoperative nausea/vomiting	00 (0.0%)	03 (12.0%)	-

Postoperative pain evaluation for the two groups is summarized in Table 4. There were significantly lower postoperative VAS scores in the group I immediately after the operation and at 12 and 24 h after the surgery (p<0.001). However, the VAS score at 6 h was not significantly different (p = 0.591).

Table 4: Postoperative pain evaluation

Measurement time	Group I	Group II	P value
VAS at 0 min	0.27 ±0.43	8.17 ±0.45	0.000*
VAS at 6 hrs	4.31 ±0.50	4.24 ±0.41	0.591
VAS at 12 hrs	1.82 ±0.42	2.27 ±0.47	0.001*
VAS at 24 hrs	0.23 ±0.39	1.19 ±0.40	0.000*

DISCUSSION

In the present study, all surgical operations were completed successfully with the laparoscopic appendicectomy. In the spinal anesthesia group, all anesthesia procedures were completed successfully and none of the patients needed to convert to general anaesthesia. The diagnosis was acute appendicitis for 45 patients and perforated appendicitis for 5 patients. Patients were discharged at postoperative days 1–3 and controlled daily for 1 week. In the group II, 1 patient with perforated appendicitis developed an intra-abdominal abscess at postoperative day 12. This patient was managed with antibiotic treatment. Also, 2 patients in both groups developed skin infections at the trocar entrance site. These infections were managed with antibiotic treatment over 2–4 days. There was no significant difference in the duration of the surgical operations between the groups (p = 0.501), but total procedure time was significantly longer in the spinal anesthesia group (p=0.023). As for patients' satisfaction with their operations, there was no significant difference between the two groups (p = 0.566). These findings are comparable with the study done by Erdem VM et al [8].

Abdominal discomfort observed in 4 patients, shoulder pain was observed in 5 patients and 5 patients suffered from anxiety. Three of these 5 anxious patients also developed abdominal discomfort/pain and 1 of them developed shoulder pain that required both midazolam and fentanyl treatment. Right shoulder pain incidence for LA under spinal anesthesia was reported between 25% and 30.8%, and this result is similar to other laparoscopic operations [9-11]. Shoulder pain is a referred pain related to phrenic nerve irritation due to carbon dioxide pneumoperitoneum [12]. This pain may be light and insignificant in some cases or may be so serious that it needs to be treated with opioids in some cases [13, 14]. Intra-abdominal pressure increase secondary to pneumoperitoneum may result in abdominal discomfort/ pain, and this may reduce the tolerance of laparoscopic surgery under regional anesthesia. Another intraoperative adverse event in the group I was hypotension. Hypotension is one of the serious complications of regional anesthesia and is related to peripheral vasodilatation and a decrease in venous return due to the sympathetic block [15, 16]. In present study hypotension was observed in 3 patients, who easily recovered within 5 min following a 250 ml saline infusion and there was no need for vasopressor treatment. Bradycardia did not occur in any patients. Nausea was observed in 1 patient, who recovered with 8 mg IV ondansetron.

Shoulder pain was the most common undesirable postoperative event. Postoperative shoulder pain is related to residual carbon dioxide under the diaphragm similar to the intraoperative cause [17]. In current study, post-laparoscopic shoulder pain was significantly greater in the general anesthesia group (28%) than the spinal anesthesia group (8%) which is comparable with the study done by Erdem VM et al [8] and Mane et al [10]. Shoulder pain incidence was lower in the spinal anesthesia patients, which may be related to better elimination of residual carbon dioxide in these patients. Patients in the spinal anesthesia group also experienced more urinary retention and in the general anesthesia group experienced more PONV, but these differences were not statistically significant.

In the present study the spinal anesthesia technique proved superior to general anesthesia in cases of postoperative pain control. We think that this result is related to the continuous effect of local anesthetics and analgesics applied to subarachnoid space and epidural space after surgery. Until now general anesthesia was preferred due to aspiration risk, abdominal discomfort, and hypercapnia secondary to carbon dioxide pneumoperitoneum [13, 14]. However, now there are many reported studies that support the safety of spinal/regional anesthesia for laparoscopic operations [18, 19].

CONCLUSION

Spinal anesthesia is effective and safe in patients undergoing laparoscopic appendicectomy. It is cost effective and efficient approach. Less postoperative pain, less postoperative nausea, vomiting, and shoulder pain are the advantages of spinal anaesthesia compared to general anaesthesia. Patient satisfaction is also improved through a significant decrease in the lack of vomiting and possible lower pain scores. Therefore, it has been recommended that an increase in the usage of spinal anaesthesia for laparoscopic appendicectomy particularly in patients with risks for general anaesthesia.

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