COMPARISON OF VERTICAL AND HORIZONTAL TRANSPERITONEAL INCISIONS IN ABDOMINAL AORTIC SURGERY: A RETROSPECTIVE ANALYSIS

[Dr. ADITYA GUPTA]

MCh VASCULAR SURGERY

2023

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES ANDTECHNOLOGY,

TRIVANDRUM

An Institution of National Importance established by an Act of the Indian Parliament
(ActNo.52 of 1980)

Dept. of Science and Technology, Govt. of Indiawww.sctimst.ac.in

COMPARISON OF VERTICAL AND HORIZONTAL TRANSPERITONEAL INCISIONS IN ABDOMINAL AORTIC SURGERY: A RETROSPECTIVE ANALYSIS

A THESIS SUBMITTED BY

[Dr. ADITYA GUPTA]

TO

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES

AND TECHNOLOGY, TRIVANDRUM.

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FORTHE AWARD OF

MCh VASCULAR SURGERY

2023

DECLARATION BY THE STUDENT

CERTIFICATE

I, **Dr Aditya Gupta**, **Department of CVTS, Division of Vascular Surgery** hereby certify that I had personally carried out the work depicted in the thesis titled, "**Comparison of vertical and horizontal transperitoneal incisions in abdominal aortic surgery: a retrospective analysis**".

No part of this thesis has been submitted for the award of any other degree or diploma prior to this date.

Signature

Dr Aditya Gupta

Date 28/06/23

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

CERTIFICATE BY THE RESEARCH GUIDE

Name of the Guide: **Dr.Varghese T. Panicker**
Division/Department: **Department of CVTS**

This is to certify that **Dr Aditya Gupta**, **Department of CVTS, Division of Vascular Surgery** of this institute has fulfilled the requirements prescribed for the **MCh Vascular Surgery** degree of the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

The thesis entitled, "**Comparison of vertical and horizontal transperitoneal incisions in abdominal aortic surgery: a retrospective analysis"** was carried out under my direct supervision. No part of the thesis was submitted for the award of any degree or diploma prior to this date.

*Clearance was obtained from the Institutional Ethics Committee / Institutional Animal Ethics / Institutional Committee for Stem Cell Research / Other appropriate committees (if any, specify) for carrying out the study.

Signature
Dr Varghese T. Panicker

Date 28/02/23

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

CERTIFICATE BY THE RESEARCH CO-GUIDE

Name of the Guide: **Dr P Shivanesan**
Division/Department: **Department of CVTS, Division of Vascular Surgery**

This is to certify that **Dr Aditya Gupta**, **Department of CVTS, Division of Vascular Surgery** of this institute has fulfilled the requirements prescribed for the **MCh Vascular Surgery** degree of the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

The thesis entitled, "**Comparison of vertical and horizontal transperitoneal incisions in abdominal aortic surgery: a retrospective analysis"** was carried out under my direct supervision. No part of the thesis was submitted for the award of any degree or diploma prior to this date.

*Clearance was obtained from the Institutional Ethics Committee / Institutional Animal Ethics / Institutional Committee for Stem Cell Research / Other appropriate committees (if any, specify) for carrying out the study.

Signature
Dr P Shivanesan

Date 28/08/23

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

APPROVAL OF THE THESIS

The thesis entitled

COMPARISON OF VERTICAL AND HORIZONTAL TRANSPERITONEAL INCISIONS IN ABDOMINAL AORTIC SURGERY: A RETROSPECTIVE ANALYSIS

Submitted by

Dr ADITYA GUPTA

for the degree of

MCh VASCULAR SURGERY

of

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM

is evaluated and approved by

.....

(Guide: **Dr.Varghese T. Panicker**)

.....

(Name & Signature of thesis examiner)

ACKNOWLEDGEMENTS

I would like to show my appreciation to the many people who have helped bring this study to fruition.

Firstly, I want to thank my Parents, family, wife and children for their constant support. I owe who I am and what I have achieved to their unconditional love and support.

I am highly indebted to my supervisor, Dr Varghese T Panicker, Professor, Department of CVTS, SCTIMST, for being the best mentor any one can ask for. He has supported me throughout my thesis with patience and knowledge whilst allowing me the room to work in my own way.

My mentor and co-guide, Dr P Shivanesan, Associate Professor, Division of Vascular surgery, Department of CVTS, is an inspiration, not only as a doctor and a surgeon, but as a human being as well. His commitment to teaching and patient care is par excellence. I am blessed and thankful to be his student.

I want to thank Dr Vivek V. Pillai, Head of Department, Department of CVTS, for his support and guidance. I would also like to thank Dr Baiju S. Dharan, Dr Bineesh, Dr Sabarinath, Dr Sudip, Dr Sowmya, Department of CVTS.

I thank my seniors Dr Ashutosh Pandey and Dr Sriram, who have been encouraging throughout this course. I also thank my colleagues Dr Neelam, Dr Akash, Dr Sandeep and Dr Prashant, for sharing this experience with me.

I am grateful for having my friends who were always there for me and supported me throughout this journey.

Lastly, I would like to thank the patients, without whom this study would not have been a reality.

August 2023 Dr Aditya Gupta

TABLE OF CONTENTS

Sl. No.	PARTICULARS	PAGE NO.
1.	Declaration by the student	iii
2.	Certificate by the Research Guide	iv
3.	Certificate by the Research Co-Guide	v
4.	Approval of thesis	vi
5.	Acknowledgements	vii
6.	Table of contents	ix
7.	List of Abbreviations	x
8.	List of Tables	xi
9.	List of Images	xii
10.	Synopsis	1
11.	Introduction	5
12.	Review of Literature	8
13.	Materials and Methods	14
14.	Results	17
15.	Discussion	28
16.	Summary and Conclusion	33
17.	References	34
18.	Annexures CVs Ethics Committee Approval Plagiarism check report Master sheet	

LIST OF ABBREVIATIONS

S.No	Abbreviation	Full Form
1	AAA	Abdominal aortic aneurysm
2	ICU	Intensive care unit
3	POD	Postoperative day
4	CT	Computerized tomography
5	DM	Diabetes mellitus
6	HTN	Hypertension
7	CKD	Chronic kidney disease
8	CVA	Cerebrovascular accident
9	COPD	Chronic obstructive pulmonary disease
10	CAD	Coronary artery disease

LIST OF TABLES

Table No	Table Caption	Page No
Table 1	Division of cases based on the incision	17
Table 2	Baseline characteristics of the study population	18
Table 3	Mean values of the Baseline Characteristics including SBP, DBP, HR, RR and SpO_2	20
Table 4	Comparison between vertical and horizontal incision categories by chi-square values	21
Table 5	Comparative presentation of perioperative outcomes	23
Table 6	Comparison of perioperative outcomes of ICU stay, IV analgesia post epidural removal and postoperative hospital stay in two groups	25
Table 7	Comparative analysis of postoperative ileus in vertical and horizontal incision group	27

LIST OF IMAGES

Table No	Image Caption	Page No
Image 1	Division of cases based on the Sex	17
Image 2	Distribution of the cases according to smoking history and preoperative abdominal pain	19
Image 3	Graphical representation of comparison between the two groups based on comorbidities	22
Image 4	Graphical representation of the perioperative outcomes in the Vertical and Horizontal group	24
Image 5	Graphical presentation of the perioperative consequences in the Vertical and Horizontal group for ICU stay, IV analgesia post epidural removal and hospital stay post operatively.	26
Image 6	Graphical presentation of postoperative ileus in vertical and horizontal incision groups	27

SYNOPSIS

COMPARISON OF VERTICAL AND HORIZONTAL TRANSPERITONEAL INCISIONS IN ABDOMINAL AORTIC SURGERY: A RETROSPECTIVE ANALYSIS

SYNOPSIS BY

Dr ADITYA GUPTA

for the degree of

MCh VASCULAR SURGERY

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM

SYNOPSIS

Patients with abdominal aortic aneurysm (AAA) may be treated with endovascular intervention or open surgical repair. Despite possibility of retroperitoneal approach for open surgery, many surgeons prefer transperitoneal approach. Transperitoneally aortic exposure may be done by longitudinal or vertical incision. Transverse incisions are thought to be less painful and have less perioperative complications as compared to vertical midline incision, but the reports to this effect are not conclusive. For the patient, pain relief and rapid return to normal function is important, but still without sufficient evidence the choice of incision is usually based on surgeon's preference rather than any patient criteria. Grantcharov et al review of RCTs concluded advantage of transverse incision in postoperative complications, but favoured midline laparotomy for emergency surgeries. In a study of 50 patients undergoing elective aortic surgery Peter et al concluded that type of incision used may be based on surgeon's preference as there was no statistically significant difference between postoperative complications in vertical and transverse incision groups. As most of the data on choice of incision for aortic surgery is inconclusive, a retrospective study from this Institute may contribute to achieve some concrete evidence on the above subject.

As per the protocol, 52 consecutive cases were selected from the institute's data base with 26 cases each in vertical and horizontal incision group. The

comparability of the groups was established by running a student's t test on the baseline characteristics. The mean difference was not found to be statistically significant for the groups hence eliciting that the groups formed are comparable to produce meaningful results.

The comparison of the perioperative consequences of the vertical and horizontal incision rendered insightful results. There was no significant difference in the ventilation requirement in the two study groups in the perioperative period. Probably, with good preoperative optimization and perioperative epidural pain relief, patients can be extubated early irrespective of the type of incision.

Further, postoperative analgesia requirement was assessed in both the groups. The comparison of this parameter was done using number of days of IV analgesia requirement post epidural analgesia termination. No statistically significant difference was found in two groups.

The duration of hospital stay postoperatively was found to be significantly lesser in the cases with horizontal incision when compared to their transverse incision counter parts. Another interesting finding of the study with respect to the perioperative outcomes has been development of postoperative ileus, the mean difference of the postoperative ileus in the two groups has been found to be statistically significant with p value < 0.05. Both these perioperative measures strongly indicate towards the horizontal incision as a better choice for the AAA surgery when compared to vertical incision. Another outcome that was analysed was the postoperative ICU stay in patients operated using vertical or horizontal incision. The mean value was not found

to be statistically significant to infer the effectiveness of either of the incision to reduce the ICU stay.

To conclude, this study aimed to investigate the impact of incision type in elective open AAA repair on perioperative outcomes. While the debate on this topic persists in the literature, our findings suggest that horizontal incisions offer advantages. They are associated with reduced postoperative ileus and shorter hospital stays compared to vertical incisions. However, the study couldn't establish the same advantage in terms of postoperative ventilation and analgesic requirements. The study's limitations, including a small sample size, short follow-up duration, and retrospective design, highlight the need for future research with a prospective approach, larger sample size, and longer follow-up. Despite limitations, the study indicates that horizontal incisions yield better perioperative outcomes, potentially alleviating financial burdens on patients and healthcare systems due to decreased hospitalization duration.

INTRODUCTION

A meticulously planned incision is critical to the performance of any surgical procedure. A surgically good abdominal incision is the one that is made relatively quickly, gives a better exposure of the intra-abdominal viscera, can be easily extended, is associated with the fewer post-operative complications and eventually provides better strength to the abdominal wall resulting in fewer wound dehiscence and hernia. Lastly, the cosmetic and aesthetic outcome should also be in the plan of action. The open abdominal aortic aneurysm (AAA) repair traditionally requires a long incision. The incisions used to explore the abdominal cavity can be either vertical or horizontal incision. With the advent of the multipurpose Omni-tract abdominal retractor, equal access to the abdominal aorta can be had through vertical and horizontal abdominal incisions. Horizontal incisions are thought to be less painful and have less perioperative complications as compared to vertical midline incision, but the reports to this effect are not conclusive. A vertical midline incision is still the incision of choice in the conditions that require rapid intra-abdominal entry like in case of a trauma or where the preoperative diagnosis is uncertain as it is quicker and can be easily extended (9). As a general rule of thumb, the choice of surgical incision is determined by access, the elective or emergency nature of the case and personal preference of the operating surgeon. It can be safe to say that incisional approach to treat the aortic aneurysms are largely based on the patient factors and surgeon experience/choice (5,20). However, the perioperative parameters like postoperative ventilatory and analgesic requirements, duration of Intensive care unit (ICU) and

hospital stay can be considered as the consequences that need consideration and validation. The Cochrane review on horizontal and vertical midline incisions on abdominal surgeries also reported almost same rate of pulmonary complications and recovery time for the two groups and concluded choice of incision to be surgeon's preference (3).

As on date, most of the data on choice of incision for aortic surgery is inconclusive. The paucity of conclusive data demands that more light be shed on these perioperative variables. In view of these circumstances, a retrospective study from this centre may contribute to achieve some concrete evidence on the above subject.

AIMS OF STUDY

To study the effect of type of incision on

1. Duration of postoperative ventilatory requirements and ICU stay.

2. Requirement of postoperative analgesia.

3. Presence of prolonged postoperative ileus

3. Duration of overall postoperative hospital stay.

REVIEW OF LITERATURE

'Research is to see what everybody else has seen, and to think what nobody else has thought'.

Albert Szent-Gyorgyi

The purpose of the present study is to evaluate the impact of type of incision administered by the surgeon in abdominal aortic aneurysm (AAA) on the perioperative outcomes that include duration of ventilatory support, postoperative analgesia requirements and duration of ICU and hospital stay postoperatively.

Types of Incisions

The open AAA repair traditionally requires a long incision. The incisions used to explore the abdominal cavity can be typified as vertical and horizontal incisions. Vertical incision may further be classified as midline (median), para median or wide para median.

Anatomical considerations for the incision in Abdominal Surgery

Perioperative morbidity in patients undergoing AAA surgery is often due to cardio vascular, pulmonary and ischemic events

Langer's lines of cleavage cross the skin of the anterior abdominal wall in a generally transverse direction. An incision parallel to these lines will therefore cause the least structural and cosmetic damage to the skin. Further, the musculature of the anterior abdominal wall is comprised of two groups, the flat muscles (external oblique,

the internal oblique and the transverses abdominus) and the rectus muscles. The fascial fibres of the anterior abdominal wall lie in the transverse direction. A vertical incision therefore divides them, and the suture closure of such vertical wounds places the suture material between the fibres. Contraction of the abdominal wall causes laterally directed tension on the closure line and might cause the suture material to cut through by separation of the transversely oriented fibres (24). Contrary to this, a horizontal incision opens the fascia along the fibres so that closure places the suture material around fascial fibres. On contraction, the fibres are approximated and the suture material causes minimal laterally directed tension. Sectioning of one or more rectus muscles has no serious anatomical or physiological consequences. When healed the muscles will have an extra tendinous intersection without functional impairment (22). The main blood supply to the abdominal wall is derived from the superior and inferior epigastric arteries. These vessels lie for the most part posterior to the rectus muscle where a rich vascular anastomosis is formed. Transection of epigastric arteries has no physiological consequences for the blood supply to the abdominal wall as the deep circumflex iliac artery and the lumbar and intercostal arteries also contribute to the anastomosis (19).

Patients with abdominal aortic pathology may be treated with endovascular intervention or open surgical repair. Despite possibility of retroperitoneal approach for open surgery, many surgeons prefer transperitoneal approach. Transperitoneally aortic exposure may be done by vertical or horizontal incision. Horizontal incisions are thought to be less painful and have less perioperative complications as compared to

vertical midline incision, but the reports to this effect are not conclusive. For the patient, pain relief and rapid return to normal function is important, but still without sufficient evidence the choice of incision is usually based on surgeon's preference rather than any patient criteria. Tekkis et al, in a study on 60 patients undergoing aortic surgery reported no influence of incision on incidence of respiratory complications (25). Grantcharov et al, review of Randomised Controlled Trials (RCTs) concluded advantage of horizontal incision in postoperative complications, but favoured midline laparotomy for emergency surgeries (9). In a study of 50 patients undergoing elective aortic surgery Peter et al, concluded that type of incision used may be based on surgeon's preference as there was no statistically significant difference between postoperative complications in vertical and horizontal incision groups (20). The Cochrane review on vertical and horizontal incisions on abdominal surgeries also reported almost same rate of pulmonary complications and recovery time for the two groups and concluded choice of incision to be surgeon's preference (3). As most of the data on choice of incision for aortic surgery is inconclusive, a retrospective study from this centre may contribute to achieve some concrete evidence on the above subject. The major hindrances in such studies include variability of the data and the heterogeneity of the participant groups. However, there is a strong evidence suggesting that a horizontal incision has less impact on pulmonary function particularly in the early postoperative period and is less prone to rupture (wound dehiscence/incisional hernia). Outcomes have been studied as antecedents of analgesic use, pulmonary function, complication rates and duration of hospital stay. A trend was realised towards less analgesic requirement, less effect on pulmonary function and lower wound

dehiscence and incisional hernia rates with a horizontal incision. The recent interest in accelerated discharge after the abdominal procedure further emphasise on the importance of the comparison of incision types as it is generally hypothesised that horizontal incisions may lead to more rapid recovery (17). It has been reported that there is an increased rate of incisional hernia with vertical incision but no difference in infection and dehiscence rate compared with other incisions. The study deduced that the use of midline incision should be reserved for the operations where the unlimited access to the abdominal cavity is useful or necessary (23).

Type of incision as an antecedent of the perioperative outcomes

It has been reported that horizontal incision results in significantly less postoperative pain and fewer pulmonary complications and hence can be considered better for anatomical and physiological principles in case of an abdominal surgery. A vertical midline incision is still the incision of choice in the conditions that require rapid intra-abdominal entry like in case of a trauma or where the preoperative diagnosis is uncertain as it is quicker and can be easily extended (9). Another study asserted that these two surgical techniques don't differ in their impact on either respiratory mechanics or inspiratory muscle function, however, there was a tendency for an impact on patient's stay in ICU and overall hospital stay considering the type of incision administered (28).

It has been emphasised that patients with horizontal incision seem to recover more quickly than those operated by standard incisions (14). Further, some data suggested that a horizontal incision is less painful compared to its other counterparts (3). Use of a horizontal incision was usually associated with a longer hospital stay when compared to the vertical incision (9).

If we talk about the type of incision as an antecedent of cosmetic outcome, it should be noted that cosmoses data is lacking. Two studies come to the fore that infers about this aspect (21,12), they suggested a significant difference in the favour of horizontal incision despite of a significantly longer incision. Wound dehiscence with horizontal incisions show a trend towards a lower rate of the occurrence. Further (15) suggest that it takes more than 2 years for the 75% of the incisional hernias to occur. Also, if the extent of exposure to intra-abdominal structures for the respective type of incision has to be assessed, it can be asserted that both type of incisions provide equal exposure (2).

Another variable under study is the analgesic use. One trial ascertained that the analgesia on demand to the patients, where the carers were blinded to the type of incision suggested no significant difference for the analgesia requirement in the respective modalities (16). Lacy et al. administered a trial where 50 patients (10 females, 40 males, mean age 67 years) undergoing abdominal aortic surgery were randomised to a vertical (n=25) and horizontal (n=25) incision. All the patients were evaluated preoperatively and postoperatively for seven days. The consequence of their trial suggested that there is no significant difference between the two groups with

respect to the parameters like morbidity and analgesia consumption following the respective incision (18). Another study, by Tekkis et al in a study on 60 patients undergoing aortic surgery reported no influence of incision on incidence of respiratory complications (25).

From the above quoted studies it is enunciated that most of the data on choice of incision for aortic surgery is inconclusive. The paucity of conclusive data demands that more light be shed on these variables. In view of these circumstances, a retrospective study from this centre may contribute to achieve some concrete evidence on the above subject. In light of the literature review it may be hypothesised that the horizontal incision in AAA surgery offered considerable advantages in the postoperative period, also the perioperative period with fewer complications like pain and pulmonary morbidity in the case of horizontal incision.

METHODS AND METHODOLOGY

A retrospective study was conducted on patients who underwent elective open transperitoneal repair of AAA in our institute between 1st Jan 2021 to 30th Jun 2022 fulfilling the inclusion criteria.

Inclusion criteria:

Patients with AAA who underwent elective open transperitoneal repair of AAA in our institute during the study period.

Exclusion criteria:

1) Patients who had prior abdominal surgeries.

2) Patients who underwent emergency surgery for acute rupture.

3) Patients who underwent AAA repair through retroperitoneal approach.

Conduct of study:

After obtaining permission from IEC, the data on patients who were admitted and underwent elective open transperitoneal repair of AAA in our institute between 1st Jan 2021 to 30th Jun 2022 fulfilling the inclusion criteria was collected as per the proforma. During the said period the total number of patients who underwent the

surgery for AAA that fulfilled the criterion fixed for the study was 52 with 26 patients each in vertical and horizontal incision groups. To determine if both the patient groups are comparable data was collected to get the demographic characteristics of patients, history of smoking and other comorbidities, if the patients had preoperative abdominal pain, document vital signs like blood pressure (BP), heart rate (HR), respiratory rate (RR) and blood oxygen saturation (SpO2) and maximum transverse diameter of the aneurysm as per the preoperative computerised tomography (CT) imaging. Post-operative ventilator requirement of patients was assessed. It was considered prolonged if extubation was delayed beyond 1st postoperative day (POD). Postoperative ileus was considered if patients did not tolerate oral feeding by 3rd POD. Re-exploration for any postoperative complication was documented. Number of days in ICU postoperatively was documented. All patients got postoperative epidural analgesia with Injection Bupivacaine 0.125% + Injection Fentanyl 0.25mcg/ml for 2 days. Beyond 2nd POD, the number of days intravenous (IV) analgesics were required was assessed and documented for the comparison among the two groups. The number of days postoperatively patient was discharged from hospital was also documented to make comparison between the two groups.

Statistical analysis:

Data was analysed by the principal investigator to determine if the two groups are comparable. Further the data was analysed to highlight the effect of type of incision

for abdominal aortic surgery on the duration of ventilatory requirements and ICU stay, postoperative ileus, perioperative analgesia requirement, and the duration of hospital stay in these patients. The continuous normally distributed values were expressed as means and standard deviation and compared using paired or unpaired t tests as required. Categorical variables were compared with the chi-square test.

RESULTS

A total number of 52 patients met the inclusion criteria and were included in the study with 26 patients each in vertical and horizontal incision groups (Table1).

Table1: Division of cases based on the incision

Cases	Vertical Incision	Horizontal Incision
52	26	26

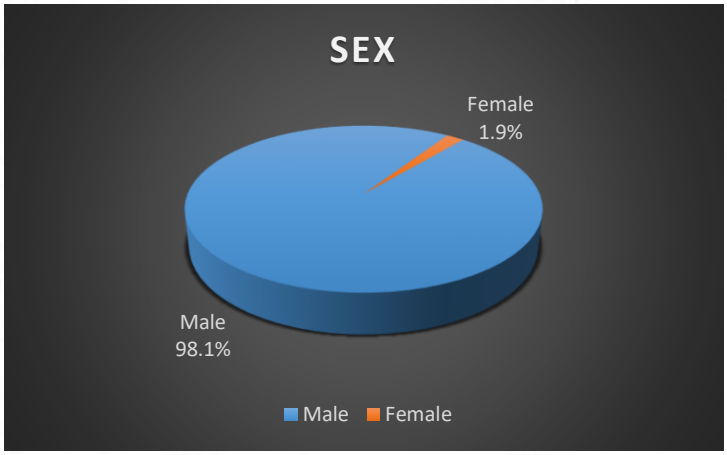

Image 1: Division of cases based on the Sex

Baseline characteristics of study population:

The age of the study group ranged from 46-86 years. Males comprised the majority of patients (n=51, 98.1%), only one patient was female (n=1, 1.9%) (Image 1). The mean age of the sample with vertical incision was 65 years with the standard

deviation of 8.7. The mean age of the sample with horizontal incision is 66 years with the standard deviation of 8.5. 92.3% of the cases in the vertical cohort had the history of smoking and 84.6% of the cases in horizontal cohort had the history of smoking. About 73.1% of the patients in the vertical cohort had pre-operative pain and around 80.8% of the cases in horizontal cohort complained of it. The mean diameter of the aortic aneurysm in the group with the vertical incision was reported to be 7.15 cm with the standard deviation of 1.16 and the mean diameter of the aortic aneurysm in the group with the horizontal incision was reported to be 7.08 cm with the standard deviation of 1.09. The following figures illustrate these characteristics (Table 2 and Image 2) respectively.

Table 2: Baseline characteristics of the study population

	Type of incision		
	Vertical (n=26)	Horizontal (n=26)	p
Age in years (mean±sd)	65±8.7	66.1±8.5	0.641
History of Smoking - n(%)	24(92.3)	22(84.6)	0.385
Preoperative abdominal pain - n(%)	19(73.1)	21(80.8)	0.51
Maximum Diameter of Aneurysm in cm (mean±sd)	7.15±1.16	7.08±1.09	0.806

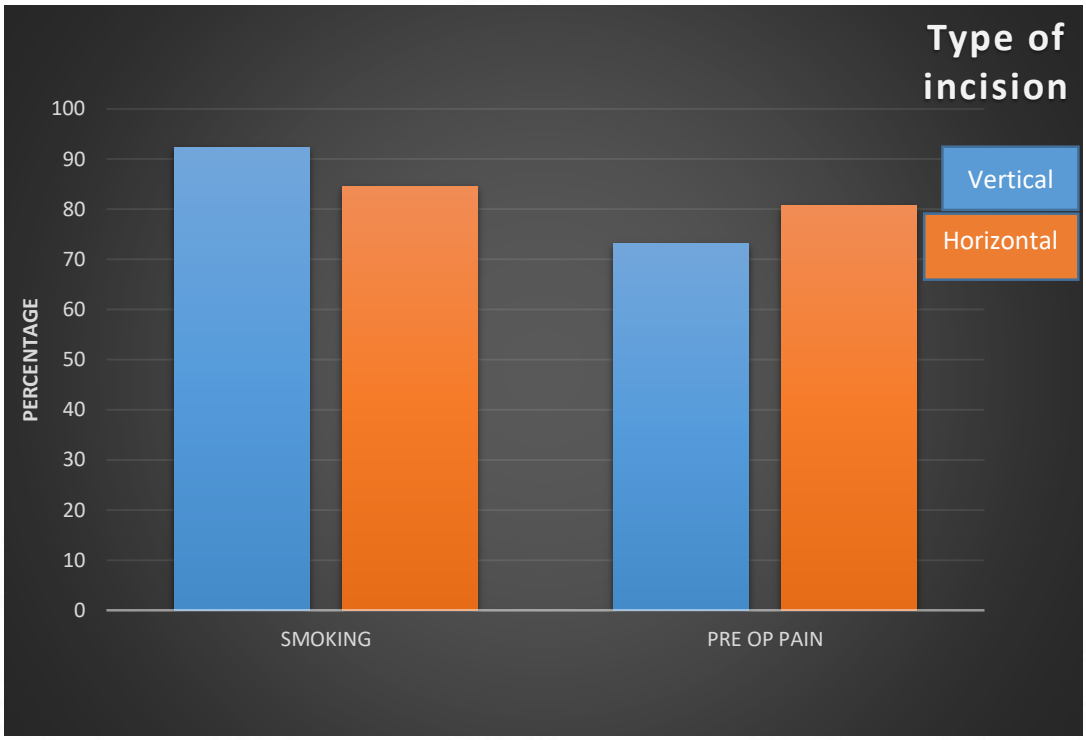

Image 2: Distribution of the cases according to smoking history and preoperative abdominal pain

Vital parameters:

The vital clinical parameters of the patients like systolic and diastolic blood pressure (SBP, DBP), heart rate (HR), respiratory rate (RR) and oxygen saturation (SpO2) were comparable in both the groups. The comparison has been elicited in the Table 3.

Table 3: Mean values of the Baseline Characteristics including SBP, DBP, HR, RR and SpO_2

	Type of incision				
	Vertical		Horizontal		P
	mean	sd	mean	sd	
SBP	133.5	4.9	134.2	4.7	0.645
DBP	81.6	8.0	80.0	9.4	0.509
HR	75.6	7.0	75.9	7.0	0.859
RR	16.0	2.7	15.0	2.9	0.191
SpO_2	99.1	0.9	99.5	0.8	0.154

Comorbidities:

A chi square test was performed to assess the comparability of the two groups. A total of 47 (90.4%) patients out of 52 had some associated comorbidities. In the group with vertical incision the comorbidities were reported in 23 out of 26 cases (88.5%) and in the patients with the horizontal incision this number was 24 out of 26 (92.3%).

In vertical incision group 11 out of 26 (42.3%) patients had diabetes mellitus (DM), 18 out of 26 (69.2%) had hypertension (HTN), 5 out of 26 (19.2%) had chronic

kidney disease (CKD), 12 out of 26 patients (46.2) had coronary artery disease (CAD), 2 out of 26 patients (7.7%) had cerebrovascular accident (CVA) and lastly 4 out of 26 patients (15.4%) had chronic obstructive pulmonary disease (COPD).

In horizontal incision group 9 out of 26 (34.6%) patients had diabetes mellitus (DM), 21 out of 26 (80.8%) had hypertension (HTN), 2 out of 26 (7.7%) had chronic kidney disease (CKD), 8 out of 26 patients (30.8) had coronary artery disease (CAD), 1 out of 26 cases (3.8%) had cerebrovascular accident (CVA) and lastly 4 out of 26 patients (15.4%) had chronic obstructive pulmonary disease (COPD). Table 4 and Image 3 enunciates the comparative results between the two groups.

Table 4: Comparison between vertical and horizontal incision categories by chi-square values

	Type of incision							
	Vertical		Horizontal		Total		$\chi 2$	p
	n	%	n	%	n	%		
COMORBIDITIES	23	88.5	24	92.3	47	90.4	0.35	0.638
DM	11	42.3	9	34.6	20	38.5	0.22	0.569
HTN	18	69.2	21	80.8	39	75.0	0.923	0.337
CKD	5	19.2	2	7.7	7	13.5	1.49	0.223
CAD	12	46.2	8	30.8	20	38.5	1.30	0.254
CVA	2	7.7	1	3.8	3	5.8	0.35	0.552
COPD	4	15.4	4	15.4	8	15.4	0.00	1.000

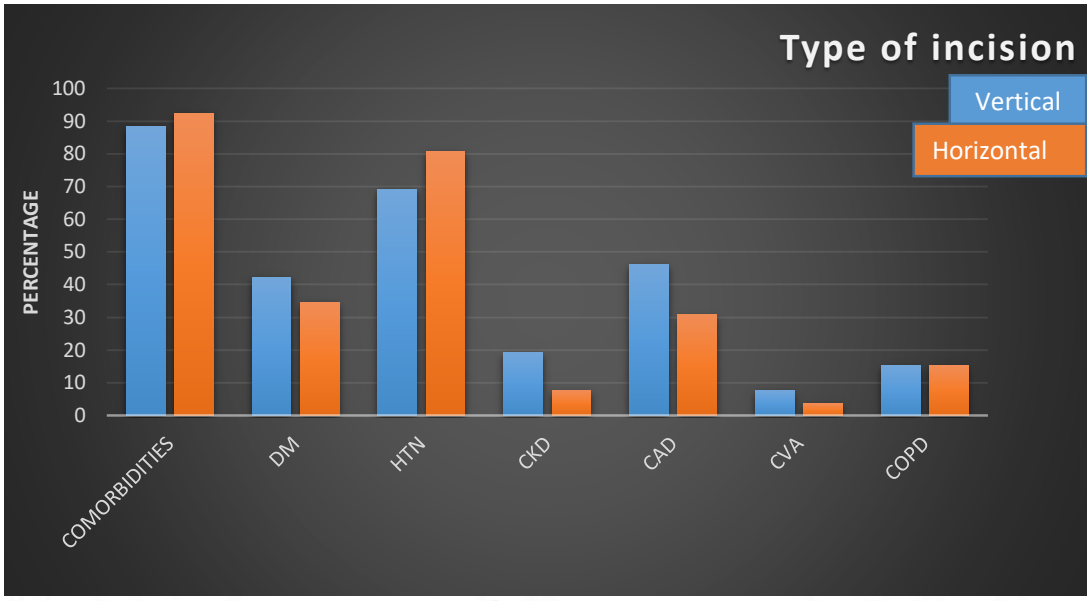

Image 3: Graphical representation of comparison between the two groups based on comorbidities

Perioperative Outcomes:

The perioperative outcomes like prolonged ventilation, postoperative ileus, re-exploration and mortality were examined in the two groups. 3 out of 26 patients (11.5%) demonstrated a need for prolonged ventilation in vertical incision group and 1 out of 26 (3.8%) in horizontal group. Postoperative ileus was reported in 6 out of 26 patients (23.1%) in vertical incision group and in case of horizontal group this figure was 1 out of 26 (3.8%). 3 out of 26(11.5%) cases were re-explored postoperatively in vertical incision group and no re-exploration was done in horizontal group. Overall

mortality in the perioperative period was 3 patients (5.76 %). Two patients having preoperative CKD developed renal failure and one patient died due to ventilator associated pneumonia (VAP). Mortality was reported in 2 out of 26(7.7%) cases in vertical group and 1 out of 26 (3.8%) in horizontal group. Out of the above mentioned outcomes only post op ileus was found to be statistically significant with the p value <0.05. (Table 5 and Image 4)

Table 5: Comparative presentation of perioperative outcomes

	Type of incision							
	Vertical		Horizontal		Total		χ^2	p
	n	%	n	%	n	%		
Prolonged Ventilation	3	11.5	1	3.8	4	7.7	1.083	0.298
Postoperative ileus	6	23.1	1	3.8	7	13.5	4.127	0.042
Re-exploration	3	11.5	0	0	3	5.8	3.18	0.074
Mortality	2	7.7	1	3.8	3	5.8	0.35	0.552

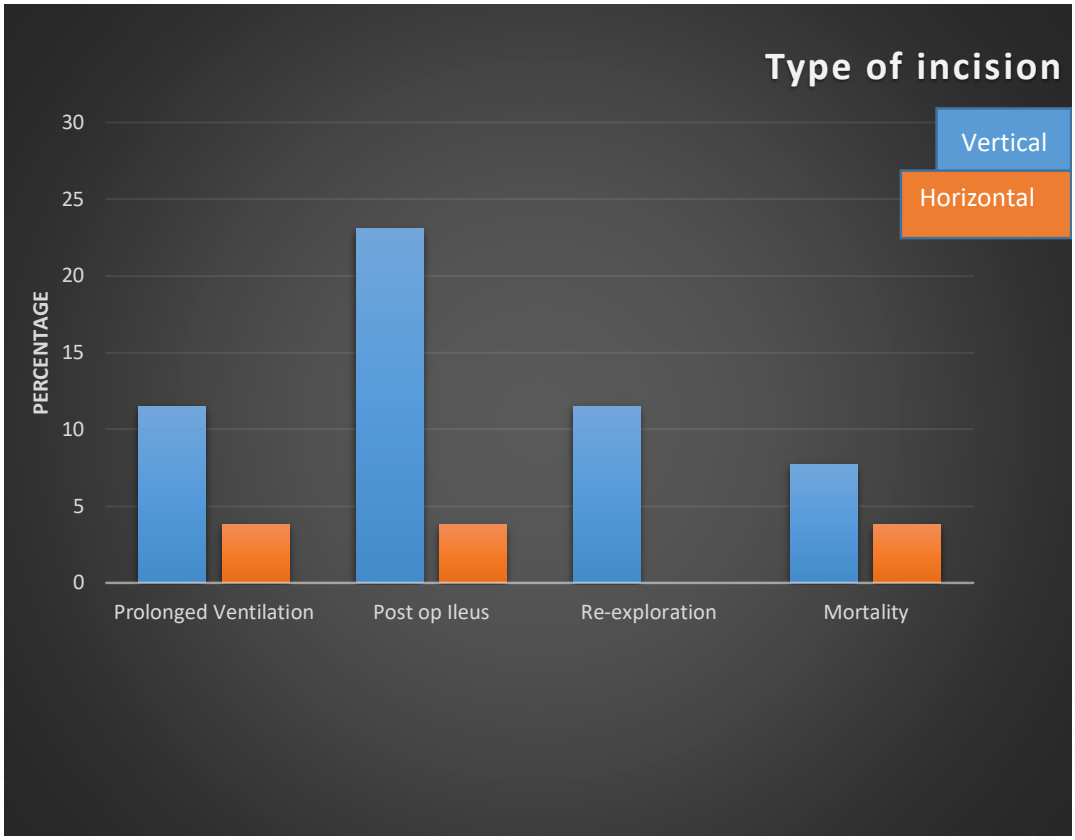

Image 4: Graphical representation of the perioperative outcomes in the Vertical and Horizontal group

Also, further perioperative outcomes like ICU stay, IV analgesia post epidural removal and hospital stay post operatively were also assessed and compared in the two study groups. The mean ICU stay for the cases in vertical incision group was found to be 3.5 days while for the horizontal incision group it was 2.38 days. The mean duration of IV analgesia post epidural removal for vertical incision group was 3.88 days and for horizontal incision group it was 3.19 days. Lastly, the mean hospital stay post

operatively for the vertical incision was found to be 8.27 days and for horizontal incision group this figure stood at 6.96 days. All the three consequences can be seen to be on the higher side for the vertical incision group when compared to the horizontal incision group, however only the difference in number of days of hospital stay post operatively was found to be of statistical significance with the $p < 0.05$ (Table 6 and Image 5)

Table 6: Comparison of perioperative outcomes of ICU stay, IV analgesia post epidural removal and postoperative hospital stay in two groups

Duration in days	Type of incision				
	Vertical		Horizontal		p
	mean	sd	mean	sd	
ICU stay	3.50	3.09	2.38	0.98	0.085
IV analgesia post epidural	3.88	1.93	3.19	0.63	0.088
Post operatively hospital stay	8.27	2.69	6.96	1.25	0.029

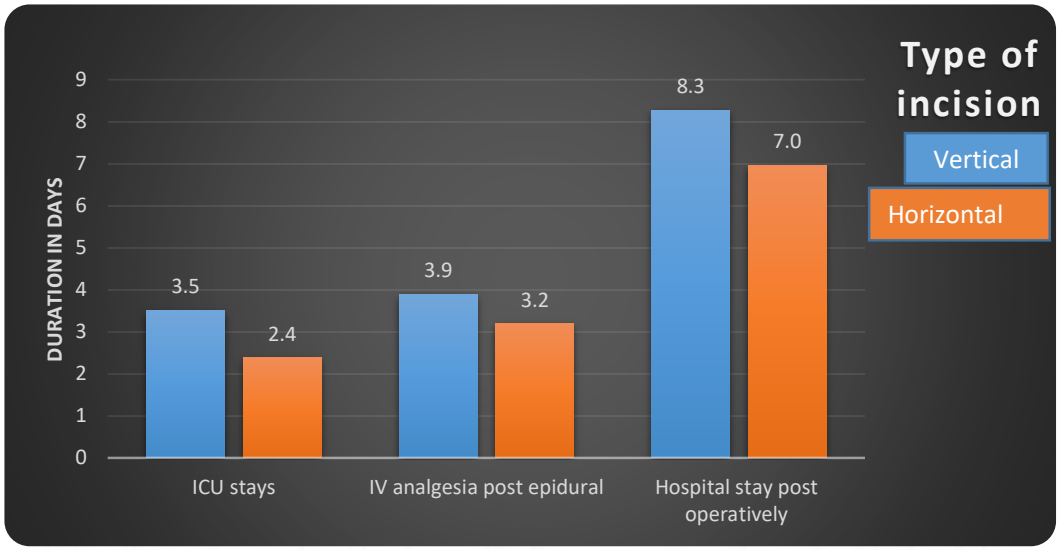

Image 5: Graphical presentation of the perioperative consequences in the Vertical and Horizontal group for ICU stay, IV analgesia post epidural removal and hospital stay post operatively.

As was elicited from table 6, post op ileus was found to be an outcome of the type of vertical and horizontal incision at the statistical significance of p value <0.05, It looked imperative to examine post op ileus as the consequence of the vertical or horizontal incision. Out of 26 cases in vertical incision group only 6 patients reported with the mean hospital stay of 12.2 days found to be statistically significant at the p value <0.01. Contrast to it, only 1 case out of 26 cases complained of post op ileus with a mean hospital stay of 10 days, however this outcome was statistically significant with the p value <.01. (Table 7 and Image 6)

Table 7: Comparative analysis of postoperative ileus in vertical and horizontal incision group

Type of incision	Postoperative ileus	N	Postoperative hospital stay in days		p
			Mean	sd	
Vertical	Yes	6	12.2	2.8	<0.001
	No	20	7.1	1.1	
Horizontal	Yes	1	10.0	.	
	No	25	6.8	1.1	<0.010

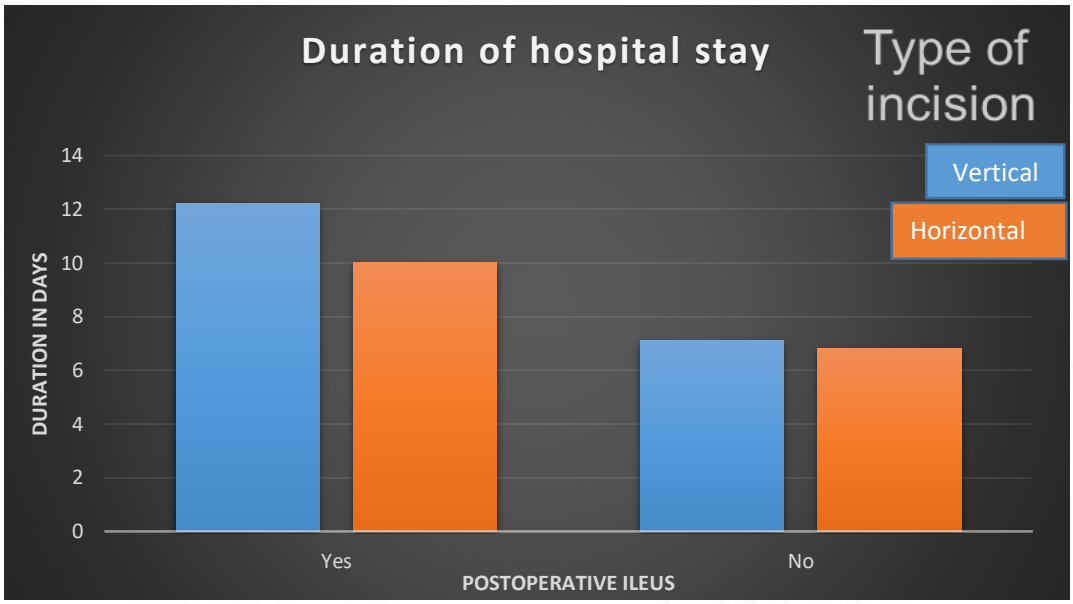

Image 6: Graphical presentation of postoperative ileus in vertical and horizontal incision groups

DISCUSSION

This study intended to demonstrate the outcomes by drawing a comparison between the vertical and horizontal incisions for AAA cases so that the operating surgeon makes an informed choice that is ultimately best in the interest of the patient and for the surgeon. The studies to elicit the importance of choice of incision for an AAA are lacking and needed further investigation to come on some veritable conclusions. The reported literature is inconclusive in favouring one type of exposure over the other although each exposure has its pros and cons.

The open repair in AAA aims to prolong the overall survival of patients, also there is no denying that the patients with AAA usually have significant comorbidities, which may be life threatening in the perioperative period (21). Further the surgery and perioperative period are physiologically challenging and poor outcomes are not uncommon in patients with impaired functional capacity (22). Transperitoneally aortic exposure may be done by horizontal or vertical incision. Horizontal incisions are thought to be less painful and have lesser perioperative complications when compared to the vertical midline incisions but it lacks sufficient backing of the studies (4). Staying true to the retrospective design of the study, 52 consecutive cases were selected from the institute's data base with 26 cases each in vertical and horizontal incision group. The comparability of the groups was established by running a student's t test on the baseline characteristics such as blood pressure, heart rate, respiratory rate, oxygen saturation, the patient comorbidities, smoking history and size of the aneurysm. The mean difference was not found to be statistically significant for the

groups hence eliciting that the groups formed are comparable to produce meaningful results.

To determine the choice of incision whether vertical or horizontal it is important to consider associated co-morbidities. In both the groups the co-morbidities that were of interest included DM, HTN, CKD, CAD, CVA and COPD. Literature favours horizontal incision as the choice of incision under such circumstances due to the fact that it is associated with lower number of complications in the early postoperative period which is very critical for the recovery of the patient. So particularly in high risk patients with any of the above co-morbidities, horizontal incision should be favoured (24). In our study population both groups were comparable in terms are all major risk factors.

Considering the complexity of AAA surgery, pulmonary outcomes were the most important vitals to be considered and for that purpose prolonged ventilatory support has been studied as the consequence of the type of incision. The comparison of the perioperative consequences of the vertical and horizontal incision rendered insightful results. There was no significant difference in the ventilation requirement in the two study groups in the perioperative period. Similar finding was reported in a study by Van Schaik et al. that compared ventilatory patterns after horizontal or vertical incision and found no difference in ventilatory requirement between these two groups (27). Also, no influence of incision on incidence of respiratory complications in cases with either of the incision has been reported (8). Probably, with good

preoperative optimization and perioperative epidural pain relief, patients can be extubated early irrespective of the type of incision.

Further, postoperative analgesia requirement was assessed in both the groups. The comparison of this parameter was done using number of days of IV analgesia requirement post epidural analgesia termination. No statistically significant difference was found in two groups. Literature is favorable with a number of studies that agree with the fact that vertical incisions were more painful in the early postoperative period than the horizontal ones (1, 9,12). However, study by Lacy et al. found no significant difference in analgesic consumption in both the groups much like the findings of the present study (16). Most of the studies comparing postoperative analgesia requirement used visual analogue pain scales for administering analgesia (3). Since the current study is a retrospective one, it was beyond the scope of this study to make use of such a tool to assess the patient's analgesia needs. A prospective study using need based analgesia may yield meaningful results.

The duration of hospital stay postoperatively has been found to be significantly lesser in the cases with horizontal incision when compared to their transverse incision counter parts. This finding has been supported by the study that reported significantly prolonged hospital stay after abdominal surgery through a vertical incision than by horizontal incision (9). Another interesting finding of the study with respect to the perioperative outcomes has been development of postoperative ileus, the mean difference of the postoperative ileus in the two groups has been found to be statistically significant with p value < 0.05. The literature aggressively supports that the

postoperative ileus which causes the delayed recovery is responsible for longer or extended hospital stay. So, optimizing measures for preventing it are critical to consider (4). Both these perioperative measures have been found to be statistically significant in our study and this strongly indicates towards the horizontal incision as a better choice for the AAA surgery when compared to vertical incision. The horizontal incision gives more room for the small bowel to be pushed to right side of the patient without much active retraction thus minimizing the bowel handling. We feel this may be the reason for reduced postoperative ileus in these patients.

Another outcome that was analyzed was the postoperative ICU stay in patients operated using vertical or horizontal incision. The mean value was not found to be statistically significant to infer the effectiveness of either of the incision to reduce the ICU stay.

Overall the horizontal incision has advantage of less postoperative ileus and reduced postoperative hospital stay which may secondarily reduce overall financial burden on the patient and use of lesser manpower to manage these high risk patients. Other than these two parameters, the postoperative outcomes were comparable between the two groups.

The better insights and inferences can be drawn by further studies because the present study has its inbound limitations. The major limitation of the study is its design, a prospectively designed study could better enunciate the objectives when compared to the present retrospective design. Further, the sample size is small to verify the claims of the study. However, a larger sample may better validate the results. Also, the

duration of the study is a major limitation, a study spanning over larger time frame could yield more conclusive inferences getting results of long term follow up of these patients and possibly a larger sample size. Lastly, tools like regression analysis can help establish causal relationships between type of incision and its correlates giving a substantial validity to the claims.

SUMMARY AND CONCLUSION

This study aimed to investigate the impact of incision type in elective open AAA repair on perioperative outcomes. While the debate on this topic persists in the literature, our findings suggest that horizontal incisions offer advantages. They are associated with reduced postoperative ileus and shorter hospital stays compared to vertical incisions. However, the study couldn't establish the same advantage in terms of postoperative ventilation and analgesic requirements. The study's limitations, including a small sample size, short follow-up duration, and retrospective design, highlight the need for future research with a prospective approach, larger sample size, and longer follow-up. Despite limitations, the study indicates that horizontal incisions yield better perioperative outcomes, potentially alleviating financial burdens on patients and healthcare systems due to decreased hospitalization duration.

REFERENCES

1. Armstrong P.J., Burgees R.W. Choice of incision and pain following gallbladder surgery Br J surg1990:77: 746-748
2. Becquemin J-P, Piquet J, Becquemin M-H, Melliere D, Harf A. Pulmonary function after transverse or midline incision in patients with obstructive pulmonary disease. Intensive Care Med 1985;11:247-251.
3. Brown SR, Goodfellow PB. Transverse verses midline incisions for abdominal surgery. Cochrane Database Syst Rev. 2005 Oct 19. 2.
4. Buchanan L. and Tuma F. Treasure Island (FL). Stat pearls Publishing; Jan, 2023.
5. Carlisle J, Swart M. Mid-term survival after abdominal aortic aneurysm surgery predicted by cardiopulmonary exercise testing. Journal of British Surgery. 2007 Aug;94(8):966-9.
6. Charles David Williams, Jerold B. Brenowitz,, Ventilatory patterns after vertical and transverse upper abdominal incisions, The American Journal of Surgery, Volume 130, Issue 6, 1975, Pages 725-728
7. Edwards JM, TeefaySA, Zierler RE, Kohler TR. Intraabdominal para-anastomotic aneurysms after aortic bypass grafting. J Vasc Surg. 1992 Feb; 15(2): 344-350; discussion 351-353.
8. Fassiadis et al. Randomized clinical trial of vertical or transverse laparotomy for abdominal aortic aneurysm repair. Br J Surg. 2005 Oct;92(10):1208-11.

9. Grantcharov T.P., Rosenberg J., Vertical compared with transverse incisions in abdominal surgery. Eur J Surg. 2001 Apr;167(4): 260-7.

10. Garcia-Valdecasas J.C. Almenara R, Cabrer C, et al. subcostal incision versus midline laparotomy in gall stone surgery: a prospective and randomised trial. Br J Surg 1988;75: 473-475.

11. Greenall et al. Midline or transverse laparotomy? A random controlled clinical trial. Part II: Influence on postoperative pulmonary complications. Br J Surg. 1980 Mar;67(3):191-4.

12. Hall et al. Abdominal wall hernias in patients with abdominal aortic aneurysmal versus aortoiliac occlusive disease. Am J Surg. 1995 Dec;170(6):572-5; discussion 575-6.

13. Halasz N.A, Calif T. Vertical vs Horizontal laparotomies. Arch Surg 1964; 88: 911-914.

14. Hickey N.C. and Caldwell S.P. Aortic surgery through a transverse mini-laparotomy. European Journal of Vascular and Endovascular Surgery. 2003 Apr;25(4):369-370.

15. Hoer J, Stumpf M, Rosh R, Klinge U, Schumpelick V. Prevention of incisional hernia. Chirurg 2002; 73(5):474-480.

16. Inaba T, Okinaga K, Fukushima R, Iinuma H, Ogihara T, Ogawa F, Iwasaki K, Tanaka M, Yamada H. Prospective randomised study of two laparotomy incisions for gasterctomy: midline incision versus transverse incision. Gastric cancer 2004; 7:167-171.

17. Kehlet, H. and Dahl, J.B. (2003) Anaesthesia, Surgery, and Challenges in Postoperative Recovery. Lancet, 362,1921-1928.

18. Lacy PD, Burke PE,O'Regan M, Cross S, Sheehan SJ, Hehir D, Colgan MP, Moore DJ, Shanik GD. The Comparison of the type of incision for the transperitoneal abdominal aortic surgery based on postoperative respiratory complications and morbidity. Eur J Vasc Surg. 1994 JAN; 8(1): 52-5.

19. Nilsson T. The relative rate of the wound healing in longitudinal and transverse laparotomy incisions. Acta Chir Scand 1982;148:251-256.

20. Peter et al. The comparison of type of incision for transperitoneal abdominal aortic surgery based on postoperative respiratory complications and morbidity, European Journal of Vascular Surgery, Volume 8, Issue 1, 1994, Pages 52-55,

21. Proske JM, Zieren J, Muller JM. Transverse versus midline incision for the upper abdominal surgery. Surgery Today 2005;35:117-121.

22. Rees V.L, Coller F.A.Anatomic and clinical study of transverse abdominal incision. Arch Surg 1943;47:136-146.

23. Burger S., Cataliotti F.S., Fort C., Minardi F., Inguscio M., Chiofalo M.L., and Tosi M.P. Phys. Rev.Lett. 89,088902- Published 2 August 2002.

24. Santora T.A, Roslyn J.J. Incisional hernia. Surg Clin North Am 1993;73:557-570.

25. Tekkis et al. (2002). Randomized prospective comparison of postoperative pain control and respiratory complications following midline or transverse laparotomy for aortic surgery. British Journal of Surgery. 88. 611 - 612.

26. Teodor P Grantcharov, Jacob Rosenberg, Vertical compared with transverse incisions in abdominal surgery, *European Journal of Surgery*, Volume 167, Issue 4, April 2001, Pages 260–267

27. Van Schaik TG, Yeung KK, Verhagen HJ, de Bruin JL, van Sambeek MR, Balm R, Zeebregts CJ, van Herwaarden JA, Blankensteijn JD, Grobbee DE, Blankensteijn JD. Long-term survival and secondary procedures after open or endovascular repair of abdominal aortic aneurysms. Journal of vascular surgery. 2017 Nov 1;66(5):1379-89.

28. Volta, C.A., Ferri, E., Marangoni, E. et al. Respiratory function after aortic aneurysm repair: a comparison between retroperitoneal and transperitoneal approaches. *Intensive Care Med 29*, 1258-1264 (2003).

29. Williams C.D. and Brenowitz J.B. Ventillatory patterns after vertical and transverse upper abdominal incisions. Am J Surg 1975;130:725-728.

ANNEXURES

Format for CV of the Investigators

GUPTA	ADITYA	-
Last Name	First Name	Middle Name
Date of Birth (dd/mm/yy) 19/12/1982		Sex MALE
Study Site Affiliation (e.g. Principal Investigator, Co-Investigator, Coordinator)		

Professional Mailing Address (Include Institution name)	Study Site Address (Include Institution name)
DEPT. OF CVTS SCTIMST, TRIVANDRUM, 695011	DEPT. OF CVTS SCTIMST, TRIVANDRUM, 695011
Telephone (Office): 04712524553	Mobile Number: 9419904574
Telephone (Residence): -	Email aadi191282@sctimst.ac.in

Academic Qualifications (Most recent qualification first)

Degree/Certificate	Year	Institution, Country
MS General Surgery	2016	INHS ASVINI, MUMBAI
MBBS	2006	ASCOMS, JAMMU

Details of professional registration : (MCI/State Registration/Bar Council/DCI/etc including Registration Number and Year of Registration TCMC 80144 (2021)

Current and previous positions (most recent position first)

Month and Year	Title	Institution/Company, Country
2021 onwards	SR, VASCULAR SURGERY	SCTIMST, TRIVANDRUM

Brief summary of relevant research experience:

Current project/s at hand:

Signature:	Date: 06/11/2022 Place: TRIVANDRUM

Format for CV of the Investigators

T. PANICKER	VARGHESE	–
Last Name	First Name	Middle Name

Date of Birth (dd/mm/yy) 29/05/1973 ✓ Sex MALE

Study Site Affiliation (e.g. Principal Investigator, Co-Investigator, Coordinator)

Professional Mailing Address (Include Institution name)	Study Site Address (Include Institution name)
DEPT. OF CVTS SCTIMST, TRIVANDRUM, 695011	DEPT. OF CVTS SCTIMST, TRIVANDRUM, 695011
Telephone (Office): 04712524553	Mobile Number: 9387801642
Telephone (Residence):	Email vtp@sctimst.ac.in

Academic Qualifications (Most recent qualification first)

Degree/Certificate	Year	Institution, Country
Mch CVTS	2008	SCTIMST, TRIVANDRUM
MS GENERAL SURGERY	2004	MCH, TRIVANDRUM
MBBS	1997	MCH, TRIVANDRUM

Details of professional registration : (Travancore Cochin Medical Council, including Registration Number and Year of Registration) TCMC - 27238 (2009)

Current and previous positions (most recent position first)

Month and Year	Title	Institution/Company, Country
2019 onwards	Professor	SCTIMST, TRIVANDRUM

Brief summary of relevant research experience:

Current project/s at hand:

Signature:

Date: 06/11/2022
Place: TRIVANDRUM

V2.15042017

Format for CV of the Investigators

PITCHAI	SHIVANESAN	—
Last Name	First Name	Middle Name
Date of Birth (dd/mm/yy) 14/08/1985		Sex MALE

Study Site Affiliation (e.g. Principal Investigator, Co-Investigator, Coordinator)

Professional Mailing Address (Include Institution name)	Study Site Address (Include Institution name)
DEPT. OF CVTS SCTIMST, TRIVANDRUM, 695011	DEPT. OF CVTS SCTIMST, TRIVANDRUM, 695011
Telephone (Office): 04712524668	Mobile Number: 7012704125
Telephone (Residence):	Email drpshivc@sctimst.ac.in

Academic Qualifications (Most recent qualification first)

Degree/Certificate	Year	Institution, Country
Mch VASCULAR SURGERY	2016	SCTIMST, TRIVANDRUM
Ms GENERAL SURGERY	2012	PGIMER, CHANDIGARH
MBBS	2009	PSGIMSR, COIMBATORE

Details of professional registration : (Travancore Cochin Medical Council, including Registration Number and Year of Registration) TCMC - 64489 (2017)

Current and previous positions (most recent position first)

Month and Year	Title	Institution/Company, Country
JAN 2022	Assoc. Professor	SCTIMST, TRIVANDRUM
ongoing		

Brief summary of relevant research experience:

Current project/s at hand:

Signature:

Date: 06/11/2022
Place: TRIVANDRUM

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Institutional Ethics Committee

(IEC Regn No. ECR/189/Inst/KL/2013/RR-21)

SCT/IEC/1986/JANUARY/2023

28.03.2023

Dr. Aditya Gupta
Senior Resident
Department of CVTS
SCTIMST, Thiruvananthapuram

Dear Dr. Aditya Gupta,

The Institutional Ethics Committee held on 19th January, 2023, reviewed and discussed your application to conduct the study titled "**COMPARISON OF VERTICAL AND HORIZONTAL TRANSPERITONEAL INCISIONS IN ABDOMINAL AORTIC SURGERY: A RETROSPECTIVE ANALYSIS**" (IEC/1986).

The following members of the Ethics Committee were present at the meeting held on 19th January, 2023

SL. No.	Member Name	Highest Degree	Gender	Scientific /Non Scientific	Affiliation with Institution(s)
1.	Prof. C.C. Kartha	MBBS,MD	Male	Basic Medical Scientist (Chairman)	No
2.	Dr. Pradeep S	MBBS, MD	Male	Basic Medical Scientist	No
3.	Smt. Sathi Nair	MA (English Literature)	Female	Lay Person	No
4.	Dr. Rejnish Kumar	MBBS,MD ,DNB	Male	Clinician	No
5.	Adv. Priya Kaimal	LLM, MBL	Female	Legal Expert	No
6.	Dr. P. Manickam	BSMS, MSc (Epid) ,PhD	Male	Health Science Expert/ Social Scientist	No
7.	Dr. Christina George	MD Psychiatry	Female	Clinician	No
8.	Dr. Harikrishna Varma PR	Ph.D (Materials Science)	Male	Medical Technology	Yes
9.	Dr. Manikandan.S	MBBS,MD,PDCC	Male	Clinician	Yes
10.	Dr. Narayanan Namboodiri. K K	MBBS,MD,DM	Male	Clinician	Yes
11.	Dr. Biju Soman	MBBS,MD, DPH, MSc, DLSHTM	Male	Basic Medical Scientist	Yes
12.	Dr. Syam K	MBBS, MD, DM	Male	Clinician	Yes
13.	Dr. Srinivas G	PhD	Male	Basic Medical Scientist (Member Secretary)	Yes

The following documents were reviewed:

Original submission

1. *Checklist Form*
2. *Covering letter addressed to the Chairman, IEC, SCTIMST dated 20.11.2022*
3. *Project Proposal*
4. *IEC Application Form*
5. *Declaration Form*
6. *Proforma*
7. *CV of PI and Co-PIs*
8. *SRC Recommendation Letter*

Revised submission

1. *Checklist Form*
2. *Covering letter addressed to the Chairman, IEC, SCTIMST dated 27.03.2023*
3. *Responses/Amendments made based on the Reviewer's comments*
4. *Project Proposal*
5. *IEC Application Form*
6. *Declaration Form*
7. *Proforma*
8. *CV of PI and Co-PIs*

IEC Decision

The IEC approved the conduct of the study in the present form.

Remarks:
The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,

Dr. G. Srinivas
Member Secretary, IEC

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST
THIRUVANANTHAPURAM

Ouriginal by Turnitin

Document Information

Analyzed document	Thesis.docx (D173144870) 2023-08-26
Submitted	15:23:00
Submitted by	Shivanesan Pitchai
Submitter email	drpshivc@sctimst.ac.in
Similarity	0%
Analysis address	drpshivc.sctims@analysis.urkund.com

Sources included in the report

Entire Document

INTRODUCTION A meticulously planned incision is critical to the performance of any surgical procedure. A surgically good abdominal incision is the one that is made relatively quickly, gives a better exposure of the intra-abdominal viscera, can be easily extended, is associated with the fewer post-operative complications and eventually provides better strength to the abdominal wall resulting in fewer wound dehiscence and hernia. Lastly, the cosmetic and aesthetic outcome should also be in the plan of action. The open abdominal aortic aneurysm (AAA) repair traditionally requires a long incision. The incisions used to explore the abdominal cavity can be either vertical or horizontal incision. With the advent of the multipurpose Omni-tract abdominal retractor, equal access to the abdominal aorta can be had through vertical and horizontal abdominal incisions. Horizontal incisions are thought to be less painful and have less perioperative complications as compared to vertical midline incision, but the reports to this effect are not conclusive. A vertical midline incision is still the incision of choice in the conditions that require rapid intra-abdominal entry like in case of a trauma or where the preoperative diagnosis is uncertain as it is quicker and can be easily extended (9). As a general rule of thumb, the choice of surgical incision is determined by access, the elective or emergency nature of the case and personal preference of the operating surgeon. It can be safe to say that incisional approach to treat the aortic aneurysms are largely based on the patient factors and surgeon experience/choice (5,20). However, the perioperative parameters like postoperative ventilatory and analgesic requirements, duration of Intensive care unit (ICU) and hospital stay can be considered as the consequences that need consideration and validation. The Cochrane review on horizontal and vertical midline incisions on abdominal surgeries also reported almost same rate of pulmonary complications and recovery time for the two groups and concluded choice of incision to be surgeon's preference (3). As on date, most of the data on choice of incision for aortic surgery is inconclusive. The paucity of conclusive data demands that more light be shed on these perioperative variables. In view of these circumstances, a retrospective study from this centre may contribute to achieve some concrete evidence on the above subject.

AIMS OF STUDY To study the effect of type of incision on 1. Duration of postoperative ventilatory requirements and ICU stay. 2. Requirement of postoperative analgesia. 3. Presence of prolonged postoperative ileus 3. Duration of overall postoperative hospital stay.

METHODS AND METHODOLOGY A retrospective study was conducted on patients who underwent elective open transperitoneal repair of AAA in our institute between 1st Jan 2021 to 30th Jun 2022 fulfilling the inclusion criteria.

Inclusion criteria: Patients with AAA who underwent elective open transperitoneal repair of AAA in our institute during the study period.

Exclusion criteria: 1) Patients who had prior abdominal surgeries. 2) Patients who underwent emergency surgery for acute rupture. 3) Patients who underwent AAA repair through retroperitoneal approach.

S.NO.	AGE	SEX	SMOKING	PREOP ABD PAIN	BP	HR	RR	SPO2
1	67	M	Y	Y	136/78	80	14	100
2	72	M	Y	Y	130/70	84	12	100
3	80	M	Y	Y	144/80	86	18	98
4	86	M	N	N	136/88	78	16	98
5	65	M	N	Y	134/80	88	12	100
6	61	M	Y	Y	134/60	66	11	100
7	73	M	Y	N	134/80	87	17	98
8	68	M	Y	Y	130/88	67	14	98
9	57	M	Y	N	134/90	80	14	100
10	57	M	Y	Y	130/90	77	18	98
11	71	M	Y	Y	136/70	67	20	99
12	73	M	Y	Y	133/88	89	20	98
13	76	M	Y	Y	146/70	76	16	100
14	54	M	Y	Y	138/90	70	14	100
15	67	M	Y	Y	136/68	79	16	99
16	60	M	Y	Y	134/80	70	17	100
17	68	M	Y	N	136/78	69	12	100
18	68	M	Y	N	132/70	74	19	100
19	69	M	N	Y	134/90	70	12	100
20	72	M	Y	N	135/88	72	18	98
21	67	M	Y	Y	130/90	68	12	99
22	67	M	Y	Y	136/90	76	15	98
23	50	M	N	Y	136/78	66	12	100
24	74	M	Y	Y	140/78	70	18	100
25	46	M	Y	Y	132/80	80	16	100
26	60	M	Y	Y	136/88	87	12	100
27	55	M	Y	Y	144/90	82	17	100
28	76	M	Y	Y	130/70	90	12	98
29	62	M	Y	Y	136/80	79	16	100
30	65	M	Y	N	134/66	71	14	100
31	68	M	Y	Y	132/88	85	19	98
32	70	M	Y	Y	132/70	74	20	99
33	64	M	Y	N	136/88	76	20	99
34	58	M	Y	Y	136/92	79	18	98
35	68	M	Y	N	124/80	77	14	100
36	67	M	Y	N	128/86	68	17	100
37	54	M	Y	Y	120/86	65	13	100
38	74	M	Y	Y	132/70	70	19	98
39	58	M	Y	Y	132/90	78	12	100
40	68	M	Y	Y	130/88	76	16	99
41	50	F	N	Y	134/80	64	14	100
42	74	M	N	Y	136/70	76	18	100
43	79	M	Y	Y	132/68	68	19	98
44	70	M	Y	N	130/88	80	12	99
45	58	M	Y	Y	144/90	86	17	100
46	52	M	Y	Y	130/68	71	12	100

47	71	M	Y	N	130/80	75	17	100
48	72	M	Y	Y	136/72	80	12	100
49	64	M	Y	Y	126/74	70	20	99
50	52	M	Y	Y	136/90	75	18	100
51	70	M	Y	Y	130/88	78	14	98
52	62	M	Y	Y	138/90	70	12	99

ANEURYSM SIZE(MAX)	COMORBID	INCISION	ILEUS	PRO-VENT	RE-EXP	ICU STAY	IV ANALG	HOSP STAY
7CM	CAD,DM,HTN	V	N	N	N	1	3	7
5CM	CVA,HTN	H	N	N	N	5	4	9
7CM	CAD,COPD,DM	V	N	N	N	2	3	7
7CM	HTN,CKD,DM	H	N	N	N	2	3	6
6CM	CAD,HTN	V	Y	N	N	9	6	15
7CM	DM,HTN	H	N	N	N	3	2	8
9CM	CVA,HTN,DM	V	Y	Y	Y	10	7	15
6CM	CKD ON MHD	V	N	Y	N	13	10	10-DIED-AKI
8CM	DVT,DM,HTN	V	Y	N	Y	3	3	10
7CM	CAD,COPD	H	N	N	N	2	5	8
6CM	COPD,HTN	H	N	N	N	5	4	9
7CM	CKD,HTN,DM	V	N	N	N	3	3	8
8CM	HTN,CKD	H	N	N	N	2	3	7
8CM	CAD	V	N	N	N	3	4	7
7CM	CAD,DM	H	N	N	N	2	3	6
7CM	HTN,DM	V	N	N	N	2	3	8
7CM	CAD,HTN	H	Y	N	N	2	3	10
6CM	CAD,DM	V	N	N	N	2	3	6
7CM	HTN	H	N	N	N	2	3	7
6CM	CAD,CKD,DM	V	N	N	Y	2	3	7
7CM	HTN	H	N	N	N	2	3	6
7CM	CAD,HTN	V	N	N	N	2	3	6
7CM	NIL	V	N	N	N	2	3	6
8CM	HTN,DM	H	N	N	N	2	3	7
6CM	HTN	V	N	N	N	2	3	6
7CM	CAD,HTN	H	N	N	N	2	3	7
6CM	CAD,HTN	V	N	N	N	2	3	8
8CM	NIL	H	N	N	N	2	3	6
7CM	NIL	H	N	N	N	2	3	7
6CM	HTN	V	N	N	N	2	3	7
7CM	HTN,COPD,DM	H	N	N	N	2	3	7
7CM	HTN,COPD	V	N	N	N	2	3	7
6CM	HTN,COPD,DM	H	N	N	N	2	3	8
8CM	HTN,COPD	V	Y	N	N	5	4	14
8CM	HTN	H	N	N	N	2	3	8
7CM	CAD,DM	H	N	N	N	2	3	8
7CM	NIL	V	N	N	N	2	3	6
6CM	CAD,CKD,HTN,DM	V	Y	N	N	3	4	10
6CM	CAD,HTN	H	N	N	N	2	3	6
7CM	CAD,HTN	V	N	N	N	2	3	6
6CM	HTN	H	N	N	N	2	3	6
7CM	HTN,DM	H	N	Y	N	5	5	5-DIED-AKI
7CM	HTN,COPD	V	N	Y	N	9	9	9-DIED-VAP
8CM	CVA,HTN,DM	V	N	N	N	2	3	8
7CM	HTN	H	N	N	N	2	3	6
6CM	HTN	H	N	N	N	2	3	6

8CM	CAD,HTN	V	Y	N	N	2	3	9
8CM	HTN	H	N	N	N	2	3	5
8CM	CAD,CKD,HTN,DM	V	N	N	N	2	3	7
7CM	CAD,HTN	H	N	N	N	2	3	6
11CM	CAD,HTN,DM	H	N	N	N	2	3	7
11CM	NIL	V	N	N	N	2	3	6