COMPARATIVE STUDY OF VERESS NEEDLE AND VISIPORT IN CREATING PNEUMOPERITONEUM IN LAPAROSCOPIC SURGERY

Thesis submitted by:

Dr. Sheela Prince

Roll No.: TGOU (N) 009/M.MAS/2014D

To the Global Open University

Department of Minimal Access Surgery

World Laparoscopy Hospital Center

Global Open University of Nagaland

In partial fulfillment for the Award of Masters Degree in Minimal Access Surgery

January 2018

COMPARATIVE STUDY OF VERESS NEEDLE AND VISIPORT IN CREATING PNEUMOPERITONEUM IN LAPAROSCOPIC SURGERY

Thesis submitted to the Global Open University in partial fulfillment of the rules and regulations for the Masters in Minimal Access Surgery Degree Examination

By:

Dr. Sheela Prince

Department of Minimal Access Surgery World Laparoscopy Center

Global Open University, Nagaland.

CERTIFICATE

This is to certify that the research name Comparative Study of Veress Needle and Visiport in creating pneumoperitoneum in laparoscopic surgery done by Dr. Sheela Prince under my personal supervision and guidance. I am satisfied with the work done by her, which is presented as dissertation for Masters Degree in Minimal Access Surgery Examination certified that the study is original embodying bonafied cases.

Dr. Packirisamy Kannan

Head of General Surgery Department

Hatta Hospital

Consultant, General Surgery Department

Rashid Hospital

Place:

Date:

DECLARATION

This is a consolidated report on comparative study of Veress Needle and Visiport in creating pneumoperitoneum in Laparoscopic Surgery based on the cases treated in Rashid Hospital from the period of 01.01.2015 to 31.12.2015. This is submitted to the Global Open University in partial fulfillment of rules and regulations for the Masters in Minimal Access Surgery Examination. This thesis has not been submitted for any other degrees and have no objections for this thesis to be copied in part or whole or used for research purpose.

Dr. Sheela Prince

World laparoscopic Hospital center

Global Open University, Nagaland

ACKNOWLEDGEMENT

I would like to thank my supervisor Prof. R.K Mishra and Dr. J. S Chowhan and the entire team of world laparoscopy hospital for the support, guidance during my research work and thesis writing.

I wish to express my sincere thanks to Prof. Packirisamy Kannan, head of the Department of General Surgery, Hatta Hospital and Consultant General Surgeon, Rashid Hospital, Dubai Health Authority for his support, valuable suggestions, guidance during the research period.

Dr. Sheela Prince

ETHICAL COMMITTEE APPROVAL LETTER

حكومة دبي
GOVERNMENT OF DUBAI

DUBAI SCIENTIFIC RESEARCH ETHICS COMMITTEE APPROVAL LETTER

هيئة الصحة بدبي
DUBAI HEALTH AUTHORITY

From :	Dubai Scientific Research Ethics Committee (DSREC), Dubai Health Authority	**Date :**	08 Nov 2016
To :	Dr. Sheela Prince, Specialist Registrar, General Surgery, Rashid Hospital	**Ref :**	DSREC-06/2016_02
Study Site:	Rashid Hospital, DHA		

Subject: Approval for the research proposal: **"Comparative study of Veress needle and Visiport in creating pneumoperitoneum in Laparoscopic surgery"**

Short Title: **Different Access Techniques in Laparoscopy**

Dear Dr. Sheela Prince,

Thank you for submitting the above mentioned research proposal to Dubai Scientific Research Ethics Committee, DHA. Dubai Scientific Research Ethics Committee has been organized and operates in accordance with the ICH/GCP guidelines.

Your request was discussed during the committee meeting held on 25 Jul 2016. On review and discussion, the committee issued some queries and re-queries that were communicated to you for further clarifications.

The response was discussed during the committee meeting held on 07 Nov 2016. As the response-addressed points by points fulfil DSREC Member's queries, we are pleased to advice you that the committee has granted ethical approval for the below mentioned documents:

No	Study Documents
1	Application form for the Ethical Approval of a Research Project
2	Study Proposal-Amended
3	Data Collection Sheet-Amended
4	Request for review of Medical Records
5	Confidentiality Agreement: Patient Information_Signed by PI and Co-Is
6	Resume of PI and Co-I

Please note that it is DSREC's policy that the principal investigator should report to the committee of the following:

1. Anything which might warrant review of ethical approval of the project in the specified format, including:
   - any serious or unexpected adverse events and
   - unforeseen events that might affect continued ethical acceptability of the project
2. Any proposed changes to the research protocol or to the conduct of research
3. Any new information that may affect adversely the safety of the subjects
4. If the project is discontinued before the expected date of completion (reason to be specified)
5. Annual report to the DSREC about the progress of the study
6. A final report of the finding on completion of the study

Please note that this approval is valid for **one year** from the date of this letter. It is Principal Investigator's responsibility to ensure that an application for continuing review approval has been submitted at the required time.

The following Committee members were present at the meeting and voted for its approval.

Name	Designation	Role in Committee
Dr. Suhail Abdulla Mohammad Alrukn	Consultant, DHA	Chairperson
Dr. Mahera AbdulRahman Amir Rad	Specialist, HQ - MED	Member
Prof. Yousef M Abdulrazzaq	Emeritus Professor of Paediatrics and Neonatology Faculty of Medicine and Health Sciences	Member
Dr. Nehad Hassan Mahdy Abd El Magid	Consultant, PHC - Health Centers Department	Member
Dr. Hamda Hassan Khansaheb	Specialist Senior Registrar, PHC	Member
Mr. Faisal Ahmad Ali Ahmad AlHaddad	Principal Legal Researcher, HQ - Legal Affairs Department	Member
Dr. Ali Sayed Hussain	Director, HQ - Pharmacy Department	Member

The DSREC wishes you every success in your research.

Yours faithfully,

Dr. Suhail Abdulla Mohd Alrukn
Chairman
Dubai Scientific Research Ethics Committee
Dubai Health Authority

Dubai Scientific Research Ethics Committee (DSREC),
Dubai Health Authority
Dubai, UAE.

Proforma

NAME

AGE

SEX

ADDRESS

DIAGNOSIS

ASSOCIATED COMORBIDITIES

PAST SURGICAL HISTORY

INVESTIGATIONS

A. BLOOD INVESTIGATION

B. RADIOLOGICAL INVESTIGATION

COMPARISON DONE BY DIFFERENT VARIABLES

1. TIME ANALYSIS
   A. Time required to induce pneumoperitoneum in minutes.
   B. Total operating time in minutes.
   C. Hospital Stay in hours
2. COMPLICATIONS:
   A. Injuries during induction
      a. Vascular Injury
      b. Visceral injury
      c. Preperitoneal insufflation
      d. Gas embolism
   B. Failure of technique
   C. Port site Infection

SELECTION CRITERIA FOR PATIENTS:

1. Inclusion criteria: Patients who underwent laparoscopic surgeries from 01.01.2015 to 31.12.2015 are included.

2. Exclusion criteria: Patients with more than one surgeries in the past are excluded. Medically unfit patients with multiple co-morbidities are excluded.

Dr. Sheela Prince

RESEARCH PROTOCOL

1. Name of Specialty: General Surgery
2. Name of Subject: Technique of Initiation of Pneumoperitoneum for Laparoscopic Surgery
3. Title of Thesis and Year of Submission: Comparison between veress needle and visport in creating pneumoperitoneum in Laparoscopic Surgery – 2018
4. Name of Candidate: Dr. Sheela Prince
5. Name of Hospital: Rashid Hospital
6. Sample Size: All the patients who underwent laparoscopic surgeries in the Department of General Surgery from 01.01.2015 to 31.12.2015.
7. Study Population: All the patients who underwent laparoscopic surgery in Rashid Hospital from 01.01.2015 to 31.12.2015.
8. Objectives of study (Aim): Aim of this Research is to study and compare merits and demerits of entry techniques by veress needle that is a closed (blind) entry and clear view (undervision) entry technique by visiport and to evaluate and compare the incidence of complications in both techniques.
9. Materials and Methods:
   a. Study area: Rashid Hospital, General Surgery department
   b. Study Population: All laparoscopic surgeries done in the General Surgery department in Rashid Hospital from 01.01.2015 to 31.12.2015.
   c. Sample Size: 150 cases of Laparoscopic Surgeries by veress needle and 150 cases of laparoscopic surgeries done visiport. (*All laparoscopic surgeries done in the General Surgery department in Rashid Hospital from 01.01.2015 to 31.12.2015*)
10. Data Collection: Record based crossover study collected patient details from case files, time out sheet, operation notes and follow up files entered in a particular proforma for recording information on all study variables.
11. Copy of Proforma attached.
12. Inclusion Criteria: All laparoscopic surgeries done in the General Surgery department in Rashid Hospital from 01.01.2015 to 31.12.2015.
13. Exclusion Criteria: Patients with more than one surgeries in the past were excluded. Medically unfit patients with multiple co-morbidities were excluded.

Dr. Sheela Prince

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INTRODUCTION

In minimal surgery the technique of first entry in human body with the telescope and instruments is called access technique. It is important to know that 20% of laparoscopic complications are caused at the time of initial access. Developing access skill is one of the important achievements for the surgeons practicing minimal access surgery. First entry access in laparoscopy is of two types: Closed and open access.

In closed technique, veness needle is commonly used by minimal access surgeons worldwide but it is a blind technique. Nowadays, entry technique with optical trocars are used for visual guided access in to the abdomen. Here we are analyzing the merits and demerits of two entry techniques and the incidence of complications in both techniques. Comparison is between the blind technique by using veress needle and undervision technique by using visiport.

AIM OF STUDY

1. To study and compare the merits of closed (blind) technique of creating pneumoperitoneum and clear view (undervision) technique of visiport in creating pneumoperitoneum in Laparoscopic surgery.

2. To assess evaluate and compare the incidence of complications in blind and clear view access techniques in laparoscopic surgery.

REVIEW OF LITERATURE

The word "Laparoscopy" originated from the greek word *laparo* which means abdomen and *scopion* – to examine. [2]

Laparoscopy is an art of examining the abdominal cavity and it's contents. This is achieved by sufficiently distending the abdominal cavity (pneumoperitoneum) and visualizing the abdominal contents using illuminated telescope. [2]

The first laparoscopy in humans was performed by Jacobeus of Sweden in 1910 [7]. Since then, the laparoscopic techniques have been in constant evolution. Over the last two-three decades, it has become the preferred options for multitude of operative procedures [7].

Initially, laparoscopic surgery was termed minimally invasive surgery. But this term was changed to minimal access surgery as laparoscopic surgery is an invasive procedure associated with similar risks of major complications as compared with conventional open surgery [2].

Pneumoperitoneum is the first step in laparoscopic surgery [3]. Laparoscopic surgery was made possible later in the 20^{th} century due to successful abdominal distention by introducing pneumoperitoneum initially nitrous oxide was used later on. It was replaced by a carbon dioxide. Carbon dioxide is colorless, non-toxic and non-inflammable, thus allowing the used of diathermy and laser. It also has the greatest margin of safety in case of venous embolism, as it is highly soluble. Diagnostic and therapeutic procedures have been carried out in the space created in the abdomen by the pneumoperitoneum and the initial penetration of the abdominal cavity to produce pneumoperitoneum [4].

In the last three decades, rapid advances in laparoscopic surgery have made it as an invaluable part of general surgery but there remains no clear consensus as an optional method of entry in to peritoneal cavity [12].

METHODS OF CREATING PNEUMOPERITONEUM [1, 9]

1. Closed Method:
   - Blind method
     - Veress needle
     - Direct Trocar entry method
   - Undervision
     - Clear view (optiview) trocar
     - Veress needle with optiview technique

2. Open Method
   - Hasson's technique
   - Scandinavian technique
   - Fielding technique.

CLOSED METHOD:

In closed access technique, pneumoperitoneum is created by veress needle. This is a blind technique and most commonly practice method of access by surgeons worldwide [1]. The used of veress needle to create the pneumoperitoneum has inherent risks. It may cause vascular and visceral injuries [10]. Also, visually guided entry by optical trocars is a closed method. This permits smaller skin incision and better visualization of tissues as they are penetrated and have been shown in large series to be safe and fast ways to access the peritoneal space.

OPEN METHOD:

In this there is direct entry by open technique without creating pneumoperitoneum and insufflator is connected once blunt trocar is inside the abdominal cavity under direct vision. There are various ways of open access like Hasson's techniques, Scandinavian techniques and fielding techniques.

ANATOMY OF THE ANTERIOR ABDOMINAL WALL

There are three large flat muscles (external oblique, internal oblique, transverses abdominis) and one long vertically oriented segmental muscle (rectus abdominis) on it's side. And four major arteries are present in the anterior abdominal wall which form an anastomotic arcade that supplies the abdominal wall on either side. They are superior and inferior epigastric arteries, musculophrenic artery, deep circumflex iliac artery.

Umbilicus is the site of choice for access. It is the scar remaining after the umbilical cord obliteration. At the level of umbilicus, skin peritoneum and fascia are fused together with minimum fat. The midline is free of muscle fibers, nerves and vessels except at its inferior edges where pyramidalis muscle is sometimes found. Trocar side in this locations rarely cause much bleeding. The colon is attached to the lateral abdominal wall along both gutters and puncture laterally should be under video control to avoid visceral injury.

OPERATING ROOM SET UP

An organized well equipped operation theatre is essential for successful laparoscopy. The entire surgical team should be familiar with instruments and their functions. The entire instruments should be placed according to the convenience of surgeon so that it should be ergonomically perfect for that surgery. The co-axial alignment should be maintained. The eye of the surgeon, target of the dissection and monitor should be placed in the same axis.

PATIENT POSITION

Initially at the time of pneumoperitoneum by veress needle, patient should be placed supine with 10-20 degree head down. The benefit of this steep Trendelenburg position is that bowel will be pull up and there will be more room in the pelvic cavity for safe entry of veress needle. If the surgeon is planning to insert the veress needle pointing towards pelvic cavity. If the surgeon is planning to insert the veress needle perpendicular to the abdominal wall as in case of very obese patient or diagnostic laparoscopy under local anesthesia, the patent should be placed in supine position otherwise all bowel will come just below the umbilicus and there is increase risk of bowel injury.

POSITION OF THE SURGICAL TEAM

Laparoscopic surgeon is very much dependent and helpless with eye fixed on monitor. In laparoscopic upper abdominal surgery, French surgeons like to stand between legs of the patient popularly known as French position. The American surgeons like to operate from left side in cases of upper abdominal surgery like fundoplication in hiatus hernia and cholecystectomy called American position. In most of the cases, at the time of access, surgeons should stand on the left side of the patient if the surgeon is right handed. If the surgeon is left handed, he should stand right to the patient at the time of access. This helps in inserting veress needle and trocar towards pelvis by dominant hand. Once all the ports are in position, the surgeon should come to the opposite side to target the organ to start surgery.

In most of the upper abdominal surgery, camera assistant should stand left to the surgeon and in lower abdominal surgery he/she should stand right to the surgeon. The surgeon should work in the most comfortable and less tiring position possible with shoulder relaxed, arms along side of body, elbow 90 degree and forearms horizontal.

PREPARATION FOR ACCESS

Before starting access the abdomen should be examined for any palpable lump. It is wise to tell the patient to void urine before coming to operating room but if the bladder is found full at the time of palpation, Foley's catheter should be inserted. Full bladder maybe injured very easily by veress needle or trocar.

CHOICE OF GAS FOR PNEUMOPERITONEUM

Initially in the beginning period of laparoscopy, pneumoperitoneum was created by filtered room air. Carbon dioxide and nitrous oxide are now preferred gas because of increased risk of air embolism with room air. Carbon dioxide is used for insufflation as it is 200 times more diffusible than oxygen.

SITE OF VERESS NEEDLE ENTRY

There are many sites of veress needle insertion but central location of the umbilicus and the ability of the umbilicus to hide scar makes it more attractive site for primary port. Umbilicus is good site for access because:

- It is the thinnest abdominal wall.
- Cosmetically better.
- No significant blood vessels.

- Ergonomically better (center point of abdomen).

PALMER'S POINT [16]

In patients with previous laparotomy, palmer advocated insertion of the veress needle 3 cm below the left subcostal border [9].

INTRODUCTION OF VERESS NEEDLE

Veress needle should be held like a dart at the time of insertion there should be 45 degrees of elevation angle. Elevation angle is the angle between the instrument and the body of the patient. Distal end of the veress needle should be pointed towards rectum [1]. Commercially available veress needles vary from 12 to 15 cm with the external diameter of 2 mm [12].

A bezel shape tip enables the needle to pierce the tissue of the abdominal wall upon entering the peritoneal cavity the resistance generated from the abdominal wall is overcome which permits the interior needle with its blunt atraumatic mandril. This system affords a degree of safety and efficacy making the puncture of peritoneal cavity with a veress needle an easy, fast and effective technique. Once the peritoneal cavity is inflated by this technique, the first trocar can be inserted without problem minimizing intraoperative gas leakage and saving surgical time [12].

INDICATORS OF VERESS NEEDLE INSERTION [1]

1. Needle movement test
   - Once the veress needle is inside the abdominal cavity, the tip of the veress needle should be free and if the surgeon moves the tip of the needle gently then should not be any feel of resistance. It is very important that veress needle should not be moved inside the abdominal cavity much because there is risk of laceration of bowel to be punctured.
2. Irrigation Test
   - With 10 ml syringe, try to inject 5 ml of saline through veress needle. If the tip of the veress needle is inside, the abdominal cavity there will be free flow of saline, otherwise some resistance is felt on injecting saline.
3. Aspiration Test
   - After injecting saline, surgeon should try to aspirate that saline back through veress needle. If the tip of the veress needle is inside the abdominal cavity, irrigated water cannot be sucked out. But if it is in the preperitoneal space or in the muscle fiber or above the injected water can be aspirated back.

4. Hanging drop test [12]
    - Few drops of saline should be poured over the veress needle and the abdominal wall should be lifted slightly. If the tip of the veress needle is inside the abdominal cavity, the hanging drop should be sucked inside because inside the abdomen there is negative pressure. If the tip of the veress needle is anywhere else, hanging drop test will be negative [1].

Once it is confirmed that the veress needle is inside the abdominal cavity, the tubing of the insufflator is attached and flow is started [4].

It is important to keep nice hold on the veress needle throughout while gas is flowing otherwise veress needle can slip out and make create pre peritoneal insufflation.

5. Insufflation of gas test (Quadromanometric test)
    - For safe access, surgeon should always see carefully all the four indicators of insufflator at the time of creation pneumoperitoneum. lg the gas is flowing inside the abdominal cavity, there should be proportionate rise in actual pressure with the total gas used.

QUADROMANOMETRIC INDICATORS OF INSUFFLATION

- Preset insufflation pressure
- Actual pressure
- Gas flow rate
- Volume of gas consumed

PRIMARY TROCAR INSERTION AFER VERESS NEEDLE INSUFFLATION

Patient position is important, patient should be placed supine with 10-20 degree head down.

Site: Same site of veress needle entry should be used for primary trocar insertion.

INTRODUCTION OF PRIMARY TROCAR

Hold the trocar in such a way that head of trocar should rest on the thenar eminence middle finger should encircle air inlet and index finger should point towards sharp end.

Angle of insertion: Initially angle of insertion of primary trocar should be perpendicular to the abdominal wall but once surgeon feels giving way sensation the trocar should be tilted to 60-70 degrees angle.

Confirmation of entry of primary trocar:

- Audible click if disposable trocar or safety trocar is used.
- Whooshing sound if reusable trocar is used.
- Loss of resistance felt both in disposable as well as reusable trocar.

USE OF VERESS NEEDLE IN OBESE PATIENT

In obese patient, the incision should be trans umbilical (base of umbilicus) for veress needle insertion as this is the thinnest part of the abdominal wall and less fatty area. The direction of the veress needle entry in the obese patient should be perpendicular. And pneumoperitoneum created up to 18 mm of Hg [1].

ENTRY IN CASE OF MORBID OBESITY

Morbidly obese patient it is virtually impossible to lift the abdominal wall and the veress needle need to be introduce perpendicular to the abdominal wall trans-umbilically without lifting [1, 12]

VISUAL GUIDED ENTRY

Optical trocars are used for visual guided entry, this permits smaller skin incision and better visualization of tissues as they are punctured and have been shown in long series to be safe and fast way to access peritoneal space. Injuries can be recognized immediately thereby reducing their potential morbidity. Disadvantage includes the inability to remove the trocar during its initial advancement which may change the original tract and confuse orientation. In addition making it difficult to recognize the peritoneal layer.

Optical trocar has been the bariatric surgery gold standard for minimally invasive peritoneal access [38]. Now these trocars are also being used after insufflation with veress needle. In visport, a single use optical obturator that includes a blunt clear window at the distal end along with the crescent shaped knife blade and a pistol grip handle with trigger at the proximal end. And an

opening to accommodate a 10 mm laparoscope. When the trigger is pulled, the blade extends approximately 1 mm and immediately retracts. This action permit controlled sharp dissection of the tissue layers. The laparoscope permits visualization as the obturator passed through the abdominal wall. It is essential to assure that the image is in clear focus prior to use with midline deployment. The subcutaneous fat, the linea alba, the peritoneal fat and peritoneum can be clearly and reliably visualized layer by layer. The combination of flow steady gently pressure with the firing of blade only through these recognizable abdominal wall layers are essential components of safe entry.

COMPLICATIONS OF ACCESS TECHNIQUE [4, 12, 38]

Improper veress needle insertion and trocar insertion causes most of the operative complications of laparoscopic surgery [14]. Injuries to the bowel, major vessels, bladder, inferior epigastric vessels and subcutaneous emphysema.

VISCERAL INJURY

- Small bowel
- Large bowel
- Bladder
- Stomach

Solid Organs:

- Liver
- Spleen

VASCULAR INJURY

- Inferior epigastric
- Omental vessel injury
- Mesenteric vessels
- Aorta
- Inferior vena cava

OTHER COMPLICATIONS [12]

- Gas embolism
- Pneumo omentum
- Surgical emphysema
- Port site hematoma [38]

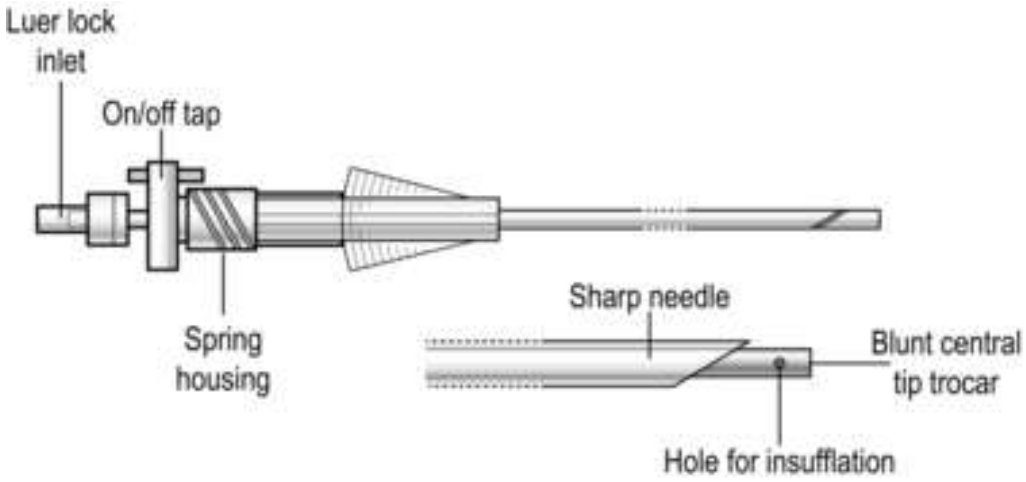
NEWER DEVELOPMENTS IN ACCESS TECHNIQUE

1. Veress needle with inbuilt fiber optic telescope – It is also used for direct visualization at the time of its introduction but quality of picture is not safe for introduction.
2. Pneumoperitoneum using versa step system – The versa step system is an integrated system combining a nylon stretchable sheath over a disposable veress needle. Once inserted, the sheath is dilated by inserting the trocar (with dilator in place). The real advantage of the system is that it has no cutting entry blade thus, dramatically decreasing trocar site bleed and potential for an intraabdominal injury. In addition, it creates a small fascial defect, which does not need to be closed.

PICTURES

PICTURES OF VERESS NEEDLE AND ITS INSERTION

PARTS OF VERESS NEEDLE



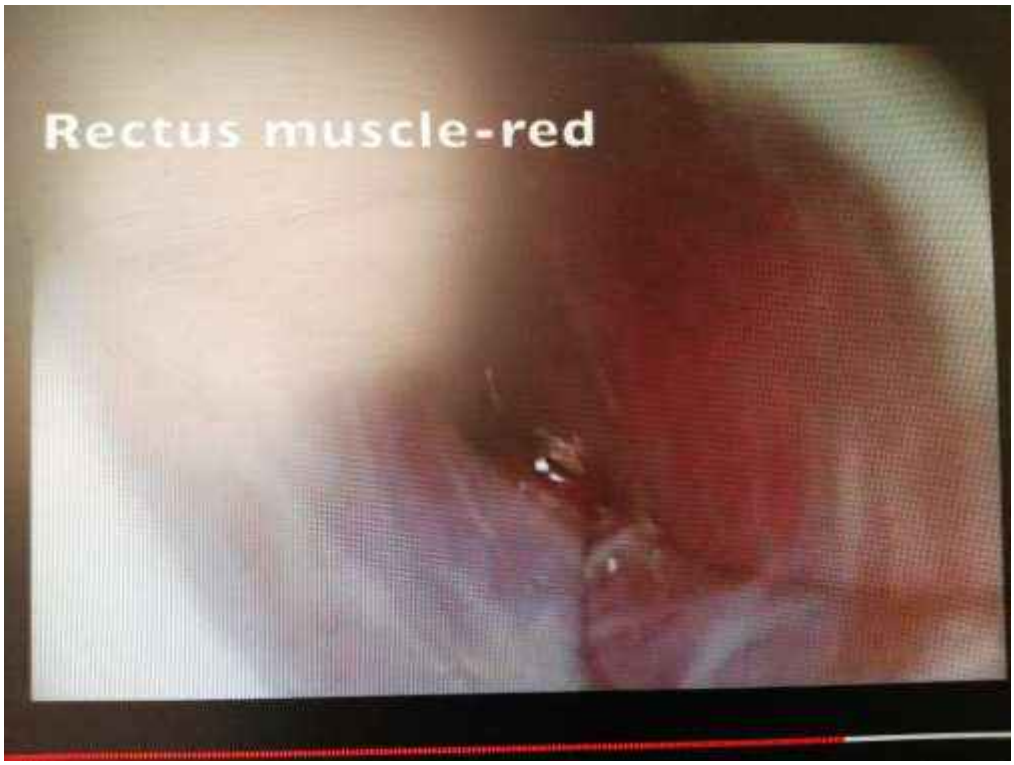
INTRODUCTION OF VERESS NEEDLE

DISPOSABLE VERESS NEEDLE

VISIPORT AND LAYERS OF ABDOMINAL WALL AT INTRODUCTION IN TO THE PERITONEAL CAVITY

ANATOMIC LAYERS DURING UMBILICAL DIRECT OPTIC TROCAR ENTRY WITH 45° TO 60° ANGLE


Anterior fascia- white


Rectus muscle-red


Posterior fascia-white


Peritoneum

MATERIALS AND METHODS

Study Area : Rashid Hospital, General Surgery Deparment

Study Population : All the patients who underwent laparoscopic surgery in Rashid Hospital, In General Surgery department from 01.01.2015 to 31.12.2015

Sample Size : 150 cases of veress needle, blind access technique cases of laparoscopic Surgery and 150 cases of visiport, clear view access technique cases of Laproscopic surgery.

Selection Criteria:

A. Inclusion Criteria - All the patients who underwent laparoscopic surgery in General Surgery department of Rashid Hospital from 01.01.2015 to 31.12.2015 were included.
B. Exclusion Criteria - Patients with previous more than one abdominal surgery and medically unfit patients with multiple co-morbidities were excluded.

Data Collection : Record based, crossover study, collected patient's details from case file, time out sheets, operation notes and follow up files. Details of all variables entered in a particular proforma for data collection.

Data Analysis : Data obtained from the proforma were entered in the excel format, the data presented in appropriate charts, tables, graphs and figures.

Statistical Procedure : Qualitative variables were expressed as mean standard deviation and Median. Quantitative variables were expressed as proportion

Comparison quantitative data between two groups were analyzed by independent samples “t” Test. Comparison of qualitative variables between two groups were analyzed by Chi square test, association A. P value <0.05 was considered statistically significant. Data analysis was Performed using SPSS version 22.0.

OBSERVATION AND RESULTS

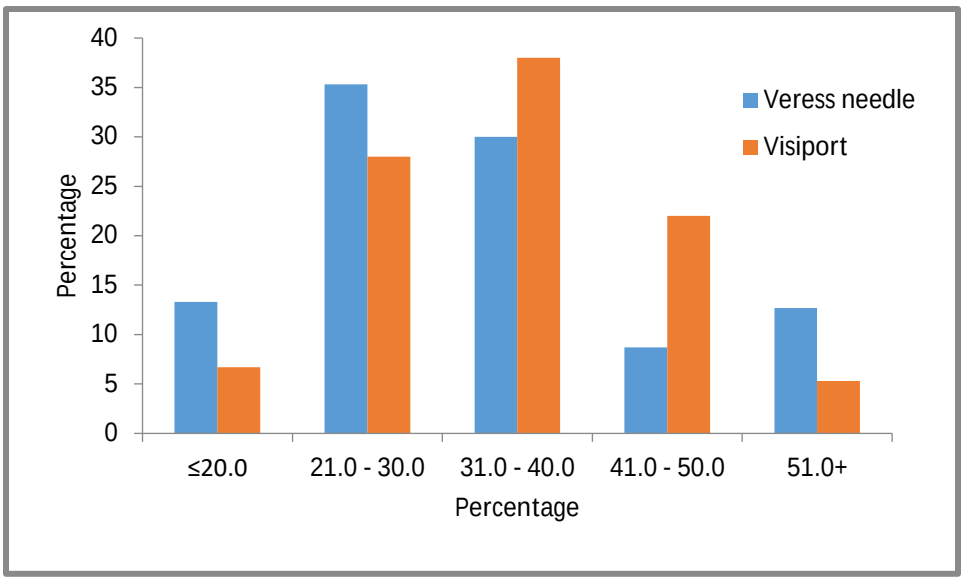
Statistical procedure: - Quantitative Variables were expressed as mean, standard deviation and median. Qualitative variables were expressed as proportion. Comparison of quantitative data between two group was analysed by independent sample t test. Comparison of qualitative variables between two groups was analysed by chi-square test. Association A p-value <0.05 was considered statistically significant. Data analysis was performed using SPSS ver 22.0.

	N	Age		t	p
		Mean	Sd		
Veress needle	150	33.1	12.8	1.698	.091
Visiport	150	35.4	10.6		

Average age of the subjects in Veress needle group was 33.1±12.8 years and that of Visiport was 35.4±10.6 years. Both group were comparable according to age.

Age in years	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
≤20.0	20	13.3	10	6.7	30	10.0
21.0 - 30.0	53	35.3	42	28.0	95	31.7
31.0 - 40.0	45	30.0	57	38.0	102	34.0
41.0 - 50.0	13	8.7	33	22.0	46	15.3
51.0+	19	12.7	8	5.3	27	9.0
Total	150	100.0	150	100.0	300	100.0

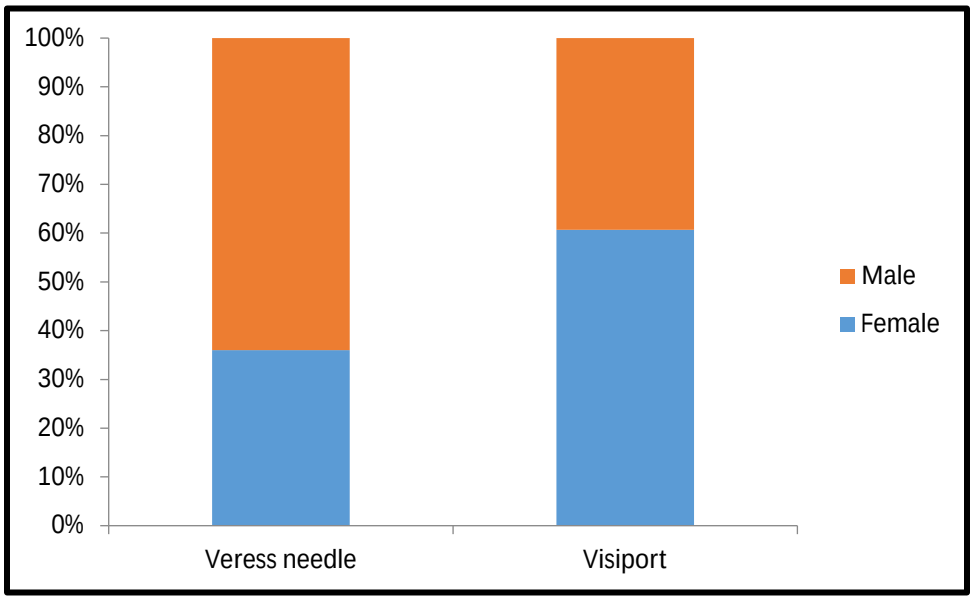
35.3% of Veress needle and 28.0% of Visiport were in the age group of 21-30 years



Gender	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
Female	54	36.0	91	60.7	145	48.3
Male	96	64.0	59	39.3	155	51.7
Total	150	100.0	150	100.0	300	100.0

χ^2 =18.274 df=1 p<0.001

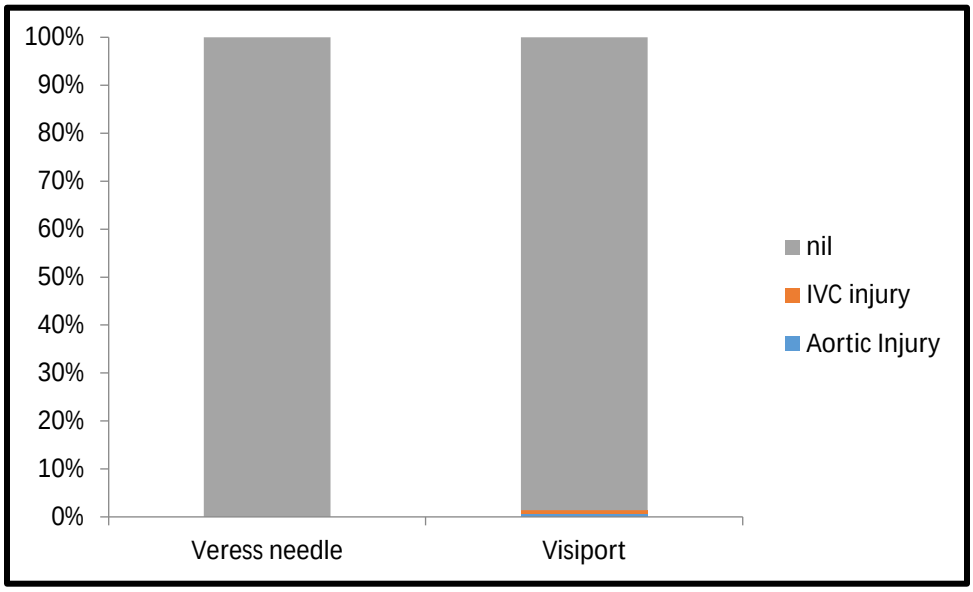
36.0% of Veress needle group and 60.7 % of Visiport group were female.



Vascular injury	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
Aortic Injury	0	0.0	1	0.7	1	0.3
IVC injury	0	0.0	1	0.7	1	0.3
nil	150	100.0	148	98.7	298	99.3
Total	150	100.0	150	100.0	300	100.0

χ^2 =2.013 df=2 p=0.365

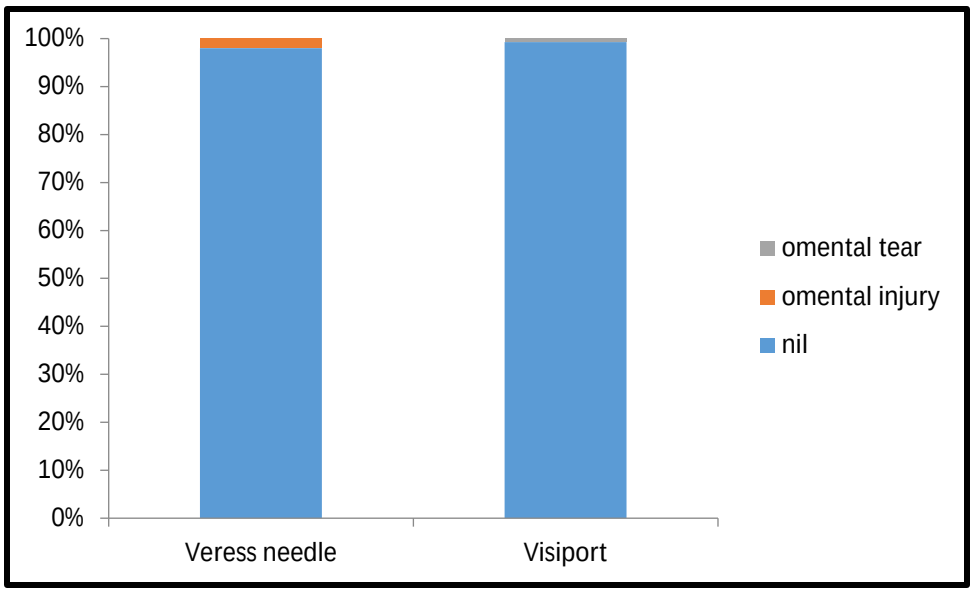
100.0% of the Veress needle group and 98.7% of Visiport group have no Vascular injury



Visceral injury	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
Nil	147	98.0	149	99.3	296	98.7
omental injury	3	2.0	0	0.0	3	1.0
omental tear	0	0.0	1	0.7	1	0.3
Total	150	100.0	150	100.0	300	100.0

χ^2 =6.054 df=3 p=0.109

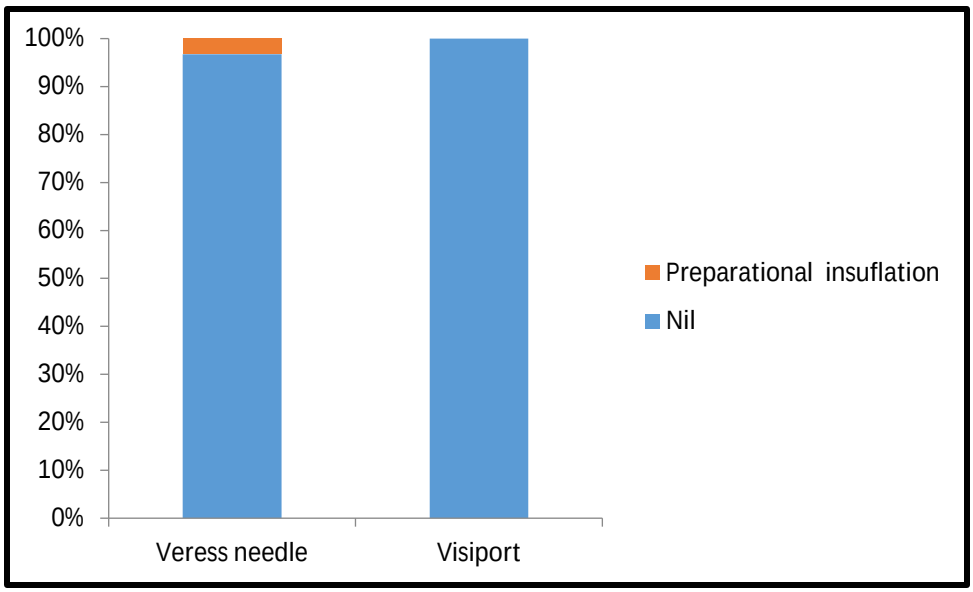
98.0% of the Veress needle group and 99.3% of Visiport group have no Visceral injury



Preparational insuflation	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
Nil	145	96.7	150	100.0	295	98.3
Preparational insuflation	5	3.3	0	0.0	5	1.7
Total	150	100.0	150	100.0	300	100.0

χ^2 =5.085 df=1 p=0.024

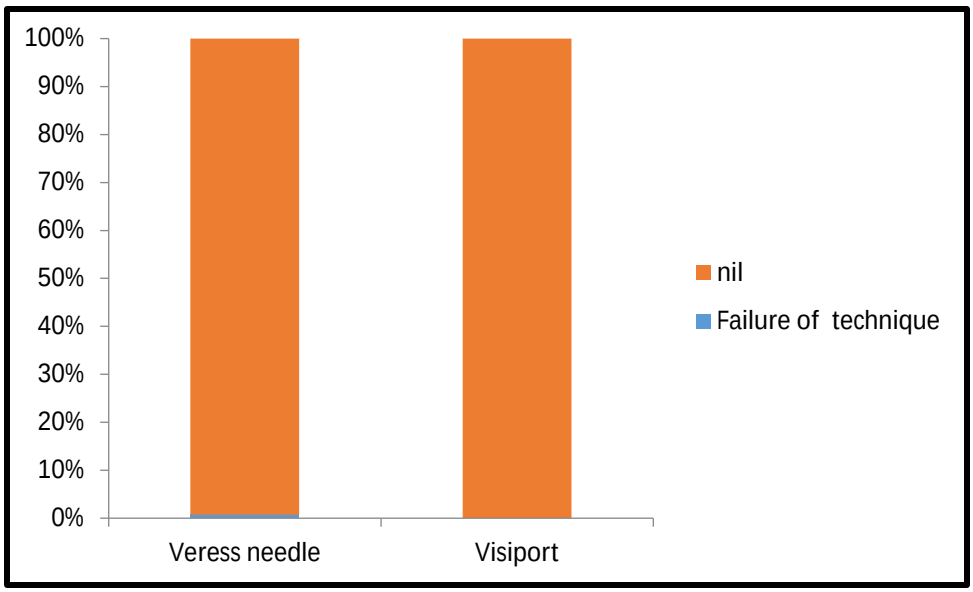
96.7 % of the Veress needle group and 100 % of Visiport group have no Preparational insuflation



Failure of technique	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
Failure of technique	1	0.7	0	0.0	1	0.3
nil	149	99.3	150	100.0	299	99.7
Total	150	100.0	150	100.0	300	100.0

χ^2 =1.003 df=1 p=0.317

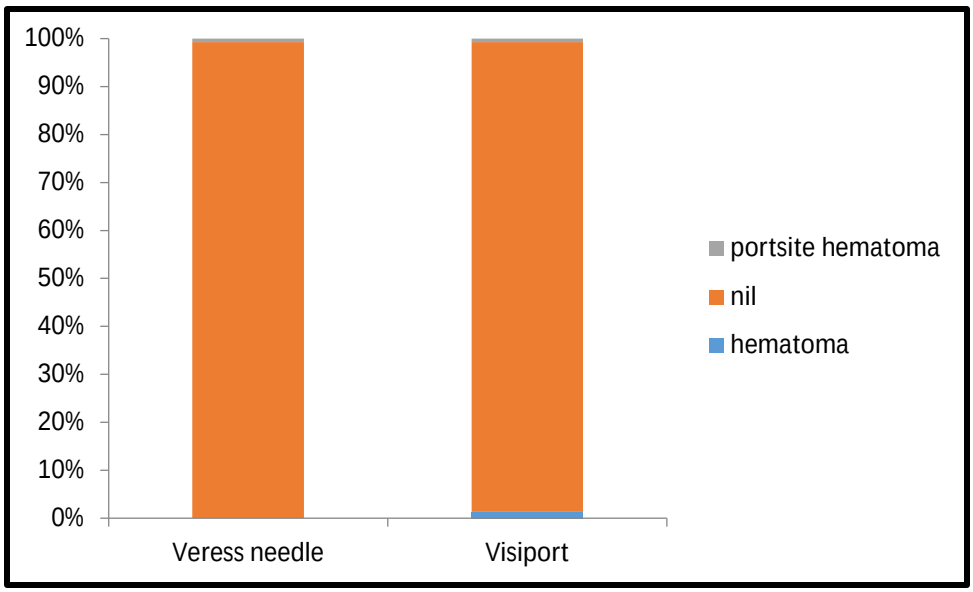
0.7 % of the Veress needle group and none of Visiport group have failure of technique



portsite hematoma	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
hematoma	0	0.0	2	1.3	2	0.7
nil	149	99.3	147	98.0	296	98.7
portsite hematoma	1	0.7	1	0.7	2	0.7
Total	150	100.0	150	100.0	300	100.0

χ^2 =2.014 df=2 p=0.365

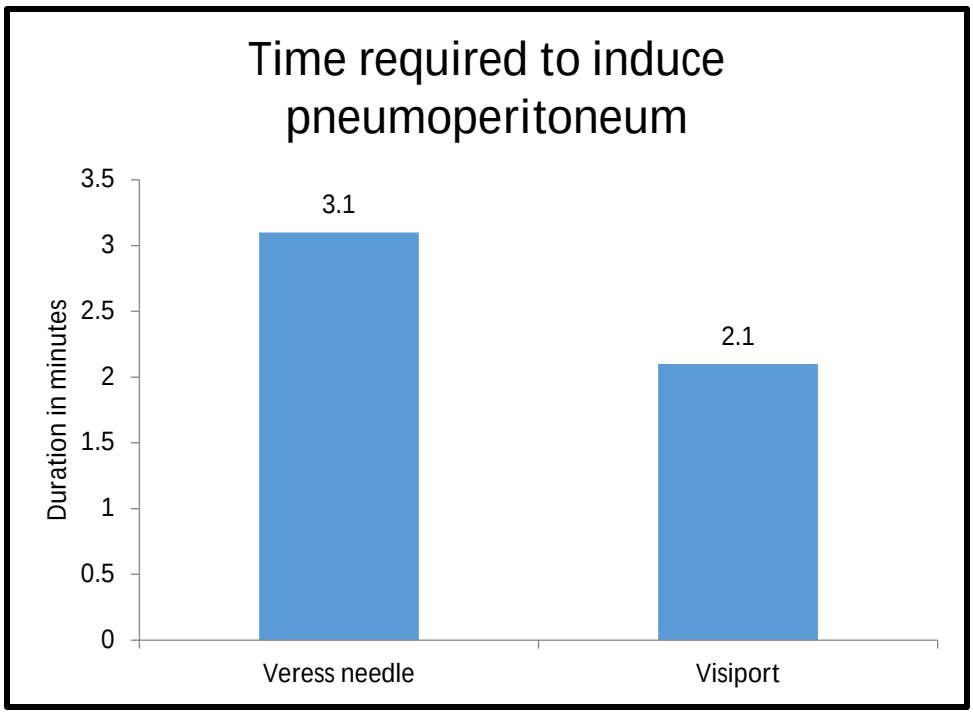
0.7 % of the Veress needle group and .7% of Visiport group have port site



Gas embolism.	Category				Total	
	Veress needle		Visiport			
	N	%	N	%	N	%
Nil	150	100.0	150	100.0	300	100.0
Total	150	100.0	150	100.0	300	100.0

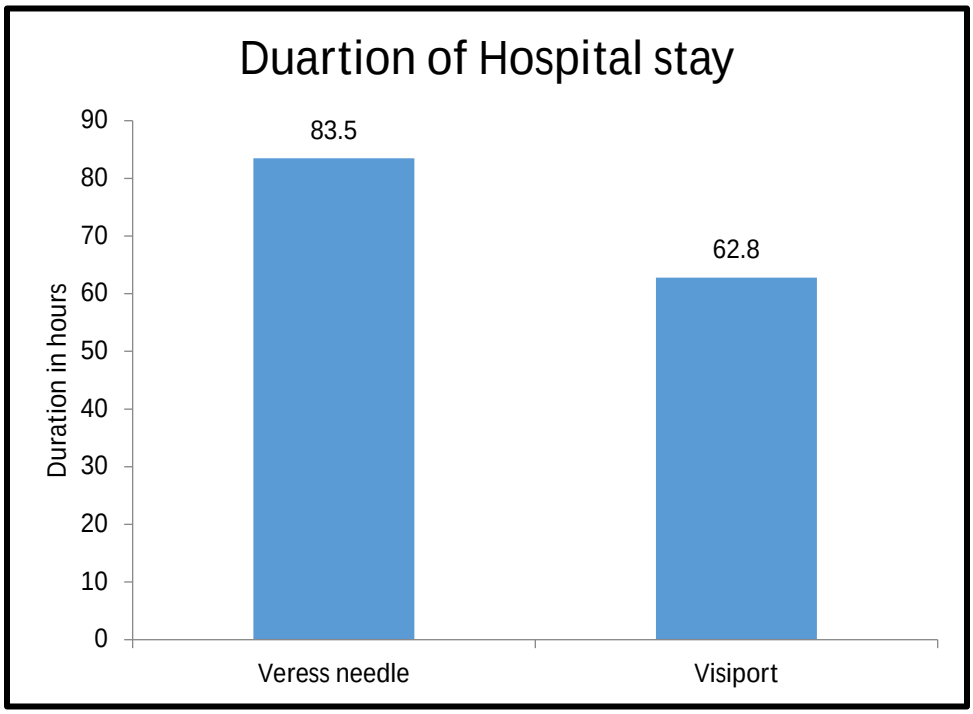
	N	Time required to induce pneumoperitoneum in minutes		t	p
		Mean	sd		
Veress needle	150	3.1	0.7	16.208	<0.001
Visiport	150	2.1	0.4		

Average time required to induce pneumoperitoneum among Veress needle was 3.1± 0.7 in minutes and that of Visiport was 2.1 ±0.4 minutes. The observed difference was statistically significant($p<0.05$). Time required to induce pneumoperitoneum among was Veress needle significantly greater than Visiport.



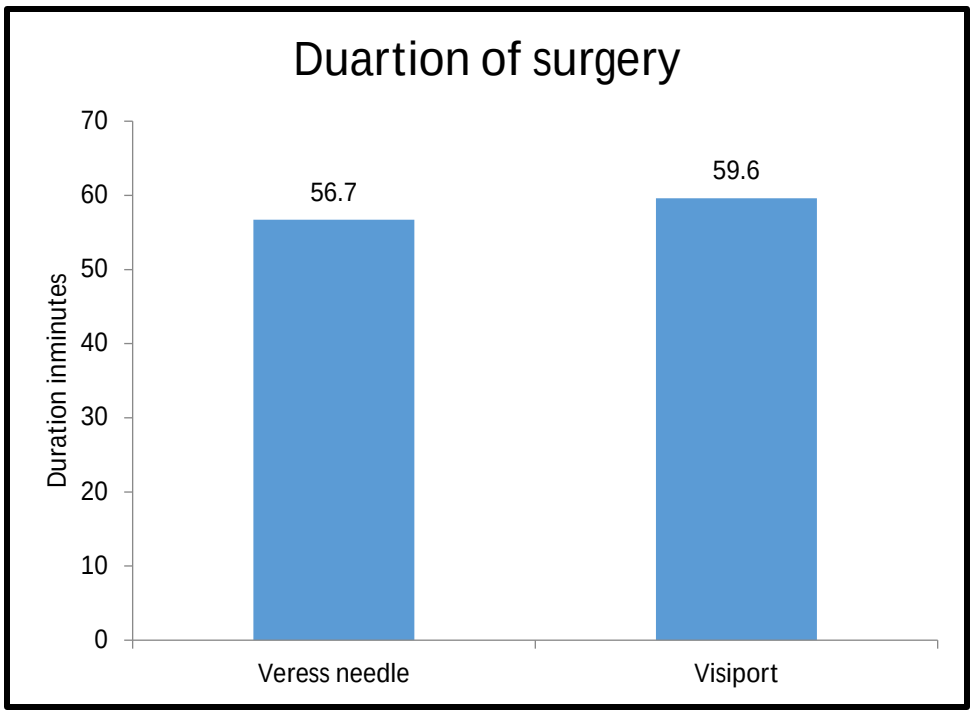
	N	Duration of Hospital stay in hours		t	p
		Mean	sd		
Veress needle	150	83.5	36.1	5.087	<0.001
Visiport	150	62.8	34.3		

Average Duration of hospital stay among Veress needle was 83.5± 36.1 hours and that of Visiport was 62.8 ±34.3 hours. The observed difference was statistically significant ($p<0.05$). Duration of Hospital stay among Veress needle was significantly greater than Visiport.



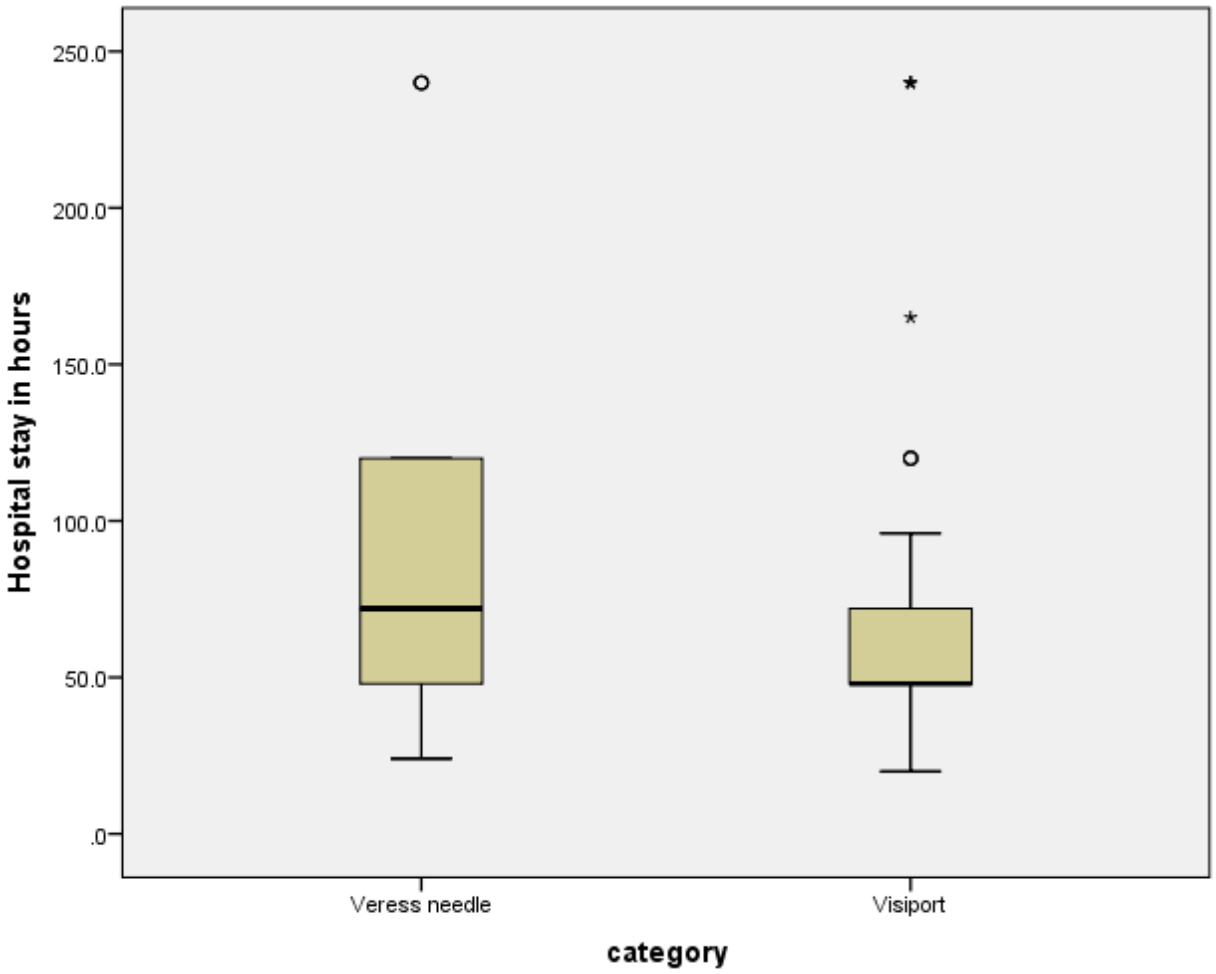
	N	Duartion of surgery in minutes		t	p
		Mean	sd		
Veress needle	150	56.7	17.2	-1.119	.264
Visiport	150	59.6	26.0		

Average Duration of surgery among Veress needle was 56.7± 17.2 minutes and that of Visiport was 59.6 ± 26.0 minutes. The observed difference was not statistically significant (p>0.05). Duration of surgery among Veress needle was significantly greater than Visiport.



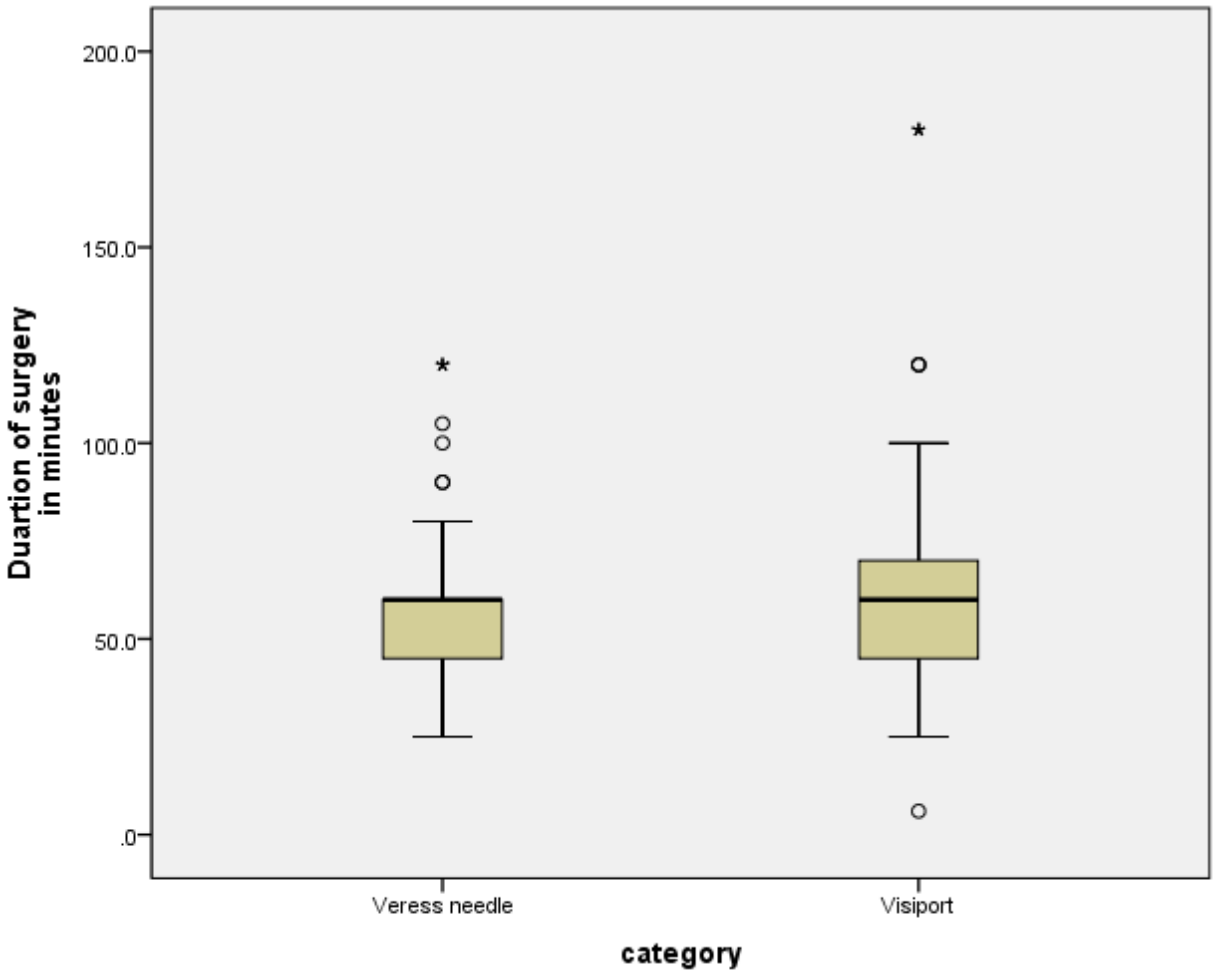
Age in years	Veress needle	Visiport
Mean	33.10	35.41
Median	31.00	35.00
Std. Deviation	12.80	10.63
Minimum	13.00	17.00
Maximum	74.00	80.00

Hospital stay in hours	Veress needle	Visiport
Mean	83.52	62.83
Median	72.00	48.00
Std. Deviation	36.09	34.33
Minimum	24.00	20.00
Maximum	240.00	240.00

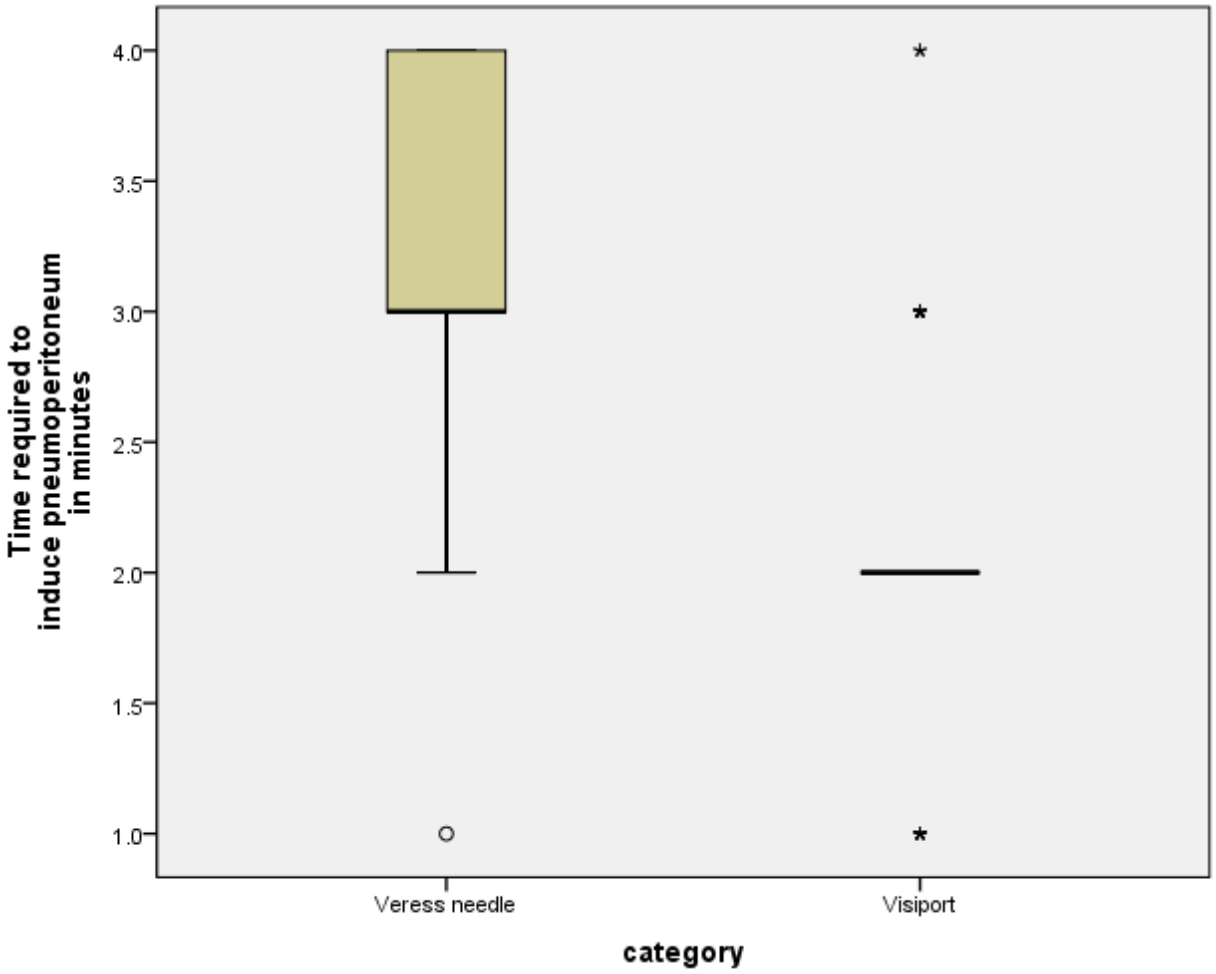


Box plot diagram describing Duration of hospital stay among veress neddle and Visiport. Lower and upper end of the whisker represent minimum and maximum duration. lower border of the box represents 25th percentile and upper border represents 75th percentile. Middle horizontal line in the box represent the median duration.

Duartion of surgery in minutes	Veress needle	Visiport
Mean	56.75	59.59
Median	60.00	60.00
Std. Deviation	17.24	25.96
Minimum	25.00	6.00
Maximum	120.00	180.00



Time required to induce pneumoperitoneum in minutes	Veress needle	Visiport
Mean	3.13	2.09
Median	3.00	2.00
Std. Deviation	0.65	0.45
Minimum	1.00	1.00
Maximum	4.00	4.00


Time required to induce pneumoperitoneum in minutes
4.0
3.5
3.0
2.5
2.0
1.5
1.0
Veress needle
Visiport
category

DISCUSSION

Ever since the first laparoscopy performed by Jacobeus of Sweden in 1925, different techniques, technologist and evidence based guidelines have been introduced to eliminate the risk associated with laparoscopic entry, whatever be the method of adopted for first port entry in to the abdomen [27]

From studies, it is proved that 50% of laparoscopic surgeries, major complications occur prior to commencement of surgery and there is delay in diagnosis of visceral injury will lead to increase morbidity and mortality [27].

Regardless of the methods used, gaining access to the abdomen and initiating pneumoperitoneum remains a source of morbidity and mortality with most common complications being visceral and vascular injuries.

Over the last three decades, rapid advances have made laparoscopic surgery a well established entity. However, laparoscopy relatively new, there are controversy existing regarding the best method of creating pneumoperitoneum [12].

To establish pneumoperitoneum, access to the peritoneal cavity can be gained through different ways which includes veress/trocar (blind technique), open technique (Hassons method), direct trocar insertion, disposable shielded trocars, radially expanding trocars and visual entry system [18]. Related to this present study, I have reviewed and compared 37 similar studies related to different access techniques in creating pneumoperitoneum in various laparoscopic surgeries.

Laparoscopic surgery will only continue to expand in terms of procedures, which can be performed in using technology. Irregardless of the procedure with the first step being induction of pneumoperitoneum, all surgeons need to achieve competence in the technique [30].

In our study, 150 cases of veress needle and 150 cases of visiport were compared and analyzed this included appendicectomy, cholecystectomy, laparoscopic inguinal and ventral hernia repair, laparoscopic sleeve gastrectomy, laparoscopic mini gastric bypass and diagnostic laparoscopy and laparoscopic closure of perforated duodenal ulcer.

In this study, there were two vascular injuries both of them happened to the same surgeon who created pneumoperitoneum through the optiview trocar while attempting to do mini gastric bypass. Both the cases converted to open and vascular surgeon was called in and repaired. This happened to the surgeon who was inexperienced with the technique. The rest of all the visport cases were safe and faster in creating pneumoperitoneum in duration of the surgery there is no statistical significance on comparison of both the techniques. There were three omental injuries with veress needle (2%). There was one omental tear among the visport group (0.7%). There were five cases of pre peritoneal insufflation among veress group (3.3%), no pre peritoneal insufflation noted in visiport group. There was one failure technique in veress group (0.7%). No failure of technique in visiport group. There was one port site hematoma in veress needle group (.07%) and four cases of port site hematoma among visiport group (2.7%).

Time required to induced pneumoperitoneum in using veress needle 3.1± 0.7 minutes and the that of visiport 2.1± 0.4 minutes P value 0.001. The observed difference is statistically significant. Time required to induced pneumoperitoneum among veress needle is significantly greater than visiport.

Duration of surgery: Average duration of surgery among veress needle 56± 17.2 minutes and that of visiport was 60±25.6 minutes. Observed difference was not statistically significant (P > 0.05)

Duration of surgery among veress needle significantly greater than visiport.

In the study of Timothy Lapham et al 5 years study from 2001 to 2006 using visiport 1623 out of 1626 cases were successful in inducing pneumoperitoneum with visiport. There were three (0.2%) retroperitoneal vascular injury.

In the study of N. Dunne et al there were visceral injury with veress needle (0.1%) but there was no vascular injury with veress needle technique.

Struge et al in four years period of study had only (0.3%) complications with visiport in creating pneumoperitoneum.

Berch et al four years study in optical trocar, there was no trocar related bowel or vascular injuries with visiport.

DEMOGRAPHIC DATA OF PATIENTS AND RESULTS

VERESS NEEDLE		VISIPORT	
Demographic Data	VN group	Optical Trocar	P Value
Number of cases	150	150	
Mean Age in years	33.1 ± 10.4	35.4 ± 10.6	0.09
Male/Female	96/54	59/91	0.001
Time for creating pneumoperitoneum	3.1 ± 0.7	2.1 ± 0.4	0.001
Duration of surgery in minutes	56.7 ± 17.2	60 ± 25.6	0.204
Duration of hospital stay in hours	83.5 ± 36.1	62.8 ± 34.3	0.001
Aortic Injury	0	1	0.365
IVC Injury	0	1	0.365
Visceral Injury			
Omental Injury	3	0	0.109
Omental Tear	0	1	
Pre peritoneal Insufflation	5	0	0.024
Failure of Technique	1	0	0.317
Port Site Hematoma	1	4	0.176
Gas Embolism	0	0	

COMPLICATIONS

Complications	Veress Needle (150)	Visiport (150)	Total
Vascular Injuries	0.0%	0.3%	0.3%
Visceral Injuries	2%	0.7%	1.3%
Pre peritoneal Insufflation	3.3%	0.0%	1.7%
Failure of Technique	0.7%	0.0%	0.3%
Port Site Hematoma	0.7%	2.7%	1.7%

HOSPITAL STAY

Average duration of hospital stay among veress needle was 83.3 ± 36.1 hours and that of visiport was 62.8 ± 34.3 hours. The observed difference was statistically significant $P < 0.05$. Duration of hospital stay among veress needle group was significantly greater than visiport group. Theses difference is due to the difference in cases, most of the cases under veress group were infective cases like appendicitis with perforation, collection, abscess formation and acute cholecystitis, blunt abdominal trauma cases for diagnostic laparoscopy, and all these needed more hospital stay. However, those under visiport were bariatric surgery and hernia cases, were all clean cases needed less duration stay in the hospital.

CONCLUSION

In this study of comparison, both techniques were seem to have associated with its own complication. But visiport is safe and faster method of creating pneumoperitoneum though there was statistically insignificant major vascular injury. It happened with inexperienced surgeon. There is no strong evidence of superiority of one technique over the other.

Even though both techniques are associated with potential danger of perforating injuries on inserting the first trocar, undervision technique allows early recognition of injuries and immediate repair. No single technique and instrument has been accepted as "gold standard" for creating pneumoperitoneum in laparoscopic surgery.

Good surgical skills and proper evaluation of the patient are important for safe access in minimal access surgery. The surgeon should be competent in both the techniques. Regardless of the technique that has chosen, one must abide by the safe general principles of surgery, meticulous, take your own time, and be highly alert for appearance of signs of injury.

With further research and development and optimal form of laparoscopic entry technique in creating and maintaining pneumoperitoneum in laparoscopic surgery is need to be designed.

The surgeon should be familiar with both the technique and adapt their entry technique to indural patient circumstances.

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