ORIGINAL ARTICLE

Effectiveness of Anaesthesia for Appendicectomy: comparison of spinal anaesthesia with other modalities being practiced in Emergency Department of Allama Iqbal Memorial Teaching Hospital.

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ABSTRACT

Aim: To determine the effectiveness, relative intra and post operative complications, postoperative recovery and cost effectiveness of spinal anaesthesia (SA) /regional anaesthesia (RA) compared with other modalities for appendicectomy.
Study Design: Prospective, comparative observational study.
Time and Place of study: Department of Anaesthesia and Surgery; Allama Iqbal Memorial Teaching Hospital, Sialkot from 1st August 2016 till 31 July 2017.
Methods: All patients undergoing appendectomy in specified time period with ASA (American society of Anesthesiologists) I and ASA II and having completed follow up of 2 months were included in study. Patients having perforated appendix undergoing laprotomy, with known history of Diabetes Mellitus, having ASA III, ASA IV , ASA V, having previous surgery, patients who left against medical advice and those who didn't completed the follow up of 2 months were excluded from study.
Results: Out of 350 patients that were included 328(93.75%f) patients had acute appendicitis while 22(6.28%) of patients doesn't had acute appendicitis on peroperative diagnosis. Male to female ratio was 1:3.20 Group I – Spinal Anaesthesia included 112(32%) patients, Group II (A) general anaesthesia with intubation included 123(35.14%) patients, while Group II (B) general anaesthesia without intubation included 115(32.85%) patients. Maximum number of patients lies in 11-20 years age group i.e., 186(53.00%).
Conclusion: Spinal anaesthesia is a safe, cost effective with minimal per and postoperative complications, efficient and effective modality for appendicectomy in emergency setting as compared to other modalities like general anaesthesia with or without endotracheal intubation.
Keywords: General anaesthesia, spinal Anaesthesia, Intubation, appendicectomy,

INTRODUCTION

Acute appendicitis is the most common surgical emergency that most of the time leads to a surgical intervention. Study showed that approximately 250,000 cases of acute appendicitis are diagnosed and subsequently treated in US annually[1]. Acute appendicitis frequently occurs in age group ranging from of 10 and 20 years. Lifetime risk for Acute Appendicitis is 8.6% risk for males, 6.9% for females, while appendicectomy rate reported in U.S is 12% males, 23% females.[2]. Study and data on appendicitis and choice of mode of anaesthesia being employed is still scarce in the Pakistani and Asian population as most of the study is being conducted on western population [3]. Approximately, every one in six person suffer from acute appendicitis in his life time. However, some cases of appendicitis are managed conservatively depending upon the time of developing symptoms to presentation at a health care facility which encompasses the patient delay and physicians delay [4,]. As acute appendicitis is the most common surgical emergency the type of anaesthesia which can be given in appendicectomy must show reduce intra and post operative complication. Apart from type of anaesthesia being administered following variable also effect postoperative recovery i.e. age , BMI, duration and effectiveness of anaesthesia, any co-morbidity effecting recovery e.g., Renal, hepatic or cardic failure, preoperative hypertension, intraoperative hypothermia and postoperative pain and mobility. Anaesthesia of choice for doing appendectomy is general anaesthesia with endotracheal intubation in patients having no contraindications and who maintain end-tidal carbon dioxide around 35mmHg

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Intraoperatively, however spinal/regional anaesthesia and general sedation can be used for this emergency procedure. Regional/spinal anaesthesia does provide several advantages over general anaesthesia in terms of cost-effectiveness, requiring no airway manipulation, quicker recovery, with effective post-operative pain relief, , shorter post-operative stay, and reduced Postoperative nausea and vomiting [5]. Ellakany, studied 40 patients undergoing comparable surgical procedure receiving either general or segmental thoracic spinal anaesthesia, he founded superior post-operative analgesia and significantly better spinal anaesthesia satisfaction scores among patients in the spinal anaesthesia group. Ellakany also found a 40% incidence of significant hypotension and about 25% incidence of abdominal discomfort in patients receiving spinal anaesthesia , which were easily managed, no patient had complications such as nausea and vomiting in the spinal anaesthesia group[6].

Spinal anaesthesia does provide advantage in term of cost effectiveness however no advantage in term of length of postoperative hospital stay observed [7]. General anaesthesia with intubation encompasses a wide range of both intra and post-op complication along with being expensive and need for presence of highly skilled anesthetist. Spinal anaesthesia can also be given safely in pregnant patients who suffered from acute appendicitis as it has minimal to no effect on fetal well being as compared to other anesthetic drugs some of which are teratogenic[8].

Spinal anaesthesia however results in low range of complication, cost effective and need less skill as compared to general anaesthesia with intubation[9]. So we can say that although general anaesthesia with intubation will remain anaesthesia of choice but spinal anaesthesia can be comparable with general anaesthesia and in centers where highly skilled anesthetist is not present then spinal anaesthesia can be given confidently and cost effectively. Spinal anaesthesia can also be given spinal anaesthesia safely in children with 97% success rate and minimal complication[10].

RESULTS

In our study initially data of 400 patients included of which 15 patients left against medical advice, 20 patients didn't completed the follow up visits and 15 other patients were excluded according to exclusion criteria. Out of 350 patients that were included 328(93.75% of) patients had acute appendicitis while 22(6.28% of) patients doesn't had acute appendicitis on peroperative diagnosis. 76%(266 pt.) appendix found were inflamed followed by mass formation with 9.7%(34 pt.). 52.6%(184 pt.) of appendix found was retroceacal in position followed by 32.6%(114 pt) with pelvic and 10.6%(37 pt.) wih subceacal position, preileal present in 2.8%(10 pt.) while postileal in 1.3%(5 pt.)of study subjects. 94.7% of patients before undergoing emergency appendectomy were made NPO and remaining was operated after they were successfully made NPO.

The age group frequencies were 1-10 years 35(10.00%), 11-20 years 186(53.00%), 21-30 years 80(22.80%), 31-40 years 40(11.40%), 41-50 years 9(2.6%). indicating the maximum incidence of acute appendicitis is in 11-20 years age group followed by 21-30 years age group. Table 2 shows the relative complications when different type of anaesthesia were given on the individuals.

Of the total subjects general anaesthesia with intubation was effective in 100% of subjects while spinal/regional anaesthesia was effective in 73.2% of patients undergoing appendectomy with no need for repetition of anaesthesia. However in the remaining 26.8% of subjects we need to convert primarily administered anaesthesia either into the general anaesthesia with intubation or general anaesthesia without intubation. 80.9% of patients on whom general anaesthesia without intubation was employed needed additional anaesthesia drug dosages at some stages peroperatively.

Relative correlation was found between the stage at which anaesthesia gases were turned off and time of recovery in general anaesthesia with intubation. It was seen that 63% of patients showed response in term of detection of pain at any part of body to painful stimulus within 1 minute (after aseptic dressing of wound) ,when anaesthesia gases were turned off peropertively (at stage where surgeon had closed external oblique muscle). While 33% of subject showed response to painful stimulus after 1-2min of dressing. However response to painful stimulus after dressing in spinal anaesthesia was 80% within 1 minute. While response was delayed in some patients undergoing spinal anaesthesia /regional anaesthesia because of addition of other anaesthesia drugs. Response to pain on lower half of body in patients undergoing spinal/regional anaesthesia (below umbilicus) were delayed in 90% of patients until 6 hours postoperatively. Patient on whom general anaesthesia without intubation was employed had only 20% response to pain after 1min.

Postoperative pain was recorded using an 11-point visual analogue scale (VAS)

A study was also directed to see the effectiveness of spinal/regional anaesthesia and the occurrence of situations which causes ineffective anaesthesia. Fig 2 show the relative percentage **(**%) of effective and ineffective anaesthesia alongwith the percent(%) distribution of causes for this.

Fig 3: Time at which Aldrete and Kroulick post anaesthesia recovery score of >7 were achieved. Variations in recovery time occur because of addition of other anaesthesia agents/drugs, in case of ineffective or insufficient anaesthesia.

In terms of cost effectiveness spinal/regional anaesthesia proved to be cost-effective when compared with general anaesthesia with intubation and general anaesthesia without intubation. It is seen that one patient who is undergoing appendectomy in spinal anaesthesia had about 200 rps/2$ cost inclusive of (sensocaine spinal 2ml (bupivacaine hcl=7.5mg, inj dextrose =82.5mg), Metoclopramide 2ml, adrenaline, ranitidine and 2 (1000ml iv R/L drips)) while General anaesthesia with intubation cost approximately 2410rps or 25$ inclusive of (atracuriam 2.5ml, neopylrolate 1ml, suxamethonium 2ml, propofol 20ml, isoflurane 100ml).

In our study it was observed that patient of age exceeding 30 years, patient who had grade 2 hypertension and weight above IBW of that age were preferably given spinal anaesthesia in respective to general anaesthesia with intubation while patient below age of 20 years and weight in range of IBW respective to that age with no co-morbidities were given General anaesthesia with or without intubation. Patient falling under 20-30 years were given either Spinal / regional anaesthesia or General anaesthesia with intubation.

Post operatively incidence of spinal headaches and backache was observed in follow up visits. Patients were asked about post spinal/ dural headache and post spinal/ dural backache during their 4 consecutive OPD visits. Following table depicts the relative incidence of post spinal headache and backache.

Table 1: General demographic data

Total patients in the study	350	100%
Sex (m:f)	83:267(1:3.21)	23.71%:76.28%
Group I	112	32.0%
Group II	238	68.0%
G/A with intubation	123	35.14%
G/A without intubation	115	32.85%

Table 2: Peroperative Complications

Type of anaesthesia	**Complications**	**Frequency**	**%age**
spinal / regional anaesthesia	Hypotension	44	39.3
	Hypothermia	5	4.5
	Hypoxemia	10	8.9
	none / no complication	53	47.3
	Total	112	100
General anaesthesia with intubation	Hypotension	12	9.8
	Hypoxemia	10	8.1
	Others	14	11.4
	none / no complication	87	70.7
	Total	123	100
General anaesthesia without intubation.	Hypothermia	5	4.3
	Hypoxemia	50	43.5
	Others	13	11.3
	none / no complication	47	40.9
	Total	115	100

Table 3: Incidence of post spinal/dural headche and backache.

Type of anaesthesia	**Complications**	**Frequency**	**%age**
Spinal / epidural anaesthesia	Post spinal / dural headache	Yes =6	5.66
		No =106	94.64
	post spinal /dural backache	Yes =11	9.82
		No =101	90.17
		Total=112	

Fig 1: Postoperative complication from the administered anaesthesia.

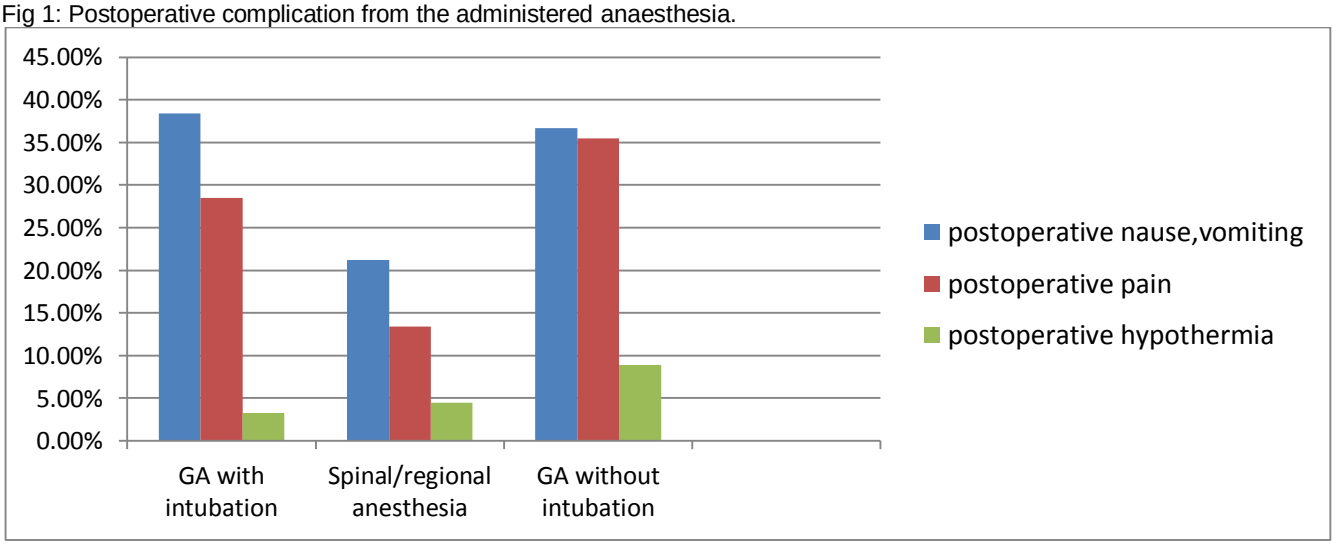


Fig 2: Causes of ineffective spinal/regional anaesthesia.

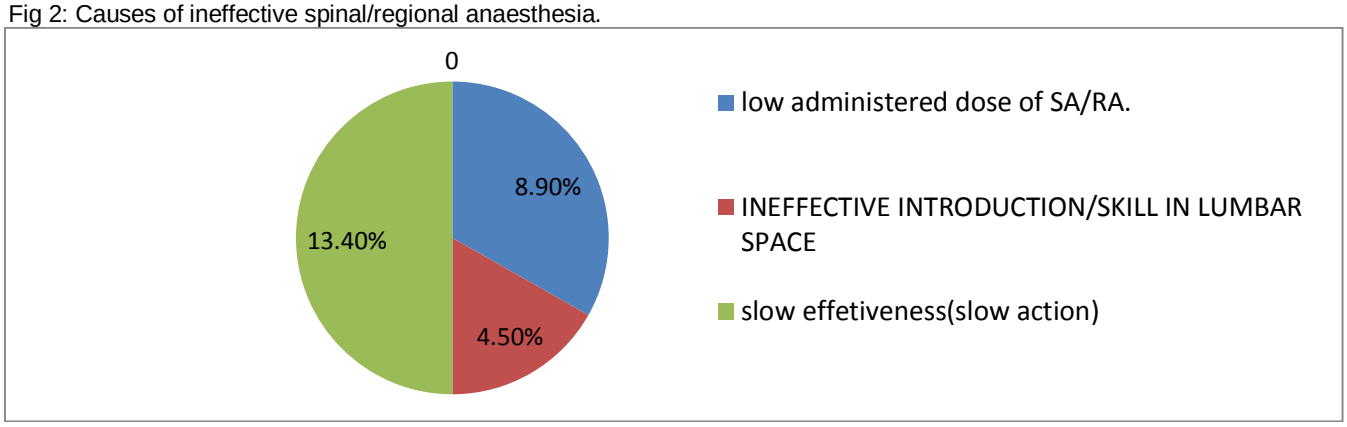
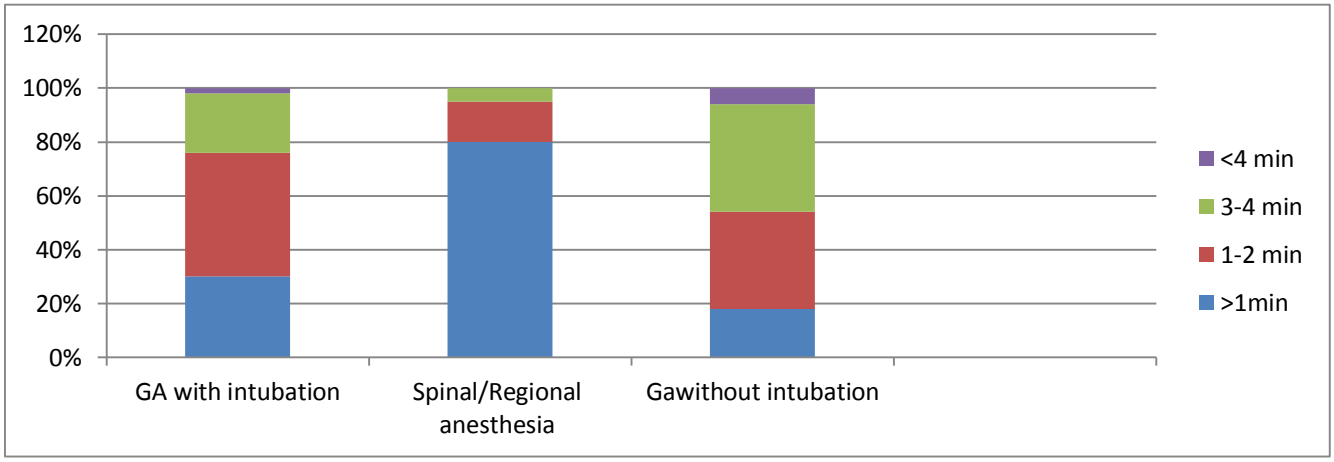


Fig.3: Aldrete and Kroulick post anaesthesia recovery score.



DISCUSSION

Our study shows that the male to female ratio in patients suffering from acute appendicitis was 1:3.20 while the study conducted by D J Humes et al [11]showed male to female ratio of 1.4:1 in U.S population while another study conducted by Naveen K et al[12] shows that acute appendicitis frequency and cases presented mostly in females as compared to male in south Indian population indicating that racial and seasonal difference do exist which effect the onset or presentation of acute appendicitis.

Our study showed that the patients who suffered from acute appendicitis mostly lie in the age group of 11-20 years 186(53.00%) while the study conducted by Addiss DG et al[13] showed that the highest incidence of acute appendicitis were in the age group of 10-19 years, while the study conducted by Hanumant P Lohar, et al[14] showed that incidence of acute appendicitis was 44.60% in patients having age group between 11-20 years (highest comparative to other age groups).

Our study showed that the incidence of hypotension in patient under spinal anaesthesia peroperatively was 39.30% while the study of Mohamed Ellakany[15] showed the incidence of hypotension was 40%. 9.8% of patients undergoing general anaesthesia with intubation developed hypotension although they were managed preoperatively as Mohamed Ellakany[15] said in his study that hypotensive incidents were easily controlled in patients who underwent general anaesthesia with intubation.

Our study showed that the incidence of hypoxemia was 43.50% in patient who underwent general anaesthesia without intubation while the study of Ji Sun et al[16] shows that the incidence of hypoxemia in patient who underwent general anaesthesia with fentanyl, propofol, succinylcholine was 26.7% showing that the difference in hypoxemia incidence was due to differences in induction techniques and induction drugs and the relative dose adjustments . The incidence of hypoxemia in patients undergoing general anaesthesia with intubation was

8.1% while study of Jesse M. Ehrenfeld et al[17] showed that during the intraoperative period, 6.8% of patients undergoing non-cardiac surgery under general anaesthesia had hypoxemic event indicating that despite advancement and implementation of modern technology hypoxemia still continue to occur in peroperative and postoperative period.

Our study shows that the incidence of hypothermia Intraoperatively was 0.3% more in spinal anaesthesia as compared to general anaesthesia without intubation as also showed in the study of Steven M. Frank et al[18] indicating that hypothermia do occur in patients undergoing spinal anaesthesia.

Our study showed that postoperative nausea, vomiting, were more pronounced in patients having undergone general anaesthesia with intubation with 38.40% incidence as supported by study done by the Benjamas Apipan et al[19] indicating overall incidence of PONV was 25.26%, basic difference arises because no prophylaxis were given for postoperative nausea and vomiting. Postoperative pain was more pronounced in patient undergoing general anaesthesia without intubation having incidence of 35.50% indicating highest postoperative pain as compared to other spinal anaesthesia which has low postoperative pain and subsequent low analgesia requirement in first 12 hours.

Our study shows that spinal anaesthesia is more cost effective as compared to other modalities of anaesthesia currently employed with a statistically significant difference as also endorsed by the study of Ninnie Borendal Wodlin et al[20] showing cost effectiveness and fast recovery of spinal anaesthesia as compared to general anaesthesia.

CONCLUSION

Spinal anaesthesia is a safe and effective modality for appendicectomy in emergency setting with less morbidity in preoperative as well as postoperative course of the disease as compared to other modalities like general anaesthesia with or without endotracheal intubation.

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