COMPARISONOF OUTCOME OF APPENDICECTOMY IN SPINAL VS GENERAL ANESTHESIA.

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ABSTRACT

INTRODUCTION: Acute appendicitis is very common surgical disease that mostly leads to a surgical removal of the appendix **OBJECTIVE:** To evaluate outcome of open appendicectomy in spinal versus general anesthesia. **STUDY DESIGN:** Prospective, observational (comparative) study design.**VENUE AND TIMING:** Surgery department in collaboration with department of anesthesia; Khairpur Medical College Hospital Khairpur mirs from 1st December 2018 till 31 July 2018. **METHODS:** All patients between 10 to 50 years of age undergoing appendectomy who has ASA class I and ASA class II were recruited. Patients having BMI greater than 30, perforated appendix, history of Diabetes Mellitus, having past history of abdominal surgery, having ASA greater than II and patients who left against medical advice were excluded. **RESULTS:** Out of 109 patient 73 (66.97%) patients were male and 36 (33.02%) were female. Male/female ratio was 2.02:1 Spinal Anaesthesia (group- A) included 64(58%) patients in which 41 (64.06%) were male and 23 (35.93%) were female. General anaesthesia (Group B) included 45(41.28%) patients in which 27(60%) were male and 18(40%) were female. 11-20 years agegroup occupied maximum number of patients i.e., 63(57.79%). Our study showed mean arterial blood pressures and pulse rate slightly higher in patients whose appendicectomy was done in general anesthesia as compared to the patients who were operated under spinal anesthesia while we did not found much difference in oxygen saturation in both groups. We also found hypotension in 05 (07.81%) patients of spinal anesthesia group while in 03 (8.33%) patients in general anesthesia group, hypothermia in 2 (3.12%) patients in spinal group-A while in 8 (22.22%) patients in general anesthesia group –B. Hypoxemia in 1 (1.5%) patient in spinal group A and 01(2.7%) patient in general anesthesia group-B was found. There was severe abdominal discomfort in 9 (14.06%) patients in spinal group-A from which 04 (6.25%) patients were converted to general anesthesia while no abdominal discomfort was found in general anesthesia group-B. From these study values we found patients operated under spinal anesthesia have comparatively less per and postoperative complications. **CONCLUSION:** Appendicectomy under spinal anesthesia is a comparatively safe with very few intra and postoperative complications as compared to appendicectomy in general anesthesia.

KEYWORDS: Open Appendicectomy, Spinal Anaesthesia, General Anaesthesia.

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INTRODUCTION

Acute appendicitis is very common surgical disease that mostly leads to a surgical removal of the appendix. A Research showed that in United States approximately 0.25 million cases of acute appendicitis are managed every year[1]. It is commonly occurs in teenage group. Males have an 8.6% and females have a 6.9% lifetime probability of developing acute appendicitis, respectively and appendicectomy is reported in U.S is 12% for males and 23% for females.[2]. Literature on appendicitis and of modes of anesthesia for appendicectomy being applied are lacking in the Pakistan as most of the studies are done on western population [3]. Life time risk of having appendicitis is one in six approximately. Treatment of choice is the appendicectomy but some cases of acute appendicitis are conservatively treated because patient delay or refusal for surgery[4] Type of anesthesia for appendicectomy should have reduced complication during and after surgery but BMI, age , total time of anesthesia and anesthesia's effectiveness, any concomitant disease e.g., kidney, liver or

failure of the heart, uncontrolled hypothermia, hypertension, during surgery and pain after surgery and mobility also effect recovery after surgery. If no contraindications, General anesthesia is choice of anesthesia for appendectomy. However spinal anesthesia and sedation can be used in emergency procedures. Surgery in Spinal anesthesia have many benefits over general anesthesia as it is cost-effectiveness, have no need of airway handling, faster recovery, with comparatively good pain relief after surgery, less hospital stay,and less rate of nausea and vomiting [5]. Research on 40 patients who underwent comparable surgery who received either thoracic spinal or general anesthesia, showed better analgesia after surgery and Patients who were operated under spinal anesthesia had much higher satisfaction scores in which hypotension incidence was 40% and Abdominal discomfort was reported in roughly 25% of the cases, which were successfully managed, patient had nausea and vomiting [6]. Surgery in spinal anesthesia is cost effectiveness however it does not help in reducing hospital stay [7]. General anesthesia has many complications during and after surgery and it is comparatively expensive and it also requires highly skilled person. Spinal anesthesia can be safe to use in pregnant women as it has very few effect on fetal well being. [8] Spinal anesthesia has low rate of complication, cost effective and do not need highly skilled anesthetist [9]. Although general anesthesia will continue to be the preferred method of anesthesia, spinal anesthesia can be used with confidence and with low cost effectively with minimal complications in hospitals where highly skilled anesthetists are deficient. Spinal anesthesia has also very low complication rate in children with 97% success rate [10].Study by Ansar latif in Pakistan found spinal anesthesia safe with minimal per and post-operative complications and effective for the appendectomy. [11]

As there are no much research and data on appendicitis or mode of anaesthesia for appendiccectomy in the Pakistan as most of the studies are done abroad so the aim of our research is to compare the outcomes of spinal and general anesthesia for open appendectomy in our population as we are lacking the facilities and highly skilled anesthetist for general anesthesia.

METHOD & MATERIAL

The khairpur medical college hospital khairpur Mirs' was the site of this comparative prospective study from DEC 2018 to MAY 2019. Total of 109 patients with acute appendicitis who were undergoing appendectomy with age from 15 years to 50 years , BMI <30 kgm/m2 and American Society Of Anethesiologist Grade I or II were recruited after taking a written & informed consent. Patients were randomly selected to get either spinal (group A) which contained 64 patients or general anesthesia (group B) which contained 45 patients. Standard preoperative measures done. All patients in group-A were informed in detail about spinal anesthesia and its possibility of conversion to general anesthesia.

A group (spinal anesthesia) patients in sitting posture, under aseptic conditions lumber puncture was done at the level of L4-3 with 27 gauge spinal needle and 15 mg hyperbaric bupivacian injected and then supine position made then effect and level of anesthesia effect was checked up to T4 sensory blockade. Lactated Ringer's solution (3-6 ml/kg/h) was infused throughout the surgery, and oxygen supplementation was given to all patients at a rate of 2 l/min. continuously monitored pulse oximetry, electrocardiogram, and non-invasive arterial blood pressure. During surgery problems (such as nausea, vomiting, headaches, abdominal pain, and hypotension) were documented. During surgery low blood pressure greater than 20% of the baseline was treated with intravenous ephedrine sulphate 5 mg. Tramadol 50 mg was given if any patient experienced pain and i.v midazolam 2 mg for anxiety if occurred. As surgery ended patient shifted to recovery room. Up to 01 hour in recovery room all patients monitored for any complication.

B Group (General Anesthesia) patients were intubated with a suitable sized endotracheal tube after receiving 2.5mg/kg propofol, 1mg/kg nelbuphine, and 1.5 mg/kg succinyl chloride. Sevoflurane and nitrous oxide in Oxygen, as well as atracurium for neuromuscular blocking, were used to maintain anesthesia during the procedure. The ventilation was kept under control to maintain a PaCO2 level between 35 and 40 mmHg. ECG, Noninvasive arterial blood pressure, pulse oximetry, and end tidal carbon dioxide were all continuously monitored. Ringer's solution (3-6ml/kg/h) transfused throughout the process. At the end of surgery neostigmine 0.05 m/kg was given to reverse the neuromuscular block and the patient was extubated and moved to the recovery room after receiving atropine sulphate 0.01 mg/kg intravenously.

Surgical technique

All patients had conventional open appendectomy by gird iron incision in standard way in supine position. Patients in both the groups were monitored for SPO2, heart rate, average arterial blood pressure at times before & after anesthesia in B group (general anesthesia) and before & after block in spinal anesthesia group. After that, every 10 minutes in both groups throughout surgery and after surgery at 1, 2, 4, 8 and 12 h. The pain level after surgery was measured using the VAS scale at 1, 2, 4, and 12 hours after operation. When the VAS was greater than 4, ketorolac acid 30 mg i.v. was given, and over the first 12 hours the number of painkiller injections given to each patient was documented. After surgery nausea/Vomiting recorded and ondensetron 4 mg was intravenously given as it was necessary. We also recorded Headache, throat irritation, itching, or any other central neurologic problems, and retention of urine if occurred. The restoration of bowel sounds and mobilization were documented. As well as the length of stay in the hospital after operation. Data according to the Performa was collected, revised and entered to SPSS version 20.

RESULTS

Our study included 109 patients from age of 10 to 50 years in which mean age is 27 years. Male patients were 73(66.97%) while females were 36 (33.02%). Male to female ratio was 2.02:1, there was male predilection and there was high predilection in 10-20 years age group. Patients were randomly allotted into group spinal anesthesia (A) and general anesthesia group (B). Group A – Spinal Anesthesia group included 64(58%) patients in which 41 (64.06%) were male and 23 (35.93%) were female. Group B general anesthesia group included 45(41.28%) patients in which 27(60%) were male and 18(40%) were female shown in table 1 and table 2.

Table-1 Distribution according to age

Age group (yrs)	Male	Female
10-20	36	27
21-30	21	04
31-40	11	03
41-50	05	02

Table-2 Group wise distribution regarding age and sex

Age group	Group –A		Group-B	
	Male	Female	Male	Female
10-20	25	11	11	16
21-30	12	02	09	02
31-40	05	01	06	02
41-50	03	01	02	01

Table – 3 shows the heart rate at different points during the surgery in group- A and group- B. Patients who are under general anesthesia have a somewhat greater heart rate than those who are under spinal anesthesia.`

Table – 3 Difference between A group and B group in terms of mean Heart rate at different points in times.

Mean HR	Group-A	Group-B
	Mean ± SD	Mean ± SD
Basal	85±2.57	86±1.77
After induction	75±1.75	90±1.05
Intra op15 min	80±3.17	99±2.47
intra-op 30 min	85±1.19	95±2.83
Intra-op 45 min	83±2.25	91±2.05
Intra-op 60 min	79±2.07	90±1.27
Post op 1 hour	84±1.18	93±3.77
Post op 2 hour	85±3.69	94±3.09
Post op 4 hour	80±2.83	96±2.33
Post op 8 hour	81±2.67	92±1.25
Post op 12 hour	83±3.62	89±2.82

Table – 4 demonstrates the mean arterial blood pressures in both group A and B at different levels during the surgery that shows slightly high readings in patients of group B group as

opposed to the patients of group A. Table – 4 Mean Arterial Blood Pressure at different points in times Comparison between A group and B group regarding

Mean ABP	Group - A	Group - B
	Mean ± SD	Mean ± SD
Basal	100.11 ± 2.08	100.23 ± 1.25
Intra op 15	84.7 ± 3.61	93.42 ± 2.87
Intra op 30	86.9 ± 3.69	92.22 ± 2.95
Intra op 45	85.52 ± 4.14	91.04 ± 3.45
Intra op 60	86.21 ± 5.86	91.86 ± 4.17
Post op 1 h	92.3 ± 2.8	107.76 ± 2.37
Post op 2 h	94.01 ± 3.31	109.65 ± 2.88
Post op 4 h	96.35 ± 2.72	105.22 ± 2.29
Post op 8 h	97 ± 2.65	103 ± 2.78
Post op 12 h	98.05 ± 3.81	101.38 ± 3.38

In table- 5 we found the oxygen saturation of patients of the both groups A & B, which does not show much of the differences. Table – 5 A and group B showing arterial oxygen saturation at different measuring times in A group and B group.

Mean ABP	Group – A	Group - B
	Mean ± SD	Mean ± SD
Basal	99± 1	99±1
Intra op 15	98±2	98±1
Intra op 30	97±2	98±1
Intra op 45	98±2	98±1
Intra op 60	99±2	98±1
Post op 1 h	98±2	96±2
Post op 2 h	97±2	97±1
Post op 4 h	99±2	98±1
Post op 8 h	98±2	99±1
Post op 12 h	99±2	99±1

Out of 64 patients under gone the spinal anesthesia, 04 (6.25%) patients converted to the general anesthesia due to severe abdominal discomfort or vomiting or severe anxiety shown in table – 6. Table – 6 Conversion of spinal anesthesia to general anesthesia

Total number of the patients converted to general anesthesia from spinal anesthesia
04

We found hypotension in 05 (07.81%) patients in A group while in 03 (8.33%) patients in B group, hypothermia in 2 (3.12%) patients in group-A while in 8 (22.22%) patients in group –B shown in table- 7 Hypoxemia in 1 (1.5%) patient in group A and 01 01(2.7%) patient in group-B was found. There was severe abdominal discomfort in 9 (14.06%) patients in group-A from which 04 (6.25%) patients were converted to general anesthesia while no abdominal discomfort was found in group-B shown in table- 7

Table- 7 Perioperative Complications

Complications	GROUP-A (%age) 64	GROUP-B (%age)
Hypotension	05(07.81%)	03 (8.33%)
Hypothermia	02(3.12%)	08(22.22%)
Hypoxemia	06 (9.37%)	05(13.88%)
Abdominal discomfort	09 (14.06)	00(00%)

We discovered that In terms of post-operative discomfort, the VAS in the A group was lower than the VAS in the B group. VAS was lower at same intervals of time after surgery in A group

as compared to B group and the number of ketorolac injections were needed for pain relief in first 12 hours postoperatively was doubled in the B group shown in table -8.

Table- 8 Post-operative pain

Pain	Group (A)	Ketorolac injections given	Group (B)	ketorolac injections given
	VAS		VAS	
At 1 hour	00±2		09±1	Ketorolac given
At 2 hours	03±1		02±2	
At 4 hours	08±1	Ketorolac given	03±1	
At 8 hours	05±1		07±1	Ketorolac given
At 12 hours	02±2		03±1	

In post-operative complications, nausea and vomiting was much higher 11(30.55%) in B group as opposed to A group which is in 10 (15.62%) patients. Conversely hypotension was slightly in higher number of patients 12 (18.7%5) in group-A as compared to group- B 04(11.11%). Hypothermia was found in 01(1.56%) patient in group-A while in 02(5.55%) patients in group – B .postoperative head ach which is higher in spinal anesthesia group-A 04(6.25%) as compared to general anesthesia group-B 02(5.55%). Urinary retention was found in 07(10.93%) patients in A group and in 01(2.77%) patients in B group shown in table- 9.

Table- 9 Post-operative Complications

Complications	GROUP-A (%age)	GROUP-B (%age)
Nausea /vomiting	10 (15.62%)	11(30.55%)
Hypotension (BP less than 100/70)	12 (18.7%5)	04(11.11%)
Hypothermia	01(1.56%)	02(5.55%)
Headache	04(6.25%)	02(5.55%)
Urinary retention	07(10.93%)	01(2.77%)

As far as hospital stay is concerned, we found the less hospital stay in the spinal anesthesia group which is 2.5 days in the patients of age group 10-20, 3 days in 21-30, 4 days in 31-40 and 4.5 days in age group41-50 years. While we found slight higher hospital stay in general anesthesia group which is 3, 4, 5 and 5.5 days respectively in 10 to20, 21 to 30, 31 to 40 and 41to 50 years of age group. (Table- 10)

Table-10 Hospital stay

Age group	GROUP-A (%age)	GROUP-B (%age)
10-20	2.5 days	3 days
21-30	3 days	4 days
31-40	4 days	5 days
41-50	4.5 days	5.5 days

DISCUSSION

The male-to-female ratio in individuals with acute appendicitis in our study was 2.02:1, whereas Ansar Latif et al found that Pakistani population has a male-to-female ratio of 1:3.20.[11]. Our study showed the high frequency of appendicitis in males while Naveen K et al[12] published another study that found that in the south Indian population, acute appendicitis is more common in females than in males, showing that there are racial and seasonal disparities in the onset and presentation of acute appendicitis.

According to our findings majority of individuals with acute appendicitis are between the ages of 11 and 20. i.e., 63(57.79%). while the same finding of high frequency of appendicitis in age group 11-20 years 186(53.00%) are noted by the Ansar et all in his study[11] While a study by Addiss DG et al[13] found that patients aged 10 to 19 years old were the most likely to develop acute appendicitis while a research conducted by Hanumant P Lohar, et al[14] found that patients aged 11 to 20 years had the highest incidence of acute appendicitis at 44.60 percent.

Our findings revealed a decreased incidence of hypotension in patients undergoing spinal anesthesia peroperatively 05(07.81%), compared to 39.3 percent in Ansar latif's study[11] and 40 percent in Mohamed Ellakany15's study.

Our study revealed the incidence of hypoxemia was 06 (09.37%) patients in

group-A vs. 05(13.88%) in group-B while the study of Ansar latif et all [11] shows 8.9% in spinal vs 8.3% in general anesthesia while according to Ji Sun et al[16], Hypoxemia was seen in 26.7 percent of patients who had general anesthesia with fentanyl, propofol, or succinylcholine indicating that differences in induction techniques and induction medicines were to blame for the variance in hypoxemia incidence. Hypoxemia was found in 8.1 percent of individuals undergoing general anesthesia with intubation While a study by Jesse M. Ehrenfeld et al[17] revealed that Hypoxemic events were detected in 6.8% of patients undergoing non-cardiac surgery under general anesthesia throughout the intra operative period, indicating that hypoxemia still occurs in the per operative and postoperative period despite technological advancements and deployment.

In comparison, a Pakistani study[11] indicated that spinal anesthesia causes 0.3 percent more hypothermia than general anesthesia, which is also corroborated by Steven M. Frank et al.[18] , our study found hypothermia in 2 (3.12 percent) patients intra operatively in the A group and 2 (5.5 percent) patients in the B group.

Our study found that after surgery nausea, vomiting was much higher 11(30.55%) in B group as compared to A group 10 (15.62%) as also seen in the study conducted by ansar latif [11] that Patients operated under general anesthesia with intubation had a 38.40 percent incidence of PONV while Benjamas Apipan et al[19], who found that the total incidence of PONV was 25.26 percent, with the discrepancy due to the absence of an antiemetic prior to surgery.

In our study, patients who underwent general anesthesia had higher postoperative pain than those who underwent surgery in spinal anesthesia that had less pain in postoperative period and so need less analgesic medicines in initial dozen hours. In comparison to general anesthesia, Ninnie Borendal Wodlin et al[20] found that the cost of spinal anesthesia is low, quick to recover, and has few issues. Our data demonstrate that spinal anesthesia is comparatively effective & safe with few complications during and after surgery.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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