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Original Research Article

# Comparison of Spinal Anesthesia Vs General Anesthesia in Laparoscopic Appendectomy Surgery

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**Conflict of interest: Nil**

**Abstract**

**Background:** Laparoscopic appendectomy has replaced the traditional surgery technique recent days in India. This surgical technique has become more popular due to various advantages like less bleeding, short hospital stays, and decrease post-operative complications. Studies suggest that spinal anaesthesia technique might be a better option for laparoscopic appendectomy. Therefore, the present study was designed to assess the effects of both general anaesthesia and spinal anaesthesia on hemodynamic response in laparoscopic appendectomy.

**Materials and Methods:** This was a comparative study which included 60 surgery patients of acute appendicitis via laparoscopic appendectomy. Groups I included 30 patients of general anaesthesia while, group II consisted 30 patients of spinal anaesthesia. Non-invasive arterial blood pressure, electrocardiography, and pulse oximetry were monitored continuously. Visual analog scale (VAS) on a 10-mm was used for assessment of severity of pain in all the patients.

**Results:** Results of the present study showed that there was a significantly higher heart rate ($p<0.05$) in group G (general anaesthesia) patients compare to group S (spinal anaesthesia) patients. VAS score was significantly low in group S patients ($1.8 \pm 0.42$) compare to group G patients ($3.3 \pm 0.8$) with p value $<0.05$ after 1 hour of surgery. VAS score was recorded after 2 hours of surgery $3.6 \pm 0.9$ in group G compare to group S $2.0 \pm 0.52$ with p value $< 0.05$.

**Conclusion:** Findings of the present study suggest that spinal anaesthesia using a combination of 0.5% hyperbaric bupivacaine and a fentanyl has significantly better cardiovascular reactivity compare to general anaesthesia. Moreover, post-operative recovery was hasty in spinal anaesthesia patients in comparison of general anaesthesia patients.

**Keywords:** General Anaesthesia; Laparoscopic Appendectomy; Spinal Anaesthesia; VAS score.



## Introduction

Appendectomy is one of the most frequent performed surgical procedure.[1-2]Laparoscopic appendectomy recently added as most popular surgical procedure [3],with advantage of less post-operative pain , fewer hospitalization days, less chance of wound infection , faster recovery and better cosmetic results.[4-5] Laparoscopic appendectomy can be done under either general anesthesia and regional anaesthesia. Through the recent evidence it suggest that regional anaesthesia has significant role in case of patient undergoing laparoscopy.[6,7] Spinal anaesthesia has lower morbidity and mortality rate compared to general anesthesia.[8] Advantage of spinal anesthesia over general anesthesia is that, patient remain awake and oriented at end of procedure. Secondly, there will

be fewer chances of post-operative nausea and vomiting, less chances of post-operative pain. They will have earlier ambulation as compared to patient receiving general anesthesia. Lastly complication related to intubation and extubation can also be avoided by regional anaesthesia. It is also beneficial for those patients where general anesthesia could be high risk. Thus, regional anaesthesia provides less invasive technique for minimal invasive surgical procedure. [9-11]

## Material & Methods

The comparative study was conducted in Chhindwara Institute of Medical Sciences, Chhindwara, MP, India, from August 2024 to September 2025. A total of 60 patients after Pre anesthetic assessment along with all routine examination in age group ranging from (20-60) years, with ASA physical status I/II were posted for laparoscopic appendectomy after taking approval from Institutional ethics committee approval [Ref No.: CIMS/IEC/2024/8496] and written informed consent, with following inclusion and exclusion criteria.

**Inclusion Criteria:**

1. Patient with ASA grade 1 and 2
2. Patient between age group 20-50 years of either sex
3. Patient with acute appendicitis undergoing laparoscopic appendectomy

**Exclusion criteria:**

1. Patient with ASA grade >3
2. Patient with previous history of any abdominal surgery
3. Patient in whom general anesthesia is contraindicated

Patients were then randomized categorized by sealed envelopes to receive either general anesthesia (group G) (n=30) or spinal anesthesia (group S) (n=30). Numbered and sealed envelopes were placed in the operating room and only opened after patient arrival.

**GA patients (Group G) (n=30):** General anaesthesia given as per protocol.

**RA patients (Group S) (n=30):** Spinal anaesthesia was given at L3-L4 intervertebral space, using 3.2 ml of 0.5% hyperbaric Bupivacaine.

Any intra-operative incidents (right shoulder pain, abdominal discomfort, headache, hypotension, nausea, vomiting) was documented. Intraoperative hypotension more than 20% of baseline was managed by IV mephentermine 0.5 mg/kg iv given in incremental dose every 5 min. If any patient experienced shoulder pain or discomfort, they were given injection fentanyl (30-50ug) iv. At the end of surgery patient was transferred to post anesthesia care unit for 12 hours for observation.

In both the groups, vital parameters were observed and recorded at prior to induction, after induction in group G and after SAB in group S, immediately after pneumoperitoneum every 15 min intraoperative period and at 1,2,4,12 hours postoperative period.

Post-operative pain was analyzed using visual analogue scale (VAS) at 1,2,4,12 hours post-operative period.

Post-operative at 1,2,4,12 hours patient was monitored for any other complication like nausea/vomiting, headache, urinary retention or any neurological complaints. Post-operative analysis of early mobilization and return of bowel sound was also recorded.

**Statistical analysis:** The observation was recorded and subjected to statistical analysis using SPSS statistical software. Student's t -test was used for inter grouping comparison. P - Value >0.05 and < 0.05 were considered statistically insignificant and significant, respectively.

## Results:

This study included 60 patients in the age group from (20-60) years with ASA Grade I/II.

**Demographic parameters:**

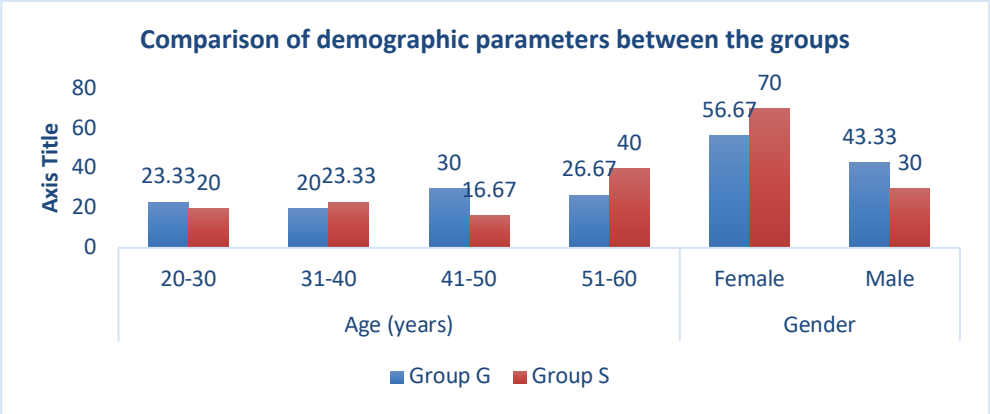


**Figure 1: Comparison of demographic parameters between the groups**

There was no significant difference found between both studied groups regarding age, and gender distribution.

**Hemodynamic parameters:**

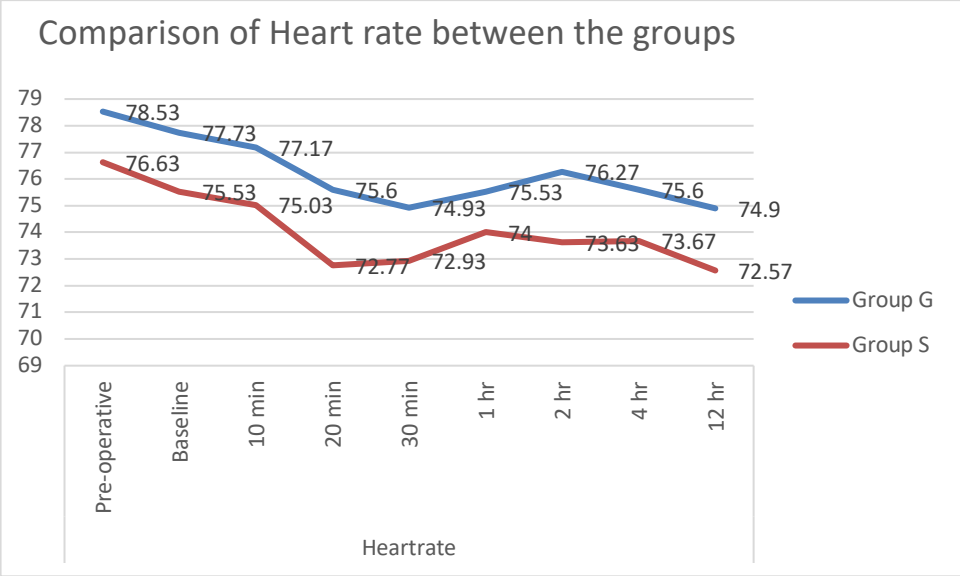


**Figure 2: Comparison of Heart rate between the groups**

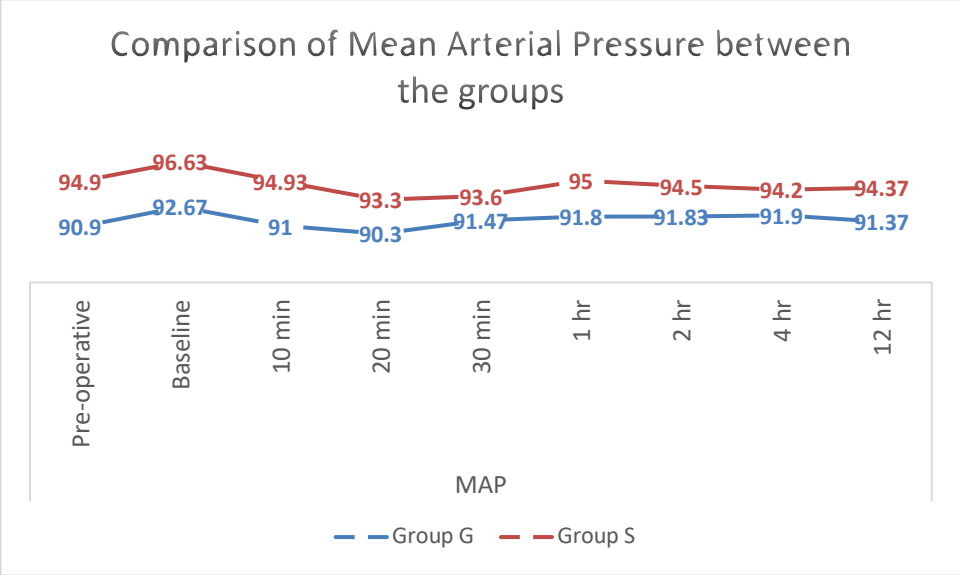


**Figure 3: Comparison of Mean Arterial Pressure between the groups**

The hemodynamics in both the groups was stable and was found to be statistically insignificant, among the groups at different follow up periods.

**VAS score (Visual Analogue Score):**

**Table 1: Comparative VAS score among both the Groups**

| VAS score | Group G (n=30%) | | Group S (n=30) | | Total (n=60) | | P-value |
|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | |
| 0-1 hour | 3.2 | 1.71 | 2.5 | 1.25 | 2.85 | 1.53 | 0.076 |
| 1 to 4 hours | 2.07 | 0.94 | 1.53 | 0.73 | 1.8 | 0.88 | **0.017** |
| 4 to 8 hours | 1.97 | 1.3 | 1.5 | 0.94 | 1.73 | 1.15 | 0.116 |
| 8 to 12 hours | 2.07 | 1.14 | 1.63 | 1.07 | 1.85 | 1.12 | 0.134 |

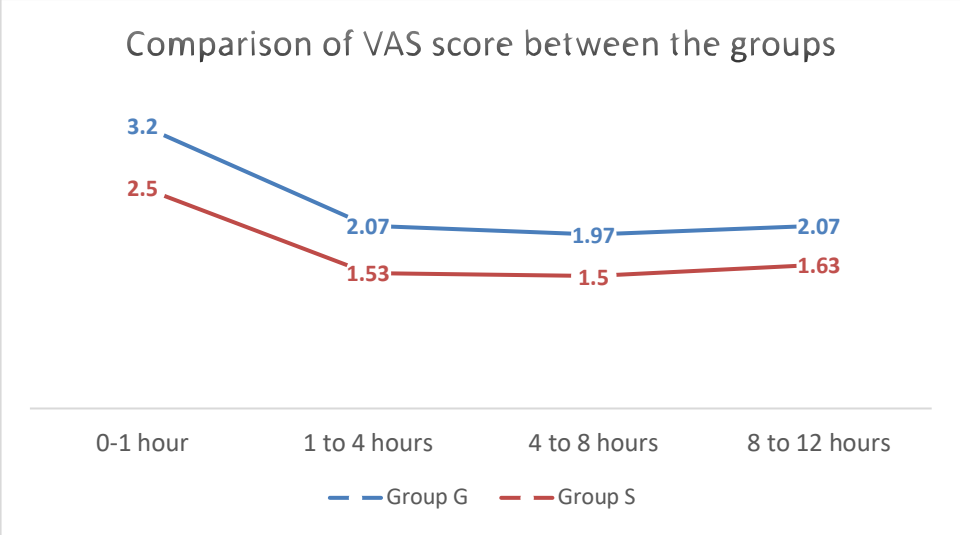


**Figure 4: Comparison of VAS score between the groups**

Intra -operatively, we found shoulder pain in 6 patients in group (S), which were relieved by administration of injection fentanyl 25 mg iv and injection midazolam 1mg iv.

**Rescue analgesia:**

**Table 2: Need of Rescue analgesia and time to first request of rescue analgesia**

| | | | Group G (n=30%) | | Group S (n=30) | | Total (n=60) | | P-value |
|---|---|---|---|---|---|---|---|---|---|
| Rescue analgesia needed | No | | 3 | 10.00 | 12 | 40.00 | 15 | 25.00 | **0.04** |
| | Yes | | 27 | 90.00 | 18 | 60.00 | 45 | 75.00 | |
| Time to first request of analgesia | 0 to 1 hour | No | 9 | 30.00 | 22 | 73.33 | 31 | 51.67 | **0.002** |
| | | Yes | 21 | 70.00 | 8 | 26.67 | 29 | 48.33 | |
| | 1-4 hours | No | 30 | 100.00 | 24 | 80.00 | 54 | 90.00 | **0.031** |
| | | Yes | 0 | 0.00 | 6 | 20.00 | 6 | 10.00 | |
| | 4-8 hours | No | 20 | 66.67 | 25 | 83.33 | 45 | 75.00 | 0.233 |
| | | Yes | 10 | 33.33 | 5 | 16.67 | 15 | 25.00 | |
| | 8-12 hours | No | 25 | 83.33 | 26 | 86.67 | 51 | 85.00 | 1.0 |
| | | Yes | 5 | 16.67 | 4 | 13.33 | 9 | 15.00 | |

In group G, 90% of cases needed rescue analgesia (inj. Tramadol 50mg) as compared to group B only 60% needed rescue analgesia, P = 0.041.

**Adverse effects:**

**Table 3: Distribution of the cases according to Adverse Events**

| Adverse events | Group A (N=30%) | | Group B(N=30) | | Total(N=60) | | P Value |
|---|---|---|---|---|---|---|---|
| | N | % | n | % | n | % | |
| None | 24 | 80.00 | 26 | 86.67 | 50 | 83.33 | 0.72 |
| PONV | 3 | 10.00 | 0 | 00.00 | 3 | 5.00 | 0.23 |
| Urinary retention | 6 | 20.00 | 1 | 3.33 | 7 | 11.67 | 0.108 |
| Hypotension | 0 | 0 | 0 | 0 | 0 | 0 | NA |
| Bradycardia | 0 | 0 | 0 | 0 | 0 | 0 | NA |
| Respiratory depression | 0 | 0 | 0 | 0 | 0 | 0 | NA |

Although the Urinary retention was found in 20% cases in group G as compared to 3.33% found in Group S and PONV found only in Group G 10 %, but statistically the difference among groups was not significant(P=0.108).

Early postoperative mobilization was noticed in group (S) at 11.0 ± 1.2 h as compared to 16.0 ± 2.3 h for group (G) with p-value<0.001. Group (G) needed early requirement of rescue analgesia as compared to Group S. Group S had better and longer pain relief as compared to Group G with early mobilization and less adverse effect.

**Discussion**

General anesthesia is the predominant technique employed for laparoscopic procedures. Spinal anesthesia is seen as a safer alternative to general

anesthetic, with advantages such as superior pain management, earlier ambulation, and reduced hospital stays. It is regarded as a superior choice for those at high risk for general anesthesia. In our study, the post-operative pain following laparoscopic appendicectomy, as assessed by the VAS score, consistently favored group (S) during the post-operative intervals (1, 2, 4, 12 hours) with a p-value <0.001. Conversely, the studies by Gurudatta and Arif [10], and Bessa et al. indicated a non-significant difference at 6 and 8 hours. Imbelloni et al. demonstrated a significant difference at 2, 4, and 6 hours, but a non-significant difference at 12 hours in their trial comparing general and spinal anesthesia in laparoscopic cholecystectomy [12]. Bessa et al. examined general and spinal anesthesia in laparoscopic cholecystectomy and found that the mean number of analgesic ampoules required was significantly lower in the spinal anesthesia group compared to the general anesthesia group [8].

Shoulder pain occurred in 2 cases (5%) of group (S), which is lower than the 24% reported by Gurudatta and Arif [10], and the 25% noted by Van Zandart et al. in a study on laparoscopic cholecystectomy under spinal anesthesia [13]. This pain was alleviated by intravenous sedation in one patient, while the other was transitioned to general anesthesia.

Additional problems, including PONV, were observed in 3 instances (7.5%) of group (G) and absent in group (S), in contrast to 32% and 8% respectively in the study by Gurudatta and Arif [10]. Urinary retention occurred in 2 patients (5%) in group (S), necessitating catheterization; however, Imbelloni et al. reported no instances of retention [12]. Early post-operative mobilization and the resumption of bowel sounds were observed more frequently in the spinal anesthetic group compared to the general anesthesia group, mostly attributable to superior pain management outcomes. The average hours for postoperative mobilization were 16.0 ± 2.5 h for group (G) and 11.0 ± 1.3 h for group (S), with a statistically significant p-value of <0.001. Conversely, bowel noises were detected earlier in group (S). The mean of 6.8 ± 1.3 h compared to 7.3 ± 2.1 h in group (G) was statistically non-significant.

## Conclusion

Using spinal anesthesia for laparoscopic appendicectomy offers better pain management, earlier recovery, and early ambulation and is cost effective for patients. It could be better alternative method of anesthesia especially in patients with high risk for general anesthesia.

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