

# Feasibility of laparoscopic appendectomy under spinal anaesthesia

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## Abstract

**Background:** Laparoscopic appendectomy is one of the most commonly performed surgeries. Laparoscopic appendectomies done under general anaesthesia are routinely associated with their own anaesthetic complications. The advent of regional anaesthesia for laparoscopic procedures to reduce complications warranted us to study the feasibility of spinal anaesthesia in laparoscopic appendectomy in comparison with general anaesthesia.

**Materials and methods:** This is a retrospective study which included 87 patients with a diagnosis of appendicitis, who underwent laparoscopic appendectomies under spinal and general anaesthesia.

**Results:** Patients in the spinal anaesthesia group had superior post-operative analgesia; however they had a longer duration of stay in the hospital as compared to the patients in the general anaesthesia group. The incidence of intra operative tachycardia and hypotension was lower in the spinal anaesthesia group. The patients in the general anaesthesia group had higher incidence of post-operative wound infection and fever.

**Conclusion:** The observations from the study proved that laparoscopic appendectomy is feasible under spinal anaesthesia and provides superior analgesia. The profiles of complications that may arise due to the same are not severe and can be managed easily. However, further studies with a larger sample may be warranted in order to prove the results conclusively.

**Key words:** appendectomy; anaesthesia; laparoscopy

## Introduction

Laparoscopic appendectomy was first performed by Kurt Semm in 1981 which has now become the gold standard in the management of acute and chronic appendicitis<sup>1</sup>. The use of laparoscopy in general surgery has proven to be useful in view of reduced post-operative pain, shorter stay in the hospital, early return to routine activity, less intra operative blood loss, less metabolic derangement and reduced overall expenditure<sup>2</sup>.

In recent years administering anaesthesia to older and patients with poor general condition, rendering anaesthesia during the laparoscopic procedures has become challenging, as it can cause cardiovascular and respiratory compromise. The various effects of induction of capneoperitoneum which is an integral part of laparoscopy can result in respiratory

embarrassment and cardio vascular changes, which are best managed by general anaesthesia<sup>3</sup>. However as it was introduced as a safe and simple procedure that may be performed on an outpatient basis, extreme caution is necessary in choosing the anaesthetic technique<sup>4</sup>. Since the initiation of laparoscopy in day care surgery, a more favourable anaesthetic technique is required, allowing early ambulation and recovery. Recent reviews document that regional anaesthesia is equally favourable in laparoscopic surgeries<sup>5</sup>. However the use of regional anaesthesia in laparoscopy hasn't gained popularity for a variety of reasons such as risk of aspiration and respiratory embarrassment in an awake patient. However it offers many advantages over general anaesthesia such as quicker recovery, effective post-operative pain relief, no airway manipulation, shorter hospital stay, reduced

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post-operative nausea and vomiting<sup>6,7</sup>.

One of the favoured techniques of regional anaesthesia is spinal anaesthesia. It is more feasible and it can provide better laparoscopic surgical conditions due to profound muscle relaxation and shorter recovery. The main advantages of spinal anaesthesia are reduced post-operative nausea and vomiting, awake patient with spontaneous respiration, prevention of airway manipulation, and effective analgesia with shorter recovery time<sup>8</sup>.

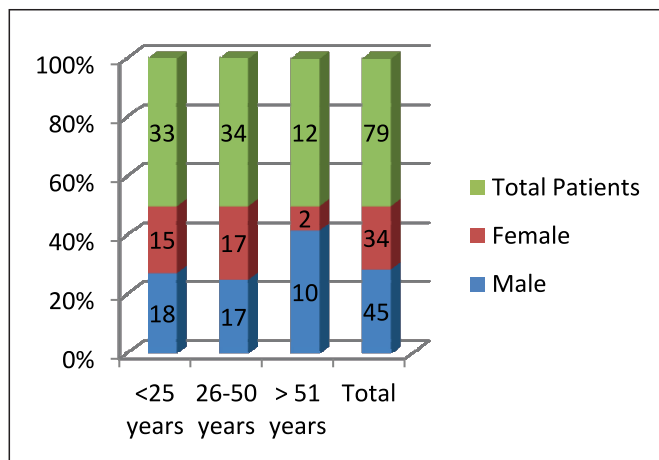
### Materials and Methods

This was a retrospective study, conducted in S. Nijlingappa Medical College, hospital Bagalkot. Patients with a diagnosis of acute or recurrent appendicitis between October 2015 and September 2016 were included in the study. Patients aged < 14 years; patients with appendicular mass, patients unfit for surgery were excluded from the study.

A total of 87 patients were included in the study. All of them underwent laparoscopic appendectomy. Out of which 51 patients underwent the procedure under general anaesthesia and 36 under spinal anaesthesia. The duration of surgery, amount of intra operative blood loss (measured by taking the difference in fluid collected in drain and the amount used for abdominal wash), anaesthetic complications, time of post-operative rescue analgesia, post-operative pain (Likert score), wound infection, other complications and total duration of hospital stay were studied.

### Results

In the study conducted, 57% of the subjects were males and 85% of them were younger than 50 years (Figure 1).



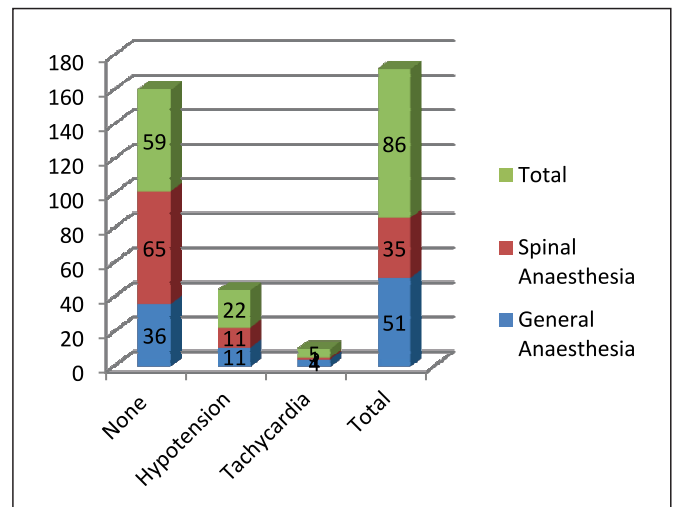
**Figure 1. Age and gender distribution of the study subjects**

The duration of surgery in minutes (mean-36.19 vs. 41.36), total blood loss in mL (mean-17 vs. 19.24) and 5-point Likert pain scores (mean-1.31 vs. 1.98) were significantly lower in patients who underwent laparoscopic appendectomy under spinal anaesthesia, as compared to those who underwent the procedure under general anaesthesia, which was found to be statistically significant ( $p < 0.001$ ) (Table 1). The duration of hospital stay in days (mean -9.36 vs. 8.86) was however longer in the patients who underwent the surgery under spinal anaesthesia, though this observation wasn't significant statistically.

**Table 1. Comparison of duration of surgery, blood loss, pain (Likert scale) and duration of hospital stay in general and spinal anaesthesia**

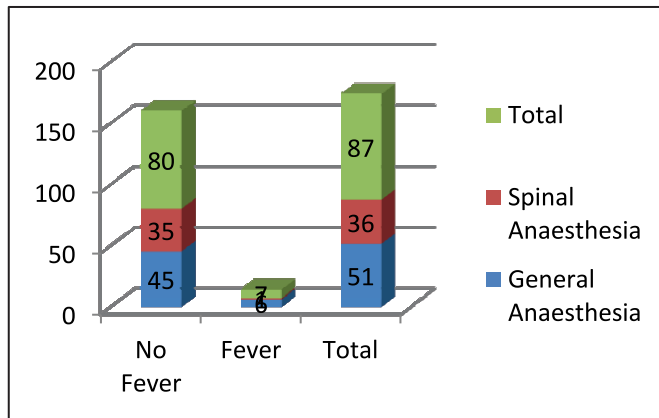
Parameter	Type of Anaesthesia	N	Mean	SD
Duration of surgery (min)	General	50	41.36	3.73
	Spinal	36	36.19	3.52
Blood loss during surgery (mL)	General	49	19.24	3.19
	Spinal	36	17.00	1.98
Likert pain scale (5-point)	General	51	1.98	0.86
	Spinal	36	1.31	0.52
Duration of stay in hospital (days)	General	51	8.86	3.80
	Spinal	36	9.36	3.15

The incidences of the intra operative complications such as hypotension (31.4%) and tachycardia (2.9%) were lower in the group who underwent the procedure under spinal anaesthesia. However, the observation wasn't significant statistically (Figure 2).

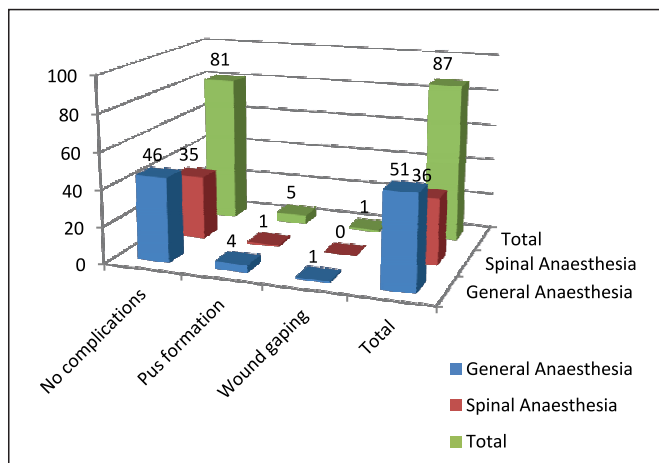


**Figure 2. Intra operative complications**

The incidence of post-operative wound infection and that of post-operative fever were higher in the group who underwent the surgery under general anaesthesia. However the observations were not statistically significant (Figure 3, 4).



**Figure 3. Incidence of post-operative fever**



**Figure 4: Comparison of post-operative wound infection**

## Discussion

The use of general anaesthesia (GA) with controlled ventilation has been considered the most acceptable technique for laparoscopic procedures owing to the various effects of pneumoperitoneum. The use of rapidly acting and shorter duration intra venous agents such as Propofol and Etomidate as well as inhalational agents such as Sevoflurane and Desflurane has made GA favourable technique for day care laparoscopic procedures<sup>9,10</sup>. The disadvantages of general anaesthesia includes post-operative nausea and vomiting, longer stay at the hospital, longer duration of recovery, increased and early need for post-operative rescue analgesia and increased cost. Recent trials document the efficacy of regional anaesthesia in laparoscopic surgeries. One of the most preferred

techniques is spinal anaesthesia. Spinal anaesthesia provides profound muscle relaxation and a resultant abundant operating space during the laparoscopic procedure, facilitates early recovery and provides good post-operative analgesia<sup>8</sup>.

However the complications of using spinal anaesthesia in laparoscopic surgery include the hypotension (incidence 20.5%) which is augmented by the use of Trendelenburg position and increased intra-abdominal pressures<sup>11</sup>. This can however be tackled by preloading the patient liberally, reducing the head tilt during the procedure, reducing the intra-abdominal pressure and liberal use of vasopressors<sup>12, 13</sup>. The incidence of post-operative shoulder pain varies from 25 – 43%, which may be distressing to the patient in the post-operative period; the irritation of the phrenic nerve by carbonic acid from the capneoperitoneum is believed to be the etiology of the pain. This can be reduced by reducing the intra-abdominal pressures to 8-10 mm of Hg, instillation of local anaesthetics into the peritoneal cavity or the use of parenteral opioids<sup>14, 15</sup>. Various studies have reported no major changes in the respiratory mechanics during laparoscopic surgery under spinal anaesthesia<sup>16</sup>

In our study we observed that the post-operative need of rescue analgesia was less and was after a longer duration in patients who underwent the procedure under spinal anaesthesia, which is consistent with the findings from other studies, which suggest a superior analgesia following regional anaesthesia. The incidence of intra operative hypotension and tachycardia were higher in the spinal anaesthesia group, though this was statistically insignificant. The incidence of post-operative fever, wound infection (gape/purulent discharge) were higher in the general anaesthesia group but the results were insignificant statistically. However, the patients in the spinal anaesthesia group had to stay in the hospital for a longer duration as compared to those in the general anaesthesia group.

**Conclusion:** The observations from the study proved that laparoscopic appendectomy is feasible under spinal anaesthesia, and provides superior analgesia. The profiles of complications that may arise due to the same are not severe and can be managed easily. However, further studies with a larger sample may be warranted in order to prove the results conclusively.

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