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HEMODYNAMIC STABILITY DURING LAPAROSCOPIC APPENDECTOMY UNDER SPINAL ANAESTHESIA IN COMPARISON TO GENERAL ANAESTHESIA

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Abstract

Laparoscopy has revolutionised surgery and management of the patient with marked decrease in morbidity and post-operative complications. Initially, these procedures were done using only General Anaesthesia. However, now with the introduction of Spinal anaesthesia and after learning its advantages, surgeons are slowly beginning to gravitate towards this mode of anaesthesia. Sixty three patients who were admitted in the hospital for appendicitis participated in this Randomized controlled trial conducted in a tertiary care hospital in India. Thirty three patients were randomly included in Group A (undergoing laparoscopic surgery under Spinal Anaesthesia) and thirty patients in Group B (undergoing laparoscopic surgery under General Anaesthesia). The mean values of Systolic and diastolic pressure was found to be significantly higher in patients who were administered General anaesthesia and no change in the respiratory functions was observed following administration of either Spinal or General anaesthesia. Laparoscopic surgery under Spinal anaesthesia is a viable and safe alternative as compared to General anaesthesia. The recovery rates and the satisfaction reported by patients is also better. Spinal anaesthesia also helps in maintaining better haemodynamic stabilization.

Keywords:laparoscopic appendicectomy, spinal anesthesia, general anaesthesia, comparison

Introduction

Appendicitis is the term given for the condition of inflammation of the appendix. Majority of appendectomies are due to appendicitis. It is characterized by inflammation in the appendix and is caused by blockage of the appendix due to faecal impaction or lymphoid hyperplasia. Inflammation compromises blood flow to appendix leading to tissue death resulting in rupture. Rupture results in spillage of bowel contents (including flora) into abdominopelvic cavity and peritonitis which may even result in death[1].

The diagnosis of appendicitis is made based on the person's clinical presentation. In instances where the diagnosis cannot be made based on the person's history and physical examination, close observation, radiographic imaging and laboratory tests are helpful. The two most common imaging tests used are Ultrasound and Computer Tomography. Surgical removal of the appendix is the standard treatment of appendicitis. This may be done via open or laparoscopic surgery[1].

Until now, General Anaesthesia has been the choice of anaesthesia to be used during Laparoscopic surgeries. Until recently, Abdominal laparoscopic surgeries have rarely been done using Spinal anaesthesia. Therefore, there are only a handful of reports of Laparoscopic surgeries being done using Spinal anaesthesia[2].

Recently, advantages such as optimal anterior abdominal wall relaxation and the conscious status and receptive nature of the patient together have encouraged researchers to conduct studies to try out Spinal anaesthesia for all laparoscopic surgery patients. Another reason for preferring. Spinal Anaesthesia was to prevent the potential problems of GA[3].

The pneumoperitoneum induced rise in intra-abdominal pressure along with pressure on the diaphragm and carbon dioxide induced peritoneal irritation are factors to be considered while using Spinal anaesthesia. Initially, there was no information as to how the patient would respond to these as he or she would be conscious at the time of surgery. Changes in technique such as methodology of port-site placement and the technique of using nitrous oxide, which is less irritating for the peritoneum compared to carbon dioxide, along with maintenance of low intra peritoneal pressure when using SA have all been reported to reduce discomfort and incidence of neck and shoulder pain[4, 5].

GA patients unlike SA patients frequently complain of stomach inflation which occurs as a result of mask ventilation. Ryle's tube intubation may be required at times like these which causes unnecessary intervention in a

body cavity. The most important point however, seems to be the difference in status of respiratory parameters among the two modes of anaesthesia during laparoscopic surgery. In this context, spontaneous physiological respiration during SA would always be better than an assisted respiration. The increased potential of intubation and ventilation related problems exists during GA as pulmonary functions take 24 hours to return to normal after laparoscopic surgery is performed using GA [4, 6].

Methodology

Sixty three patients who were admitted in the hospital for appendicitis participated in this Randomized controlled trial conducted in a tertiary care hospital in India. Thirty three patients were randomly included in Group A (undergoing laparoscopic surgery under Spinal Anaesthesia) and thirty patients in Group B (undergoing laparoscopic surgery under General Anaesthesia). Necessary baseline haematological investigations and imaging was done followingwhich patients were taken up for laparoscopic surgery. The patients' BP, heart rate, SPO_2 and ECG were recorded prior to induction, during surgery and at 15 minute intervals following surgery. The intra operative conditions, ease of operating under Spinal anaesthesia and muscle relaxations were assessed and graded by the surgeon.
All the patients were monitored for nausea and vomiting, headache, sore throat and transient neurological symptoms. Pain was assessed using visual analogue scale(VAS) and graded at 1, 3, 6, 12hours. Intensity of pain was assessed by using 10 point VAS. Statistical analysis was done using the Chi-square test and the unpaired student t test.

Results

Table 1: Comparison of Mean heart rate at different time intervals presented asmean ±SD

Heart rate	Group A (n=30)	Group B (n=33)	p-value	Significance
Basal HR	82.70±15.26	81.00±14.89	0.66	N.S.
HR @1min	82.77±15.54	89.16±13.49	0.08	N.S.
HR @3min	75.67±11.30	87.09±10.13	<0.0001	S
HR @5min	72.80±9.34	83.12±7.39	<0.0001	S
HR @pneumo	74.80±9.63	86.03±7.11	<0.0001	S
HR @15min	75.77±8.32	83.36±7.27	0.0003	S
HR @30min	74.63±7.60	81.00±6.64	0.0007	S
HR @45min	74.90±6.76	80.24±6.80	0.0027	S
HR @60min	80.63±11.99	80.21±7.39	0.87	N.S

The difference in systolic blood pressure between the two groups was significant at 1 min, 3 mins, 5 mins, pneumo, 15 mins, 30 mins, 45 mins and 60 mins.

Table 2: Comparison of systolic blood pressure presented as Mean ±SD

Sys BP	Group A	Group B	p-value	Significance
Basal Sys BP	123.70±10.59	125.03±16.02	0.70	N.S
Sys BP@1min	121.37±9.89	137.39±12.08	<0.0001	S
Sys BP @3min	117.20±8.39	133.15±10.48	<0.0001	S
Sys BP @5min	114.33±7.20	129.88±8.63	<0.0001	S
Sys BP @pneumo	121.23±7.39	136.12±8.31	<0.0001	S
Sys BP @15min	118.40±7.29	132.88±8.29	<0.0001	S
Sys BP @30min	115.40±6.50	130.45±7.75	<0.0001	S
Sys BP @45min	112.73±5.35	128.33±7.54	<0.0001	S
Sys BP @60min	113.40±5.47	126.12±5.58	<0.0001	S

The difference between the diastolic blood pressure between the two groups was found to be significant at 1 min, 3mins, 5 mins, pneumo, 15 mins, 30 mins, 45 mins and 60 mins.

Table 3: Comparison of diastolic blood pressure as Mean ±SD

Dia BP	Group A	Group B	p-value	significance
Basal Dia BP	75.53±7.66	75.97±9.20	0.84	N.S.
Dia BP @1min	72.73±6.93	72.48±7.12	<0.0001	S
Dia BP @3min	69.03±5.88	80.64±6.49	<0.0001	S
Dia BP @5min	66.73±5.04	78.51±7.15	<0.0001	S
Dia BP @pneumo	72.57±4.38	84.30±7.10	<0.0001	S
Dia BP @15min	70.30±4.27	79.76±6.42	<0.0001	S
Dia BP @30min	72.07±4.39	78.00±7.40	0.0003	S
Dia BP @45min	72.90±4.40	76.33±7.85	0.039	S
Dia BP @60min	73.43±4.61	77.79±7.39	0.0073	S

26.67% patients in Group A complained of shoulder pain intra-operatively. There was no incidence of shoulder pain in patients of Group B. The relationship between intra-operative shoulder pain and type of administration of anaesthesia was significant. (Table 6)

Discussion

General anaesthesia continues to be the most widely accepted mode of administering anaesthesia due to analgesic effects, loss of consciousness and as it provides relaxation along with improved control of airway. However there are disadvantages such as decrease in lung capacities, increase in airway pressure, increase in CO_2 levels, increase in complaints of PONV, basal atelectasis etc. that go hand in hand with general anaesthesia. This clearly points towards the need for an alternative method of anaesthesia. This study compared the use of General anaesthesia in Laparoscopic appendicectomy with that of Spinal anaesthesia.

Our study found that patients who underwent laparoscopic surgery with general anaesthesia recorded tachycardia and greater values of mean HR. Bradycardia was observed to occur in 3 patients(10%) who underwent Spinal anaesthesia while none of the patients who underwent General anesthesia developed Bradycardia. These patients were administered Inj. Glycopyrrolate for correction of bradycardia. Previously a study was done by Mehta *et al*. which assessed 60 patients who underwent laparoscopic cholecystectomy, 30 each in general anaesthesia group and Spinal anaesthesia group[7].Another study was carried out in Kathmandu which assessed feasibility of Spinal anaesthesia in Laparoscopic cholecystectomy[8].Both these studies did not record any patients as having developed bradycardia.

Hypotension was recorded in 2 patients(6.66%) who underwent surgery with Spinal anaesthesia. Patients were administered i.v. fluids and inotropes for the same. A study done by Sinha *et al*. described the feasibility of using Spinal anaesthesia in 4645 patients who underwent laparoscopic surgery, out of which 2992 underwent cholecystectomy. They found that 18.21% of their patients developed hypotension with the use of Spinal anaesthesia[9].The study done by Mehta *et al*. found that 30% of their patients recorded hypotension[7].A study done by Hartmann *et al*. attempted to identify the various factors that result in hypotension following Spinal anaesthesia in data sets of 3315 patients over a span of 3 years and 7 months. They found that 5.4% of patients had developed hypotension following induction[10].

Palachawa*et al*. [11]in Thailand found that 15.7% in their study developed hypotension as a complication following administration of spinal anaesthesia while Thrognumchai*et al*.[12]reported 20.2% of the patients in their study as having developed hypotension. Our study showed around two to four time's lower rates of incidence of hypotension as compared to the aforementioned studies. The rates of incidence on administering spinal anaesthesia have not been observed to change depending on whether the surgery is laparoscopic or open type.

The mean values of systolic pressure and diastolic pressure have been found to be higher in patients who were administered General Anaesthesia as compared to those who received Spinal anaesthesia as a result of decreased occurrence of bleeding during surgery.

Conclusion

Spinal Anaesthesia can be used safely and is a good alternative to General anaesthesia while conducting Laparoscopic appendicectomy. It is a feasible option with patients showing good recovery with high levels of satisfaction. Moreover, it also gives improved control over haemodynamic circulation. It offers good conditions for surgery and decreased incidence of pain post-operatively. It is a better option in conditions where General anaesthesia cannot be given in certain patients who have to undergo Laparoscopic appendicectomy.

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