"A COMPARATIVE STUDY BETWEEN DIRECT TROCAR, VERESS NEEDLE AND OPEN APPROACH ENTRY IN LAPAROSCOPIC SURGERIES"

By

Dr. VARUN KUMAR DAMERA

Dissertation submitted to

In partial fulfilment for the degree of

MASTER OF SURGERY

IN

GENERAL SURGERY

Under the guidance of

Dr. HEMANTH KUMAR M

Associate Professor

DEPARTMENT OF GENERAL SURGERY

BLDE UNIVERSITY

SHRI B. M. PATILMEDICAL COLLEGE,

HOSPITAL & RESEARCH CENTRE

VIJAYAPUR – 586103

2017

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled **"A COMPARATIVE STUDY BETWEEN DIRECT TROCAR, VERESS NEEDLE AND OPEN APPROACH ENTRY IN LAPAROSCOPIC SURGERIES"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. HEMANTH KUMAR M** Associate Professor, Department of General Surgery, Shri. B.M. Patil Medical College, Hospital and Research centre, Vijayapur.

Date:

Place: Vijayapur. **Dr. VARUN KUMAR DAMERA**

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled **"A COMPARATIVE STUDY BETWEEN DIRECT TROCAR, VERESS NEEDLE AND OPEN APPROACH ENTRY IN LAPAROSCOPIC SURGERIES"** is a bonafideresearch work done by **Dr. VARUN KUMAR DAMERA**in partial fulfilment for the degree of M.S. in GENERAL SURGERY.

Dr. HEMANTH KUMAR M

ASSOCIATE PROFESSOR,

Date: **DEPARTMENT OF GENERAL SURGERY**

Place: Vijayapur. BLDEU's Shri. B. M. PatilMedical College,

Hospital and Research Centre, Vijayapur.

ENDORSEMENT BY THE HEAD OF THE DEPARTMENT

This is to certify that the dissertation entitled**"A COMPARATIVE STUDY BETWEEN DIRECT TROCAR, VERESS NEEDLE AND OPEN APPROACH ENTRY IN LAPAROSCOPIC SURGERIES"** is a bonafide research work done by **Dr. VARUN KUMAR DAMERA**under the guidance of **Dr. HEMANTH KUMAR M** Associate ProfessorDepartment ofGeneral Surgery.

DR TEJASWINI VALLABHA$_{\textbf{MS(SURG)}}$

PROFESSOR AND HEAD,

DEPARTMENT OF GENERAL SURGERY

Date: BLDEU's Shri. B. M. PatilMedical College,

Place: VIJAYAPUR. Hospital and Research Centre, VIJAYAPUR

ENDORSEMENT BY THE PRINCIPAL

This is to certify that the dissertation entitled**"A COMPARATIVE STUDY BETWEEN DIRECT TROCAR, VERESS NEEDLE AND OPEN APPROACH ENTRY IN LAPAROSCOPIC SURGERIES"** is a bonafide research work done by **Dr. VARUN KUMAR DAMERA**under the guidance of **Dr. HEMANTH KUMAR M** Associate Professor Department of General Surgery.

Dr. S. P.GUGGARIGOUDAR **MS**

Principal,

Shri. B. M. Patil

Date**:** Medical College, Hospital &

Place**:** Vijayapur Research Centre, Vijayapur.

COPYRIGHT

DECLARATION BY THE CANDIDATE

I hereby declare that the BLDE University, VIJAYAPUR, Karnataka shall have the rights to preserve, use and disseminate this dissertation / thesis in print or electronic format for academic / research purpose.

Date: **Dr. VARUN KUMAR DAMERA**

Place: Vijayapur

ACKNOWLEDGEMENT

On completion of my post graduation journey and this scientific document, I would like to acknowledge the immense help received from my mentors in the Department of General Surgery.

*With privilege and respect I would like to express my gratitude and indebtedness to my Guide,**Dr. Hemanth Kumar M,**for hisconstant inspiration, extensive encouragement and loving support, which he rendered in pursuit of my post-graduate studies and in preparing this dissertation.*

*I am forever grateful to Professors, **DrTejaswiniVallabha,DrM.B.Patil, Dr.AravindPatil, Dr.B.B.Metan,Dr.M.S.Kottenavar, Dr.VijayaPatil**for their guidance and encouragement provided to me, to achieve new heights professionally over my course period.*

I am grateful to AssociateProf. Dr.Basavaraj. Narasangi, Dr.Hemanth. Kumar, Dr.Girish .Kulloli for their guidance, encouragement and inspiration.

I am thankful to Dr. Dayanand..S.Biradar, Dr.Vikram.Sindagikar, Dr.Deepak.Chavan, Dr.S.S.Patil, Dr.Shailesh.Kannur, Dr.Surekha.Rathod,Dr. Harshavardhan.Biradarfor their great help.

I am extremely thankful to Prof. Dr. S P Guggarigoudar, Principal, of B.L.D.E.U'S Shri.B.M. Patil Medical College, Hospital and Research Centre, VIJAYAPUR, for permitting me to utilize resources in completion of my work.

I also thank MrMohd. ShahnawazLecturerStatistics, for his guidance during my dissertation work.

My thanks to one and all staff of Library, GENERAL SURGERY Department and Hospital for their co-operation in my study.

I am thankful to my seniors,Dr.Ashrith.I.M, Dr.Sunil.K, Dr.Rakshith, Dr.Bharath, Dr.Ravi.I, Dr.Anikethan.V, Dr.Anand.S, Dr.Jadesh, Dr.Umesh, Dr.Rohith, Dr.Mallikarjun, Dr.Abhilashfor their advice, suggestions and co-operation in my journey.

I would also like to thank my colleagues Dr.Keeni Dilip Reddy, Dr.Ahmed Faraz Patel, Dr.Anup. Kubsad, Dr.Suhas T, , Dr.MrinalKumar, Dr.Kruti for their help and co-operation.

I would also like to thank my juniors Dr.Balakrishna, Dr.Vijaykumar, Dr.Surya, Dr.Santhosh, Dr. Manoj, Dr.Harsh,Dr. Ritesh for their support and co-operation.

I am deeply indebted to my parents Dr.Damera Ramulu and Shobha Rani for their blessings and my brother Dr.Vasu Kumar which helped me to complete this dissertation.

My heartfelt thanks to my wife Dr Sujanitha for her help, constant encouragement and moral support that led me to successfully complete this dissertation work.

Last but not the least; I convey my heartfelt gratitude to all my patients, without whose co-operation, this study would be incomplete.

Dr. VARUN KUMAR DAMERA

ABSTRACT

Purpose :The purpose of this study is to compare the results obtained from three laparoscopic techniques , Direct Trocar entry, Veress Needle, and Open Approach (Hassons technique) and to see which is the best method of establishing pneumoperitoneum.

Methods :We studied 288 patients admitted to our hospital for laparoscopic surgeries, in a randomised prospective design, 96 patients were assigned each to Direct trocar (DTI), Veress needle(VN) and Open Hassons Approach(OA).The variables analysed were : Mean trocar insertion time, Gas leak, Subcutaneous emphysema and Intra abdominal injuries.

Results :Mean trocar insertion time DTI, VN and OA are 77.6±22.4, 180.1±39.8 and 350±127.9 sec,p = <0.001 (Sig), gas leak in 0 (0%), 11(11%) and 39(40.6%) p =<0.001 (Sig),subcutaneous emphysema in 0 (0%), 5(5.2%) and 12(12.5%) p=0.001 (Sig),and intra abdominal injuries 0 (0%), 2(2.1%) and 1(1.0%)

Conclusions :Our results show DTI to be a safe, efficient, rapid and easily-learned alternative technique, reducing the number of procedure-related complications.

Keywords: Laparoscopy, Pneumoperitoneum, Direct trocar insertion (DTI), Veress needle (VN).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

INTRODUCTION

Establishing an acceptable pneumoperitoneum is the first and most important stage of laparoscopy. Access into the abdomen is the one challenge of laparoscopy that is particular to the insertion of surgical instruments through small incisions. Inducing pneumoperitoneum is the first step in carrying out laparoscopic surgery for diagnostic and therapeutic purposes.[1]

The goal of laparoscopy is to minimize patient morbidity while maintaining successful outcomes.[2] Laparoscopic entry is a blind procedure and it often represents a problem for all the related complications.

There are 4 basic techniques used to create a pneumoperitoneum: (1) Veress needle (VN), (2) Direct trocar insertion (DTI), (3) optical insertion, and (4) Open laparoscopy (Hasson technique).[3]

Control of the laparoscopic trocar as it penetrates each layer of the anterior abdominal wall is essential . Authors of previous studies have suggested that the initial trocar insertion is the most dangerous aspect of its use and possibly the most dangerous step in minimally invasive surgery. The DTI technique without preinsufflation is an alternative to VN insertion and open laparoscopy for accessing the abdominal cavity.[4]

In the last three decades, rapid advances in laparoscopic surgery have made it an invaluable part of general surgery, but there remains no clear consensus on an optimal method of entry into the peritoneal cavity.[5]

Creation of the pneumoperitoneum is the first and most critical step of a laparoscopic procedure because that access is associated with injuries to the gastrointestinal tract and major blood vessels and at least 50% of these major complications occurs prior to commencement of the intended surgery. This complication rate has remained the same during the past 25 years.[6]

Generally, the insertion technique is done with Direct Trocar, has potential chance for injury. Although Veress Needle is widely used as another popular technique, it is associated with slow insufflation rates and potentially life threatening complications.[7] The Open Approach is relatively more safe, hence, it is an alternative to Direct Trocar and Veress Needle techniques even if it is considered cumbersome by many surgeons, but no single technique has been proved to be dangerless and has advantage over other.[8]

In our institutions, laparoscopic surgeries performed regularly. This study aims at studying three most common methods of laparoscopic entry i.e., Direct Trocar, Veress Needle and Open Approach and to arrive at a conclusion as to the best modality of approach in relation to standard published material.

AIM OF THE STUDY

To compare the results obtained from three laparoscopic techniques , Direct Trocar entry, Veress Needle, and Open Approach (Hassons technique) and to see which is the best method of establishing pneumoperitoneum.

OBJECTIVES OF THE STUDY:

To compare the outcome of Direct Trocar, Veress Needle and Open Approach in laparoscopic surgeries in the view of

1. Mean trocar insertion time
2. Gas leak
3. Intra abdominal injury
4. Subcutaneous emphysema

REVIEW OF LITERATURE

- **E.Priesto Diaz Chavez et al study on 'Direct trocar insertion(DTI) without pneumoperitoneum and veress needle(VN) in laparoscopic cholecystectomy': A Comparative Study** on the safety and complications of direct trocar and veress needle. Variables analysed were: procedure complications, laparoscopic insertion time, and duration of surgery. Of 84 patients 42 each for DTI and VN. Duration of surgery was 56 ± 31 minutes (SD range 20 and 120) and 71 ± 28.7 minutes (SD range 30 and 175) for DTI and VN respectively. The time required to insert the laparoscope was significantly different with 1.56 ± 0.56(SD) minutes and 3.02 ± 0.41 (SD) for DTI and VN respectively; $p < 0.001$. Complications with VN23.8% and DTI 2.3%, P=0.009. Their results show DTI to be rapid, safe, efficient and easily-learned alternative technique, reducing the number of procedure related complications.[9]
- **HamidShayaniNasab et al studied on 'Complications of using Direct Trocar(DT) and/or Veress Needle (VN) Compared with Modified Open Approach(OA) Entry in Laparoscopy , Six year experience.'** Studied on the results obtained from three routine laparoscopic entry techniques, including Direct Trocar (DT), Veress Needle (VN), and Open Approach (OA). Safety and efficacy of three main laparoscopic entry techniques were evaluated prospectively in 453 patients, 105 for DT, 168 for VN, and 180 for OA, statistical differences were seen among mean trocar insertion time (*P<.001), mean age (P= .003),*indications for operation (*P< .001).*Three major complications occurred in DT, one in VN and none in OA approach. Hence although DT and VN are rapid and relatively safe, they can be

associated with complications. Therefore modified OA seems to be safe, feasible due to less complications.[10]

- **Pawan et al, Lakhwinder Singh and Ravi Kant study on 'Open Port Placement of the First Laparoscopic Port : A Safe Technique,** conducted a prospective study in Maulana Azad Medical College and Lok Nayak Hospital, New Delhi in which a modified open approach was performed on 755 patients over a period of five years from august 1998 to 2003, with mean time of 4 minutes , no operative complications during trocar insertion , 6.49% had minor umbilical sepsis, 2.91% had periumbilical haematoma, but none had umbilical hernia during 3 months of follow up. Hence Open laparoscopy can lead to elimination of the risks of blind insufflation and trocar insertion and safe and easy approach.[11]
- **SiavashFalahatkar M.D** conducted a retrospective study for laparoscopic procedures between December 2005 and June 2008. A total of 148 patients; 62 for DTI and 86 for Open Approach(OA) with results of mean access time for DTI was 91.45 seconds to OA taking 263.97 seconds($p<.0001$), Mean abdominal pressure for pneumoperitoneum with DTI was 16.17mm Hg which was higher than to 15mm Hg with OA, concluding DTI to be safer, faster ,easy to learn and practice, appears more effective than OA, although the safety of two techniques is equivalent.[12]
- **LIU Hai-fang et al**, conducted **A multi-center study of a modified open trocar first-puncture approach in 17350 patients for laparoscopic entry** in MOT Modified open trocar group with successful achievement rate of first puncture was 99.99% (17348/17350) with complications occurred in two cases (0.01%).In VN Veress needle group successful achievement rate was

99.89%(4565/4570) with five cases failed (0.09%) and complication rate of VN group higher than MOT group. Hence concluding that MOT is easier to follow and can avoid possible veress needle associated injuries.[13]

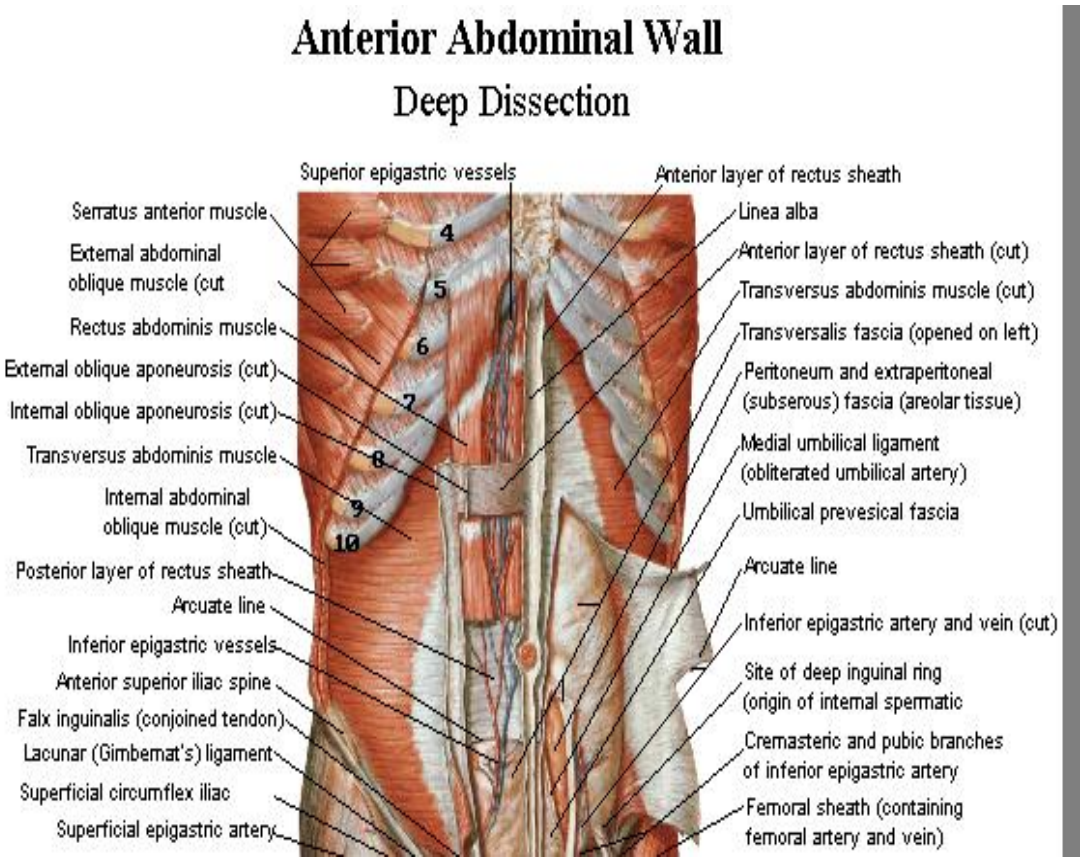
- **Rakesh Kaul et al** conducted a study *"***A Randomised Comparative Study Between Direct Trocar Insertion Verus Veress Needle Technique For Creating Pneumoperitoneum In Laproscopic Cholecystectomy "**concluded that, Both the techniques were able to create pneumoperitoneum in all patients; therefore there was no conversion of procedure to laparotomy in both the groups. The mean time taken (in minutes) to induce pneumoperitoneum in VN technique was 6.80±1.36 minutes where as in DT technique mean time was 3.18±0.66 minutes (p value= 0.001). Minor complications were more in Veress technique than in Direct trocar insertion. There was no major complication in both the groups. Therefore , Direct trocar insertion is a fast, safe and reliable alternative to traditional techniques of primary port placement in laparoscopic procedures for creation of pnuemoperitoneum.

LAPAROSCOPIC ANATOMY

- Structural landmarks of the anterior abdominal wall
  - Umbilicus
  - Anterior superior iliac spines
  - Pubic symphysis

- Vessels of the anterior abdominal wall
  - Inferior epigastric vessels
  - Superficial epigastric vessels
  - Superficial circumflex iliac vessels

- Layers of the anterior abdominal wall
  - Rectus abdominis muscle
  - Anterior and posterior rectus sheath
  - Arcuate line



Figures 1

INTRODUCTION

Incision and closure of the abdominal wall are among the most frequently performed surgical procedures. The abdominal wall is defined cranially by the xiphoid process of the sternum and the costal margins, and caudally by the iliac and pubic bones of the pelvis .[14]

Integrity of the anterior abdominal wall is primarily dependent upon the abdominal muscles and their conjoined tendons.

Knowledge of the layered structure of the abdominal wall permits efficient and safe entry into the peritoneal cavity. The principal structures from exterior to interior are: skin, subcutaneous tissue, muscles with an aponeurosis, transversalis

fascia, preperitoneal fat, and peritoneum. Nerves, blood vessels, and lymphatics are present throughout.

Abdominal wall anatomy that is clinically pertinent to the surgeon, focusing primarily on the structures of the anterior abdominal wall will be reviewed.

Skin and Subcutaneous Tissue

The subcutaneous tissue is comprised of deep and superficial adipose tissue layers separated by weak, poorly defined fibrous tissue matrices. [15]

Camper's fascia is the superficial fatty layer that is continuous with superficial adipose, and may vary in thickness, depending upon the patient's body habitus. Scarpa's fascia is a more membranous layer that will eventually become continuous with the superficial fascia of the back and thorax.

Muscles

The anterior abdominal wall consists primarily of the rectus muscles and associated fascia.

Rectus abdominus

The rectus abdominus consists of a pair of strap muscles that extend the length of the anterior abdominal wall, and are separated by the linea alba. These muscles arise from the symphysis pubis and the pubic crest with insertion into the fifth, sixth, and seventh costal cartilages and the xiphoid process. The rectus sheath has variable contributions from the oblique and transversus muscles.

External oblique

The external oblique muscle is a broad, thin muscle that arises from the surfaces of the lower eight ribs, fanning out downward to insert medially into the xiphoid process, the linea alba, and the anterior portion of the iliac crest.

Its aponeurotic sheet contributes to the anterior sheath of the rectus abdominus, then fuses at the linea alba in the midline with the contralateral counterpart.

Internal oblique

The internal oblique muscle is a broad, thin muscle that lies deep to the external oblique, with its origins from the thoracolumbar fascia, the anterior two-thirds of the iliac crest, and the lateral two-thirds of the inguinal ligament .

Its aponeurotic sheet contributes to the anterior sheath of the rectus abdominus, then fuses at the linea alba in the midline with the contralateral counterpart .

Transversus abdominus

The transversus abdominus muscle is a thin muscle sheet that lies deep to the internal oblique muscles.

It arises from the deep surface of the lower six costal cartilages, the lumbar fascia, iliac crest, and the lateral third of the inguinal ligament, and inserts into the xiphoid process, linea alba, and the symphysis pubis.

Its aponeurotic sheet contributes to the posterior rectus sheath above the arcuate line and the anterior rectus sheath below the arcuate line. It then fuses at the linea alba in the midline with the contralateral counterpart.

Pyramidalis

The pyramidalis muscle is a flat, triangular muscle at the inferior margin of the anterior abdominal wall. It originates from the superior pubic ramus, between the symphysis pubis and the pubic tubercle, and runs superomedially inserting into the linea alba.[16]

Fascia

Rectus sheath

The rectus sheath is composed of the broad sheet-like aponeurosis of the flank muscles which enclose the rectus abdominus (and pyramidalis muscle, if present). Lateral to the rectus abdominus, the aponeurosis can be separated, but they fuse as they reach the midline.

The external oblique muscle, the most superficial of the flank muscles, has a broad aponeurosis that passes anteriorly over the rectus abdominus. Beneath the external oblique, the internal oblique has a bilaminar aponeurosis that passes posterior to the rectus abdominus above the arcuate line, and anterior to the rectus below the arcuate line. The innermost abdominal muscle is the transversus abdominus. Its aponeurosis is posterior to the rectus abdominus above the arcuate line, and anterior to the rectus abdominus below the arcuate line where it fuses with the aponeurosis of the internal oblique.

Inferior to the arcuate ligament, the aponeurosis of all three muscles form the anterior sheath. The posterior sheath is absent and the rectus lies directly on top of the transversalis fascia. The arcuate line is the site where the inferior epigastric vessels enter the rectus sheath, travel superiorly, and converge with the superior epigastric vessels. The arcuate line is absent in as many as 30 percent of individuals. [17]

Transversalis fascia

The transversalis fascia is a weak fibrous layer covering the inner surface of the transversus abdominus muscles and is separated from the peritoneum by a layer of fat, commonly known as the preperitoneal fat layer. It is frequently incised off the bladder when the peritoneal cavity is opened. This layer of connective tissue forms a

continuous lining for the abdominal and pelvic cavities and is continuous with the diaphragmatic fascia, the iliac fascia, and the pelvic fascia.

Linea alba

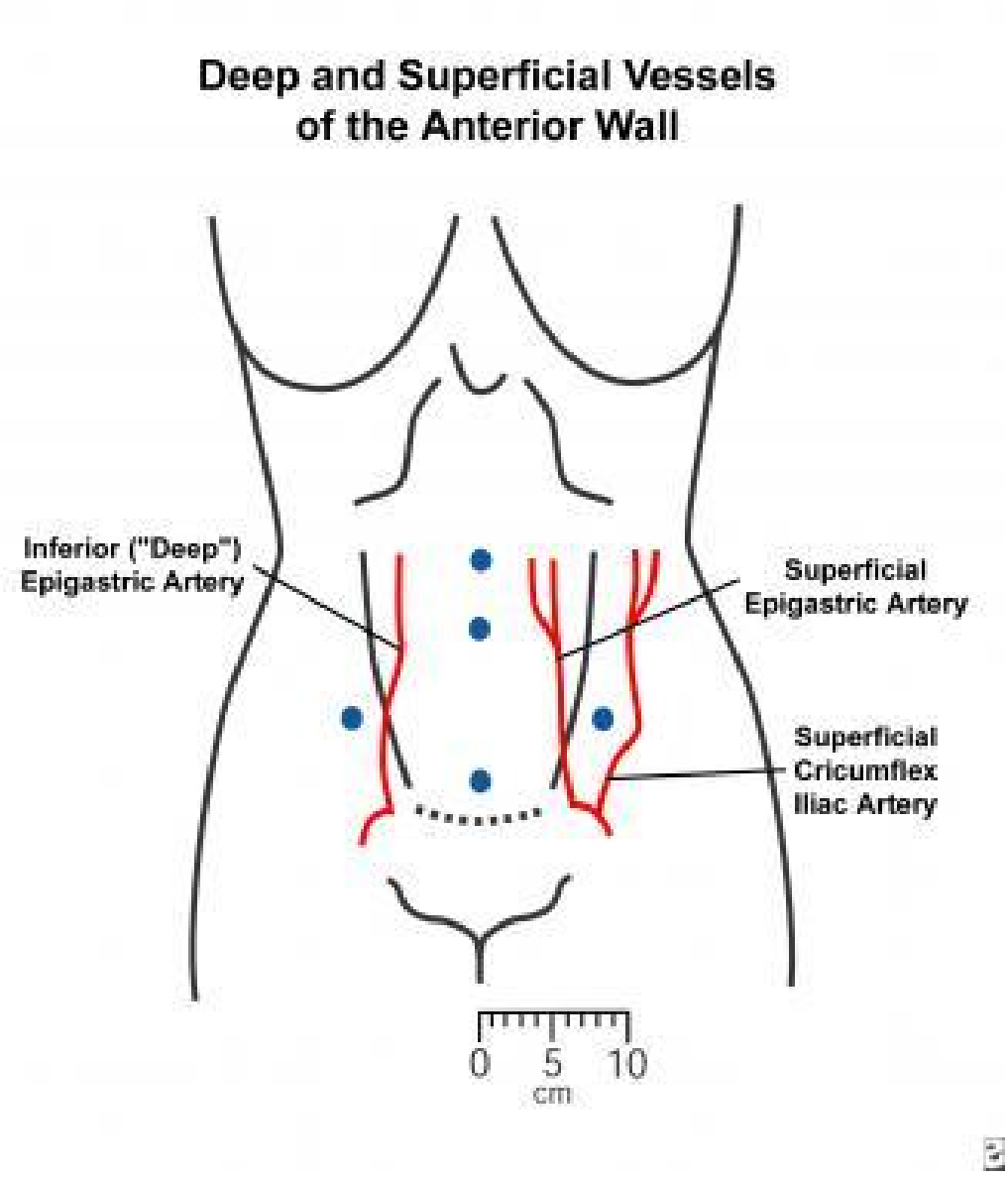
The linea alba stretches from the xiphoid process to the pubic symphysis. It is defined as the fusion of the aponeurosis of the external oblique, internal oblique, and the transversus abdominus muscles. It maintains the abdominal musculature at a certain proximity to each other. The linea tends to have its widest margin approximately 3 cm superior to the umbilicus, and has varying distances depending upon the point of reference along the abdominal wall. [18]

PERITONEUM

The peritoneum is a single layer of serosa supported by a thin layer of connective tissue that lines the abdominal cavity. Five vertical folds are formed by underlying ligaments or vessels that converge at the umbilicus: the abdominal wall reflection of the bladder, which fuses with the urachus; the single middle umbilical ligament (the obliterated urachus); the paired medial umbilical ligaments (remnants of the obliterated umbilical arteries); and the lateral umbilical ligaments associated with the deep inferior epigastric vessels.

VASCULATURE

The blood supply of the abdominal wall is comprised of superficial and deep vascular supplies.



Figures 2

Deep arteries

Inferior deep epigastric arteries

The inferior deep epigastric artery is thought to be the dominant vascular supply to the anterior abdominal wall. It branches from the external iliac artery passing medially adjacent the inguinal ligament. It ascends medial to the external inguinal ring and superficial to the transversalis fascia. It then proceeds toward the

umbilicus and crosses the lateral border of the rectus muscle at the arcuate line where it enters the posterior rectus sheath. Once the artery enters the sheath, it branches extensively. It ascends within the rectus sheath to communicate with the superior deep epigastric artery. The angle between the vessels and lateral border of the rectus forms the apex of the inguinal (Hesselbach's) triangle, the base of which is the inguinal ligament.

The musculocutaneous perforating vessels of the inferior deep epigastric artery reach and supply deeper tissue as well as the integument of the anterior abdominal wall. These perforators are particularly relevant in reconstructive surgery as an important supply for abdominal tissue flaps used[19]. The number, location, and course of these perforators are highly variable.

The inferior deep epigastric vessels are bounded only by loose areolar tissue below the arcuate line. Trauma to this portion of the inferior deep epigastric artery may result in considerable hemorrhage. Because hematomas commonly dissect into the retroperitoneal space, large quantities of blood may be lost before outward evidence of hematoma is detectable.

Superior deep epigastric arteries

The superior deep epigastric artery is a terminal branch of the internal thoracic artery. It enters the rectus sheath at the seventh costal cartilage and descends on the posterior surface of the rectus muscle. The superior and inferior deep epigastric arteries freely anastomose with one another at the level of the umbilicus to provide a generous collateral circulation between the subclavian and external iliac arteries. These vessels communicate laterally with the intercostals, subcostal, and lumbar arteries, as well as the ascending branch of the deep circumflex iliac artery[20]. Deep branches of this vessel supply the posterior rectus sheath and the peritoneum with

muscular branches and anterior perforating branches supplying skin and subcutaneous tissues.

Deep circumflex iliac arteries

The deep circumflex iliac artery also branches from the external iliac artery or, less frequently, from a common origin that includes the inferior epigastric artery. Its course is lateral and vertical behind the inguinal ligament. It then turns medially at the iliac crest, where it pierces the transversus abdominus muscle. Between the transversus abdominus and internal oblique muscles, numerous connecting branches supply the lower and lateral abdominal wall. Anastomoses with the intercostal and lumbar vessels supply branches to all the flank muscles.

Musculophrenic arteries

The musculophrenic artery is also a branch of the internal thoracic artery. It lies behind the costal cartilage to supply the intercostal spaces and upper abdominal wall. Anastomoses from intercostal and subcostal vessels to the deep circumflex iliac vessels occur in the deep layer.

Superficial arteries

The superficial vasculature of the abdominal wall is located in the subcutaneous tissues and consists of branches of the femoral artery, including the superficial inferior epigastric, superficial external pudendal, and superficial circumflex arteries.

The superficial inferior epigastric vessels run diagonally in the subcutaneous tissues from the femoral artery toward the umbilicus. They can be identified on a line between the palpable femoral pulse and umbilicus just superficial to Scarpa's fascia. As they approach the umbilicus, the arteries branch extensively.

The external pudendal arteries have a medial and diagonal course from the femoral artery, and supply the region of the mons pubis. These vessels branch extensively as they approach the midline. Following incision, bleeding is typically heavier here than in other subcutaneous areas of the abdomen.

The superficial circumflex iliac vessels proceed from the femoral vessels to the flank. The superficial vessels follow the general pattern of the deep vessels and arise from the iliac or femoral vessels. The exception is that the superficial inferior epigastric vessels have no superior counterparts.

Veins

Venous drainage of the anterior abdominal wall tends to be more variable than arterial pathways; however, veins typically follow the course of arteries . A better understanding of venous drainage systems of the anterior abdominal wall is needed for better management of abdominal flaps[21]. Above the umbilicus, they drain to the subclavian vessels, and below the umbilicus, they drain to the external iliac vessels. Veins may be dilated in patients with obstructed blood-flow through the liver and porta hepatis. They may also be engorged in patients with large pelvic masses.

Collateral flow channels

Several patterns of collateral flow exist in the abdominal wall due to the extensive network of vessels supplying it. The principle blood vessels involved in this collateral circulation are the internal mammary, superior epigastric, intercostals, inferior epigastric, and external iliac. This network allows blood to bypass the occlusion of the aorta or iliac vessels, and thus, restore blood flow to the lower extremities. Case reports have described worsening of lower extremity ischemia when transverse incisions of the abdomen disrupt the abdominal wall vessels. [22]

Lymphatic Channels

Abdominal lymphatics generally follow the course of the abdominal veins. As a general rule, the channels of the upper abdominal wall, above the level of the umbilicus, drain primarily to the anterior axillary (ie, pectoral) lymph nodes, and to a lesser extent, to the internal mammary chain. Those of the lower abdomen, below the level of the umbilicus, drain to the inguinal nodes and then to the iliac chain of nodes. Lymphatics adjacent the umbilicus drain towards the liver through the falciform ligament. Transverse incisions are likely to disrupt lymphatic drainage to some degree. This disruption may lead to tissue swelling in the abdominal wall until collateral lymphatic drainage can be established.

Nerves

The intercostal and lumbar nerves enter the abdominal wall between the transversus abdominus and internal oblique muscles, and run in a generally caudal and medial direction.

Each nerve innervates a dermatome, but some overlapping innervation occurs. Longitudinal incisions (except at the midline) can be expected to lead to sensory impairment inferior and medial to the level of the transected nerves.

Intercostal nerves

The 7th to 12th intercostal nerves innervate the abdominal wall.. The intercostal nerves divide into lateral cutaneous branches and anterior and posterior branches. The 10th nerve supplies the region of the umbilicus. Postoperative bulge is related to intercostal nerve injury with subsequent paralysis of abdominal wall musculature[23].

Iliohypogastric nerves

The 12th intercostal and the first lumbar nerves form the iliohypogastric nerve, which passes medial to the anterior superior iliac spine. The iliohypogastric nerve enters the abdominal wall at the transversus abdominus muscle and courses, on average, 2.1 cm medial and 0.9 cm inferior to the anterior superior iliac spine, following a linear course to terminate 3.7 cm lateral to the midline and 5.2 cm superior to pubic symphysis[24]. The terminal branch courses medial and parallel to the inguinal ligament. It provides motor fibers to external oblique, internal oblique, and transversus abdominus muscles, and provides sensory fibers to the skin of the mons pubis. The anterior cutaneous branch of the iliohypogastric nerve provides sensory innervation to the skin of the upper and lateral thigh[25]. It communicates with the ilioinguinal nerve, and provides sensory fibers to the skin overlying the external inguinal ring and symphysis. Measures to avoid nerve injury during the course of open hernia repair are discussed elsewhere.

Ilioinguinal nerve

The ilioinguinal nerve is formed by the combination of the first and second lumbar nerves, and passes medial to the superior anterior iliac spine to supply the lower abdominal wall. On average, the proximal end of the ilioinguinal nerve enters the abdominal wall 3.1 cm medial and 3.7 cm inferior to the anterior superior iliac spine, then follows a linear course to terminate 2.7 cm lateral to the midline and 1.7 cm superior to pubic symphysis[26]. The ilioinguinal nerve generally follows a course with the iliohypogastric nerve, running medially at the inguinal ligament between the transversus abdominus and internal oblique muscles. A branch of the ilioinguinal nerve accompanies the round ligament as it passes through the inguinal canal. It exits

the canal at the external inguinal ring, and provides sensory fibers to the labia majora and the upper aspect of the medial thigh[27].

Genitofemoral nerve

The genitofemoral nerve has fibers from the first and second lumbar nerves, and rests on the psoas muscle lateral to the external iliac artery. The genital branch provides sensation to the mons pubis and labia majora. The femoral branch provides sensation to the femoral triangle[28]. The genital branch passes within the cremasteric muscle fibers in men and in the round ligament in women, and may be encountered during open hernia surgery.

Lateral femoral cutaneous nerve

The second and third lumbar roots give rise to this nerve, which crosses the psoas muscle slightly above the femoral nerve and provides sensory innervation to the anterior and lateral thigh[29]. It runs inferiorly and laterally toward the anterior superior iliac spine, exiting the pelvis through the lateral lacuna musculorum. It pierces the fascia approximately 2 to 3 cm below the anterior superior iliac spine. Entrapment of the lateral femoral cutaneous nerve can occur, leading to numbness; paresthesias; and pain in the anterolateral thigh, a condition known as meralgia paresthetica.

LAPAROSCOPIC ENTRY TECHNIQUES:

To minimize entry-related injuries, several techniques, instruments, and approaches have been introduced during the last century.

These include the Veress pneumoperitoneum-trocar, "classic" or closed entry, the open (Hasson) technique [30], direct trocar insertion without prior pneumoperitoneum, [31]

Each of these methods of entry enjoys a certain degree of popularity according to the surgeon's training, experience, and bias, and according to regional and interdisciplinary variability.

CLOSED ENTRY (CLASSIC) LAPAROSCOPY

The classic, or closed entry, laparoscopic technique requires cutting of the abdominal skin with a scalpel, insufflation of air or gas into the abdomen (establishment of pneumoperitoneum), and insertion of a sharp trocar/cannula system into the abdomen. Following removal of the sharp trocar, the abdominal cavity is examined by an illuminated telescope through the cannula.

The first laparoscopy in a human was performed by Jacobeus of Sweden in 1910. [32] In Canada, laparoscopy was introduced by Dr Victor Gomel, University of British Columbia, Dr Jacques Rioux, Laval University, Quebec, and Dr Albert Yuzpe, University of Western Ontario, in 1970. [33]

ESTABLISHMENT OF PNEUMOPERITONEUM:

THE VERESS NEEDLE

In 1947, Raoul Palmer of France popularized the use of the Veress needle using CO2 to induce pneumoperitoneum for laparoscopy, and he subsequently published on its safety in the first 250 patients. Palmer emphasized that the creation of

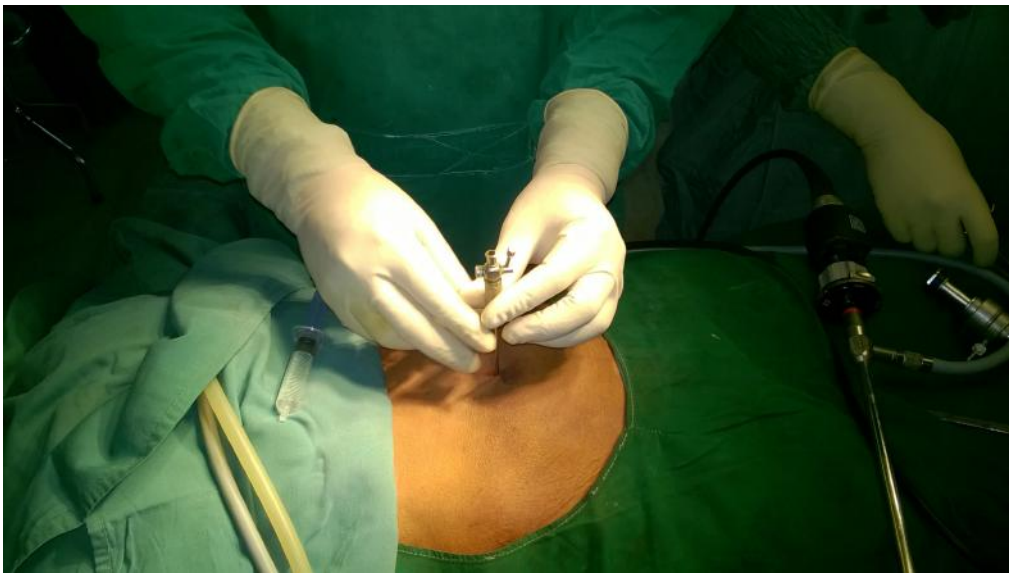
pneumoperitoneum remains a vital first step, and it is one still associated with recognized complications.

Several surveys indicate that most gynaecologists practising laparoscopy worldwide use the Veress needle pneumoperitoneum-primary trocar technique to access the abdomen. [33]

In a Canadian survey of 407 (51% responding) obstetricians and gynaecologists, 96.3% reported always inducing pneumoperitoneum prior to insertion of the primary trocar, 1.2% sometimes, and 2% never (0.5% made no response).

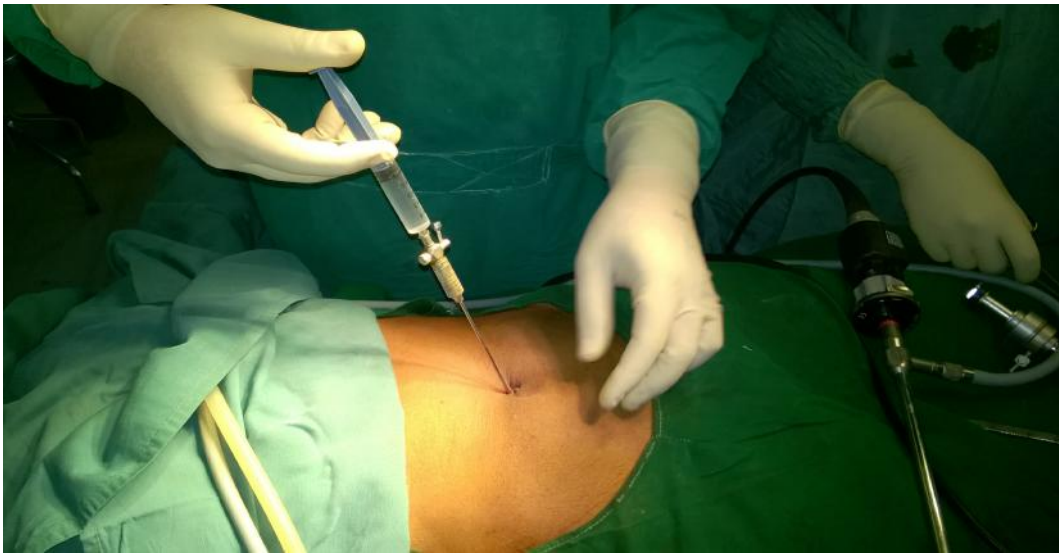
Furthermore, 26.4% of respondents had experienced vessel or organ injury attributable to the Veress needle, and 25.6% and 15.0% experienced vessel or organ injury from the primary and secondary trocars, respectively.

Veress Needle Insertion Sites Under usual circumstances, the Veress needle is inserted in the umbilical area,



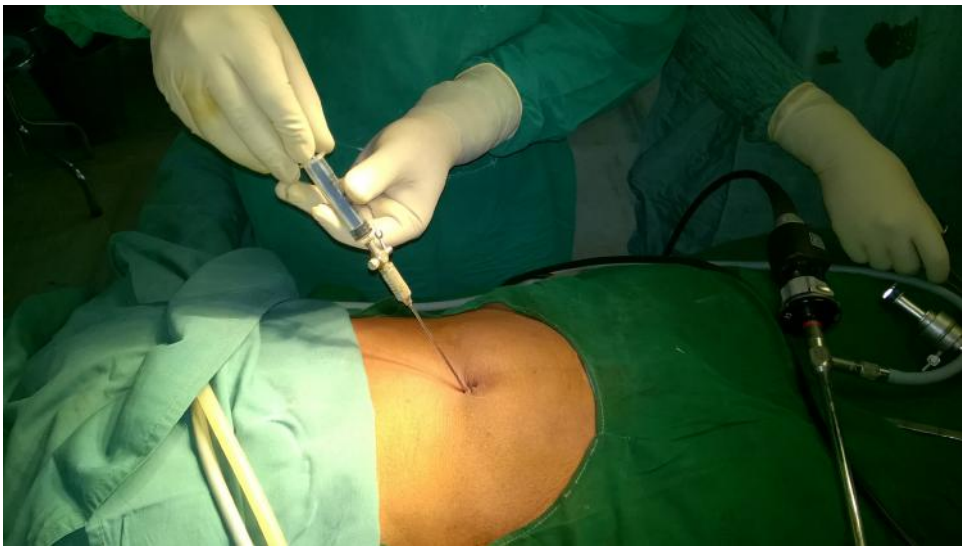
In the midsagittal plane, with or without stabilizing or lifting the anterior abdominal wall.

In patients known or suspected to have periumbilical adhesions, or after failure to establish pneumoperitoneum after three attempts, alternative sites for Veress needle insertion may be sought.34–37 Left upper quadrant (LUQ, Palmer's point) CO2 insufflation.



In patients with previous laparotomy, Palmer advocated insertion of the Veress needle 3 cm below the left subcostal border in the midclavicular line.10

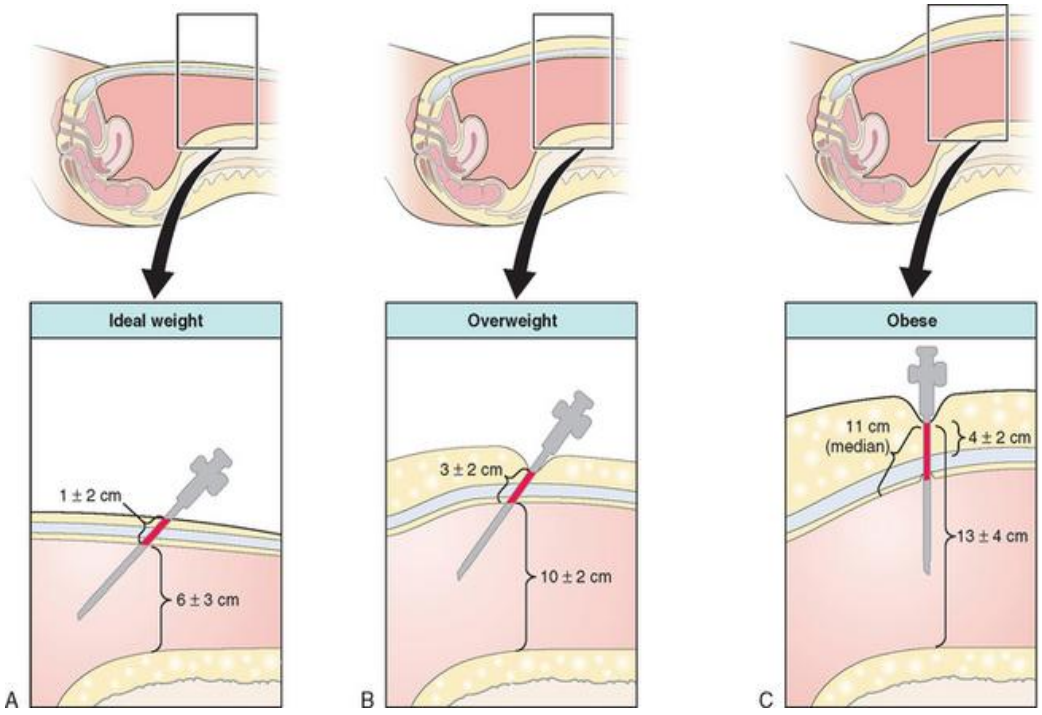
This technique should be considered in the obese as well as the very thin patient. In very thin patients, especially those with a prominent sacral promontory and android pelvis, the great vessels lie 1 cm to 2 cm underneath the umbilicus [34] and in obese women, the umbilicus is shifted caudally to the aortic bifurcation.



LUQ insufflation requires emptying of the stomach by nasogastric suction and introduction of the Veress needle perpendicularly to the skin.

Patients with previous splenic or gastric surgery, significant hepatosplenomegaly, portal hypertension, or gastropancreatic masses should be excluded[35]. There is significantly more subcutaneous fat at the umbilical area than at the LUQ insertion site.

Tulikangas et al found a positive correlation between body mass index (BMI) and the distance between various intra-abdominal organs and the insertion site.



Figures 3

After establishment of the pneumoperitoneum, trocars of various diameters and shapes may be introduced at the same site as the Veress, followed by additional trocar/cannula systems inserted under direct vision, as required. [35]

Challenges Anterior abdominal wall adhesions Adhesions at the umbilical area are found in approximately 10% of all laparoscopies. [36]

One series of 4532 laparoscopies reported an incidence of only 0.2 per 1000. In women with no previous abdominal surgery, umbilical adhesions are found in 0% to 0.68% of laparoscopies.

Rates of umbilical adhesions range from 0% to 15% in women with prior laparoscopic surgery, from 20% to 28% in those who have had previous laparotomy with horizontal suprapubic incision, and from 50% to 60% in those who have had previous laparotomy with longitudinal incision. Patients [37] with midline incisions

performed for gynaecologic indications had significantly more adhesions (109/259, 42%) than those with all types of incisions performed for obstetric indications (12/55, 22%).62 In some research protocols, preoperative ultrasonography to detect anterior wall adhesions has been found to be useful, but it needs further evaluation, and there is insufficient evidence to recommend routine preoperative ultrasound. [38]

In 58 of 69 subjects, laparoscopic or laparotomy findings confirmed the ultrasound findings of "restricted visceral slide" in the presence of visceral adhesions.

Angle of Veress needle insertion

Hurd et al. reported on computerized axial tomography (CT) scans of 38 unanaesthetized women of reproductive age. The position of the umbilicus was found, on average, 0.4 cm, 2.4 cm, and 2.9 cm caudally to the aortic bifurcation in normal weight (BMI < 25 kg/m2), overweight (BMI 25–30 kg/m2), and obese (BMI > 30 kg/m2) women, respectively. In all cases, the umbilicus was cephalad to where the left common iliac vein crossed the midline at the sacral promontory.38

Therefore, the angle of the Veress needle insertion should vary accordingly from 45 in non-obese women to 90 in very obese women. [39]

Several studies have described tests and techniques for determining the correct placement of the Veress needle.

These include the double click sound of the Veress needle, the aspiration test, the hanging drop of saline test, the "hiss" sound test, and the syringe test. [40]

Although all these tests and techniques may be helpful in accessing the peritoneal cavity, the fact that visceral and vascular injuries occur shows that they are not foolproof

In fact, a recent prospective study reported that the double click, aspiration, and hanging drop tests provided very little useful information on the placement of the Veress needle[41].

In view of recent evidence, failure to perform these tests should no longer be considered as substandard care or negligence. [42]

Some surgeons waggle the Veress needle from side to side, believing that this shakes an attached organ from the tip of the needle and confirms correct intra-abdominal placement. However, this manoeuvre can enlarge a 1.6 mm puncture injury to an injury of up to 1 cm in viscera or blood vessels. [43]

Elevation of the anterior abdominal wall surgeons advocate elevating the lower anterior abdominal wall by hand or using towel clips at the time of Veress or primary trocar insertion. [44]

One study used a suprapubic port to compare the efficacy of manual elevation below the umbilicus and of towel clips placed within and 2 cm from the umbilicus.

They reported that only towel clips provided significant elevation of peritoneum (mean 6.8 cm above the viscera) that was maintained during the force of the primary trocar insertion. [44]

Using this technique, however, one surgeon caused aortic injury to two patients in one month.

Hill and Maher reported 26 (4.8%) omental perforations as the omentum was elevated (lifted by hand), together with the anterior wall, during 542 direct trocar insertions for laparoscopic access. [45]

Extraperitoneal insufflation

Extraperitoneal insufflation is one of the most common complications of laparoscopy, frequently leading to abandonment of the procedure because further attempts to achieve pneumoperitoneum are usually unsuccessful. [46]

In one study, preperitoneal insufflation occurred in 2.7%, 15%, 44.4%, and 100% of cases at one, two, three, and more than three attempts, respectively.

Kabukoba and Skillern described a technique to deal with extraperitoneal insufflation that requires the laparoscope to be left in the preperitoneal space and the gas not evacuated.

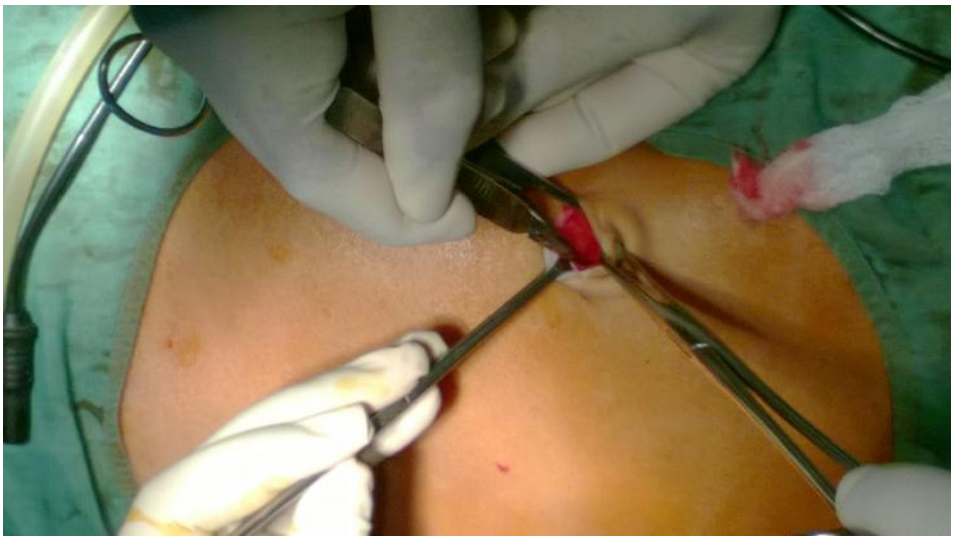
The Veress needle is then reintroduced into the preperitoneal space in front of the telescope and visually guided into the peritoneal cavity. [47]

OPEN LAPAROSCOPIC ENTRY OR HASSON TECHNIQUE

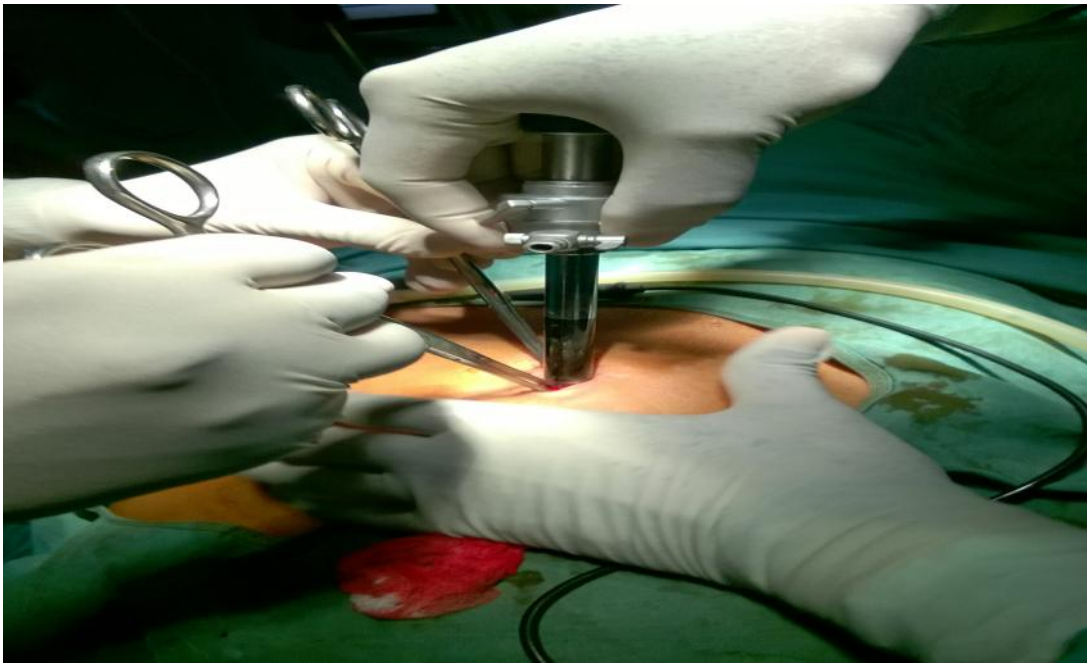
Hasson first described the open entry technique in 1971.The suggested benefits are prevention of gas embolism, of preperitoneal insufflation, and possibly of visceral and major vascular injury.

The technique involves using a cannula fitted with a cone-shaped sleeve, a blunt obturator, and possibly a second sleeve to which stay sutures can be attached. The entry is essentially a mini-laparotomy.

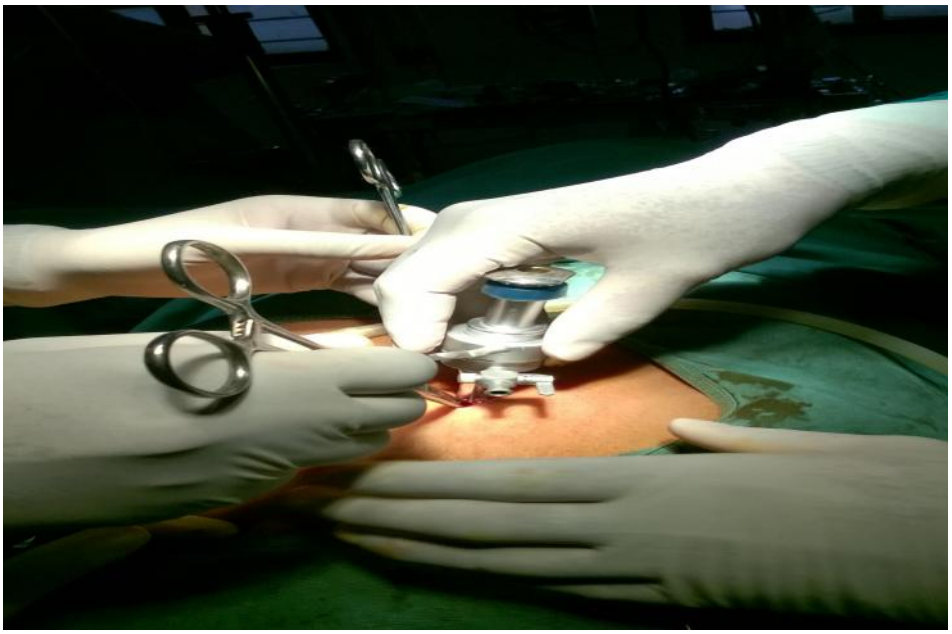
A small incision is made transversely or longitudinally at the umbilicus. This incision is long enough to be able to dissect down to the fascia, incise it, and enter the peritoneal cavity under direct vision.



The cannula is inserted into the peritoneal cavity with the blunt obturator in place. Sutures are placed on either side of the cannula in the fascia and attached to the cannula or purse-stringed around the cannula to seal the abdominal wall incision to the cone-shaped sleeve. The laparoscope is then introduced and insufflation is commenced. At the end of the procedure the fascial defect is closed and the skin is re-approximated.



The open technique is favoured by general surgeons and considered by some to be indicated in patients with previous abdominal surgery, especially those with longitudinal abdominal wall incisions.



Hasson reviewed 17 publications of open laparoscopy by general surgeons (9 publications, 7205 laparoscopies) and gynaecologists (8 publications, 13 486 laparoscopies) and compared them with closed laparoscopy performed by general surgeons (7 publications, 90 152 patients) and gynaecologists (12 publications, 579 510 patients). [48]

Hasson reported that for open laparoscopy the rate of umbilical infection was 0.4%, bowel injury 0.1%, and vascular injury 0%.

The corresponding rates for closed laparoscopy were 1%, 0.2%, and 0.2%. Hasson advocated the open technique as the preferred method of access for laparoscopic surgery. [49]

Bonjer et al. published their experience in general surgery and reviewed publications up to 1996 on closed (6 series, n = 489 335 patients) and open (6 series, n = 12 444 patients) laparoscopy. The rates of visceral and vascular injury were

respectively 0.08% and 0.07% after closed laparoscopy, and 0.05% and 0% after open laparoscopy (P = 0.002). Mortality rates after closed and open laparoscopy were respectively 0.003% and 0% .

Garry reviewed six reports (n = 357 257) of closed laparoscopy and six reports and one survey (n = 20 410) of open laparoscopy performed by gynaecologists. With the closed entry technique, the rates of bowel and major vessel injury were 0.04% and 0.02%, respectively; with the open entry, they were 0.5% and 0%, respectively. When the survey report (n = 8000) was excluded, the rate of bowel injury with the open technique was 0.06%. Garry concluded that open laparoscopy is an acceptable alternative method that has been shown to avoid the risk of injury almost completely in normally situated intra-abdominal structures. [50]

Molloy et al. 36 also reported a statistically significant difference in bowel complication rates: 0.4/1000 (gynaecologists) versus 1.5/1000 (general surgeons) (P = 0.001). When all open laparoscopies were excluded from the analysis, the incidence of bowel injuries was 0.3/1000 in gynaecological procedures and 1.3/1000 in general surgical procedures (P = 0.001).

Chapron et al. reported on a non-randomized comparison of open versus closed laparoscopic entry practised by university affiliated hospital teams. The bowel and major vessel injury rates were 0.04% and 0.01% in the closed technique (n = 8324) and 0.19% and 0% in the open technique (n = 1562), respectively. They concluded that open laparoscopy does not reduce the risk of major complications during laparoscopic access. [51]

Merlin et al. 33 reported on a systematic review of the various methods used by general surgeons and gynaecologists to establish access for laparoscopic surgery. They noted that retrospective studies compared a high-risk with a low-risk patient

population, and prospective studies investigated an unselected patient population. The result was a clear trend towards a reduced risk of major complications in unselected patients undergoing open access procedures. [52]

Chandler et al. 30 reported a study of 594 structures or organs injured during laparoscopic access in 566 patients. They found that bowel injuries were no less common with the open technique and could still be obscure. Eighteen Hasson-type entries were associated with primary entry injuries of the small bowel in four patients, two with delayed recognition and death, and with retroperitoneal vessels in another four patients, one of which resulted in the patient's death. In the remaining 10 patients, there were four instances of colon injuries, three of abdominal wall vessel laceration, and one each of liver, urinary bladder, or mesenteric vessel injury.30

Bonjer et al. reported six bowel injuries in 12 444 open laparoscopies, two of which (33%) were not recognized during laparoscopy. [53]

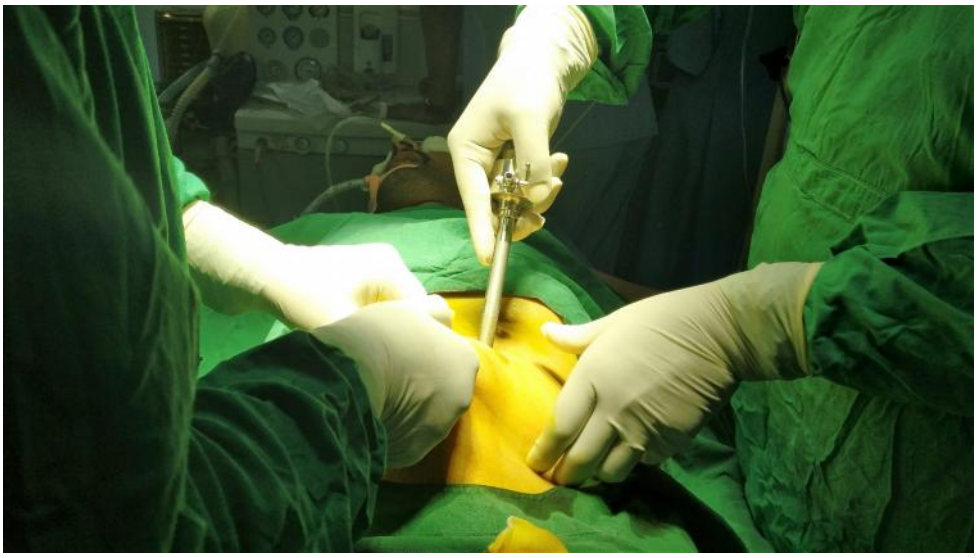
DIRECT TROCAR ENTRY

Dingfelder was the first to publish (in 1978) on direct entry into the abdomen with a trocar.

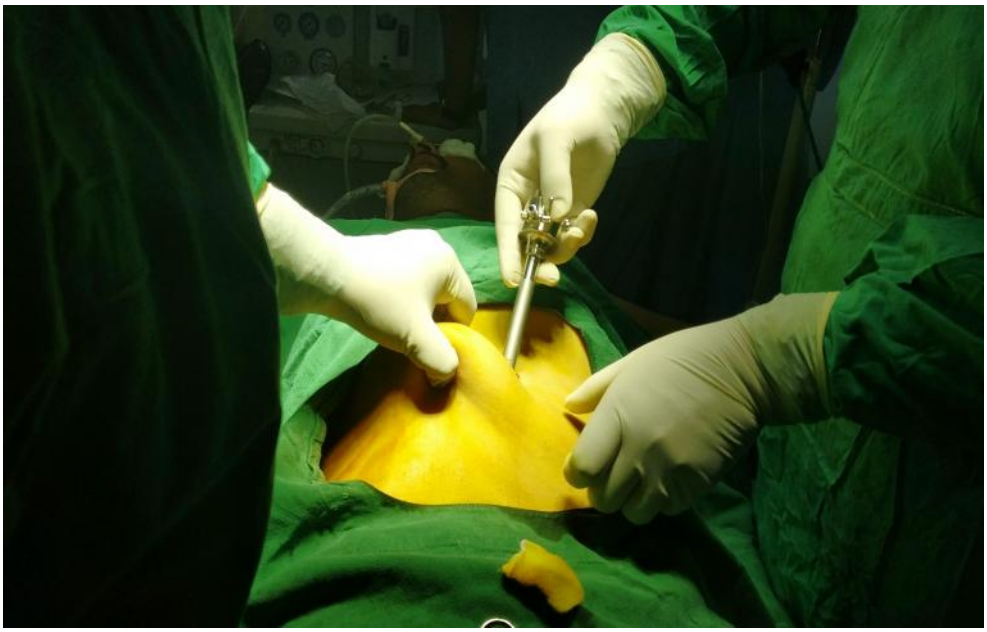
The suggested advantages of this method of entry are the avoidance of complications related to the use of the Veress needle: failed pneumoperitoneum, preperitoneal insufflation, intestinal insufflation, or the more serious CO2 embolism.105 Laparoscopic entry is initiated with only one blind step (trocar) instead of three (Veress needle, insufflation, trocar).

The direct entry method is faster than any other method of entry[54] however, it is the least performed laparoscopic technique in clinical practice today.

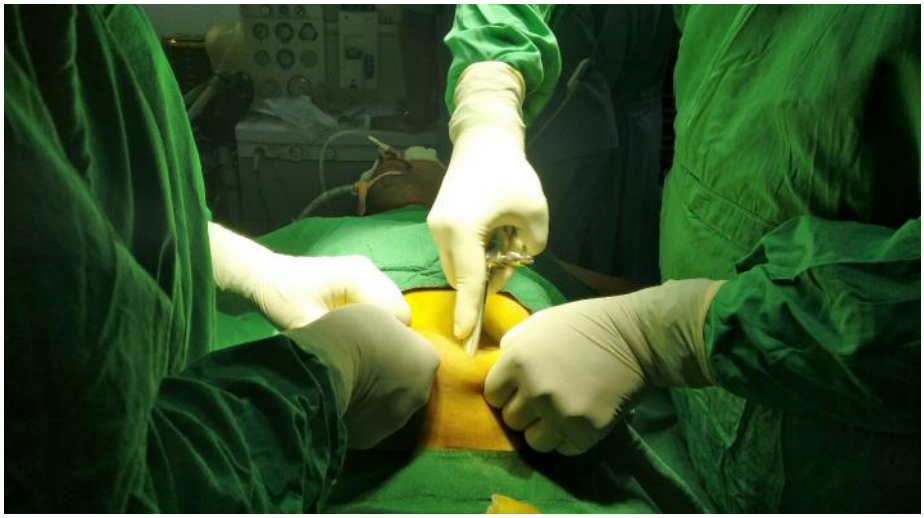
The technique begins with an infra-umbilical skin incision wide enough to accommodate the diameter of a sharp trocar system.



The anterior abdominal wall must be adequately elevated by hand, and the trocar is inserted directly into the cavity, aiming towards the pelvic hollow.



Alternatively, the abdominal wall is elevated by pulling on two towel clips placed 3 cm on either side of the umbilicus, and the trocar is inserted at a 90 angle.



On removal of the sharp trocar, the laparoscope is inserted to confirm the presence of omentum or bowel in the visual field. [55]

Nezhat et al. excluded past abdominal surgery but took into account BMI; they showed fewer minor complications with direct trocar entry than with the Veress needle. No major complications occurred in either group (n = 200 patients).14

Byron et al. used the direct entry technique on an unselected group of 937 women. The authors reported more than three attempts to enter the abdomen in 2.7% of cases, failed technique in 1.4%, and a total complication rate of 4.2% (39/937) with a significant increased risk of minor complications ($P < 0.001$). A history of abdominal surgery was not associated with an increased risk of complications.13 Subsequently, Byron et al. randomized 252 women into Veress needle (n = 141) and direct trocar insertion (n = 111) for laparoscopy. [56]

The authors reported a four-fold increase of minor complications with the Veress needle over the direct entry method (11.3% vs. 2.7%, $P < 0.05$) and a significantly longer insertion time (5.9 vs. 2.2 min, $P < 0.01$)

Copeland et al. reported on 2000 unselected women with whom direct trocar insertion was utilized. Eight cases (0.4%) required conversion to insufflation with Veress needle, and one of these resulted in bowel injury. Two additional bowel injuries were encountered with the direct trocar entry (0.1%).[57]

Hill and Maher perforated the omentum with the direct trocar in 26 of 542 patients (4.8%), as it was elevated with peritoneum. [58]

Molloy et al. reported on a review of 51 publications including 134 917 Veress/trocar, 21 547 open, and 16 739 direct entries.36 Entry-related bowel injury rates were 0.04% (Veress/trocar), 0.11% (open), and 0.05% (direct entry); corresponding vascular injury rates were 0.04%, 0.01%, and 0%, respectively. [59]

METHODOLOGY

SOURCE OF DATA:

All patients came to B.L.D.E.U.'s Shri B M Patil Medical College, Hospital and Research Centre and admitted and operated by laparoscopy.

METHOD OF COLLECTION OF DATA:

SOURCE OF DATA:

All patients posted for laparoscopic surgeries in B.L.D.E.U.'s Sri B M Patil Medical College, Hospital and Research Centre, Vijayapur. are included in the study.The period of study is from October 2014 to August 2016.

METHOD OF COLLECTION OF DATA:

The study is a prospective study of all patients referred for laparoscopic procedures between October 2014 and August 2016. The period of study is from October 2014 to August 2016.

The patients are randomized into three groups. i.e., into direct entry, veress needle and open approach (Hassons technique).

Surgeries are performed by experienced surgeons in all cases. Data is collected in the form of proforma with detailed history, clinical examination and investigationswith variables including mean trocar insertion time, CO2 gas leak, conversion to laparotomy, mortality and known complications including abdominal wall hematoma, subcutaneous insufflations of gas, port site infections, port site hernia and intra abdominal injuries for all the patients in three study groups and follow up for three months at 15, 30, 60 and 90^{th} day.

SAMPLING :

- Prospective, interventional study.
- A study titled comparison of laparoscopic entry techniques i.e., direct trocar, veress needle, and open approach by Shayani-Nasab et al found in their study that the mean standard deviation of mean trocar insertion time by Direct trocar, Veress needle and Open approach were 176.94±96.426,331.02± 64.405 and 375.36±63.808 respectively.
- Considering the average standard deviation at 20% permissible error the calculated sample size is 288=290

Formula for estimating sample size[13]

$$n = \frac{Z\alpha_{/2}^{2}\sigma^{2}}{e^{2}}$$

Where

n = Sample size to be estimated.

Z α = Z value error where Z= 1.96 at α = 5%

e = permissible error

σ =standard deviation

In this study 288 cases will be studied, in each group 96 cases will be allocated.

Determination of sample size (n). Direct trocar

The sample size n for the desired estimators of the study may be calculated by the following formula with the following assumptions.

- Standard deviation of mean trocar insertion time σ = 96.42
- $Z\alpha/_2$ = 1.96 at 5% level of significance.
- The permissible error e = 19.30

$$n = \frac{Z\alpha/_2{}^2\sigma^2}{e^2}$$

$$= \frac{(1.96)^2 x (96.42)^2}{(19.30)^2}$$

$$= 96$$

Determination of sample size (n). Veress Needle

The sample size n for the desired estimators of the study may be calculated by the following formula with the following assumptions.

- Standard deviation of mean trocar insertion time σ = 64.40
- $Z\alpha/_2$ = 1.96 at 5% level of significance.
- The permissible error e = 12.90

$$n = \frac{Z\alpha/_2{}^2\sigma^2}{e^2}$$

$$= \frac{(1.96)^2 x (64.40)^2}{(12.90)^2}$$

$$= 96$$

Determination of sample size (n).Open Approach

The sample size n for the desired estimators of the study may be calculated by the following formula with the following assumptions.

- Standard deviation of mean trocar insertion time σ = 63.81
- $Z\alpha_{/2}$ = 1.96 at 5% level of significance.
- The permissible error e = 12.70

$$n = \frac{Z\alpha_{/2}^2 \sigma^2}{e^2}$$

$$= \frac{(1.96)^2 \, x \, (63.81)^2}{(12.70)^2}$$

= 96

Statistical Analysis :

- All characteristics were summarized descriptively. For continuous variables, the summary statistics of N, mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries. Chi-square (χ^2)/ Freeman-Halton Fisher exact test was employed to determine the significance of differences between groups for categorical data. If the p-value was < 0.05, then the results will be considered to be significant. Data were analyzed using SPSS software v.23.0.

INCLUSION CRITERIA

- All Patients posted for Diagnostic and Therapeutic Laparoscopy are included in the study.

EXCLUSION CRITERIA

- Previous Surgeries where umbilical port is not used as primary site and all pathologies related to umbilicus.
- Pregnancy

- Co morbid conditions like chronic liver disease, chronic renal failure and bleeding disorders.

RESEARCH HYPOTHESIS:

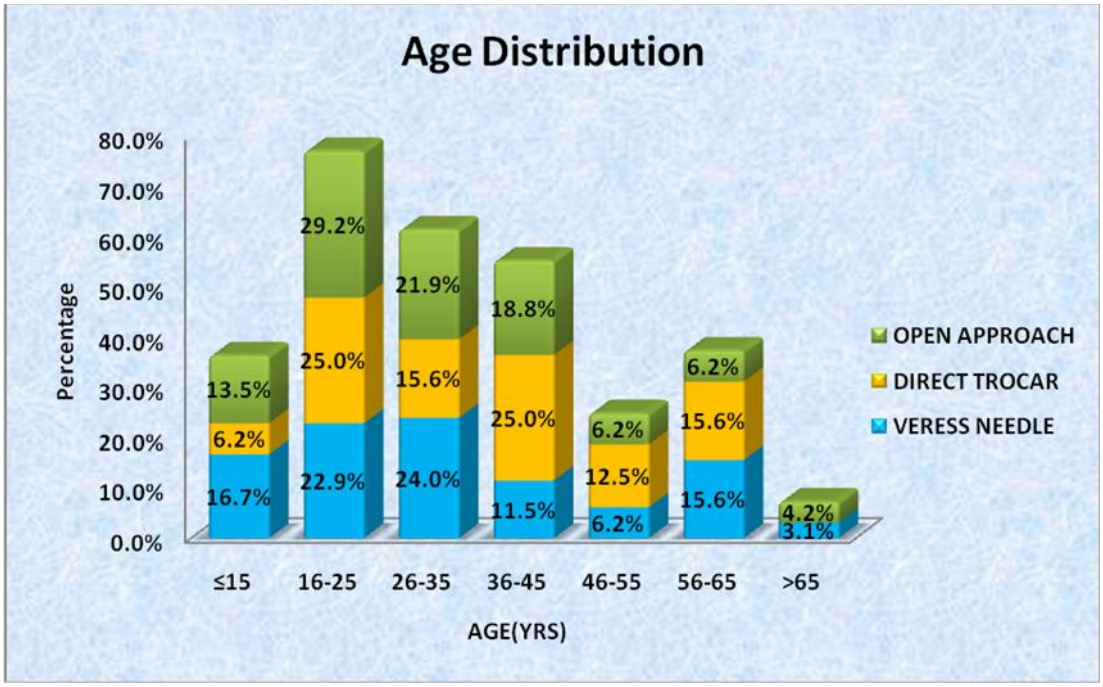
Direct trocar entry is quick and safe method for laparoscopy

RESULTS AND OBSERVATION

Table 1: Distribution of Age of cases by different procedures

AGE(YRS)	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH		p value
	N	%	N	%	N	%	
≤15	16	16.7%	6	6.2%	13	13.5%	
16-25	22	22.9%	24	25.0%	28	29.2%	
26-35	23	24.0%	15	15.6%	21	21.9%	
36-45	11	11.5%	24	25.0%	18	18.8%	0.027
46-55	6	6.2%	12	12.5%	6	6.2%	(Sig)
56-65	15	15.6%	15	15.6%	6	6.2%	
>65	3	3.1%	0	0.0%	4	4.2%	
TOTAL	96	100.0%	96	100.0%	96	100.0%	
Mean±SD	33.8±17.6		37.1±15.1		32.5±15.5		0.126

Graph 1 : Distribution of Age of cases by different procedures



MOST COMMON AGE GROUP IN OUR STUDY IS BETWEEN 16 – 45 YEARS

Graph 2 : Mean Age of cases by different procedures

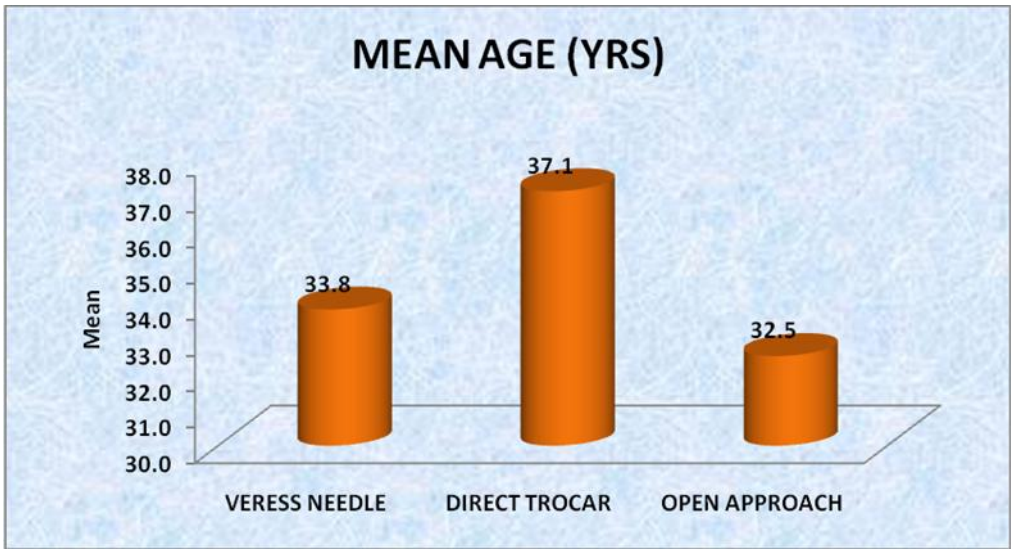
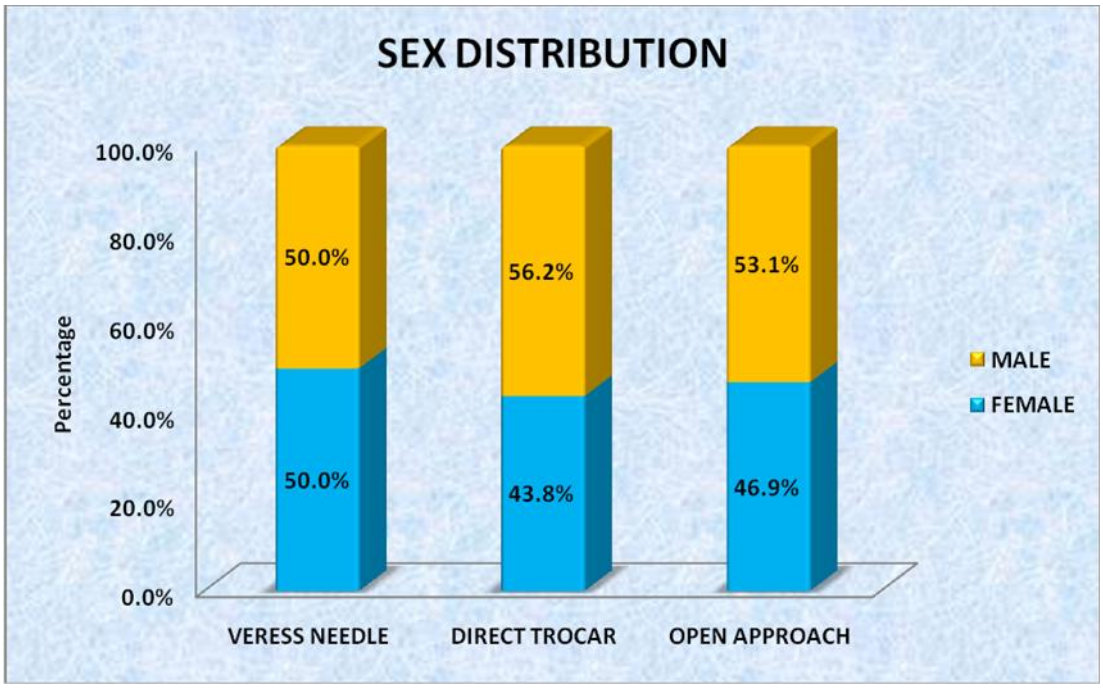


Table 2 : Distribution of Sex of cases by different procedures

SEX	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH		p value
	N	%	N	%	N	%	
MALE	48	50.0%	54	56.2%	51	53.1%	0.686
FEMALE	48	50.0%	42	43.8%	45	46.9%	
TOTAL	96	100.0%	96	100.0%	96	100.0%	

Graph 3 : Distribution of Sex of cases by different procedures

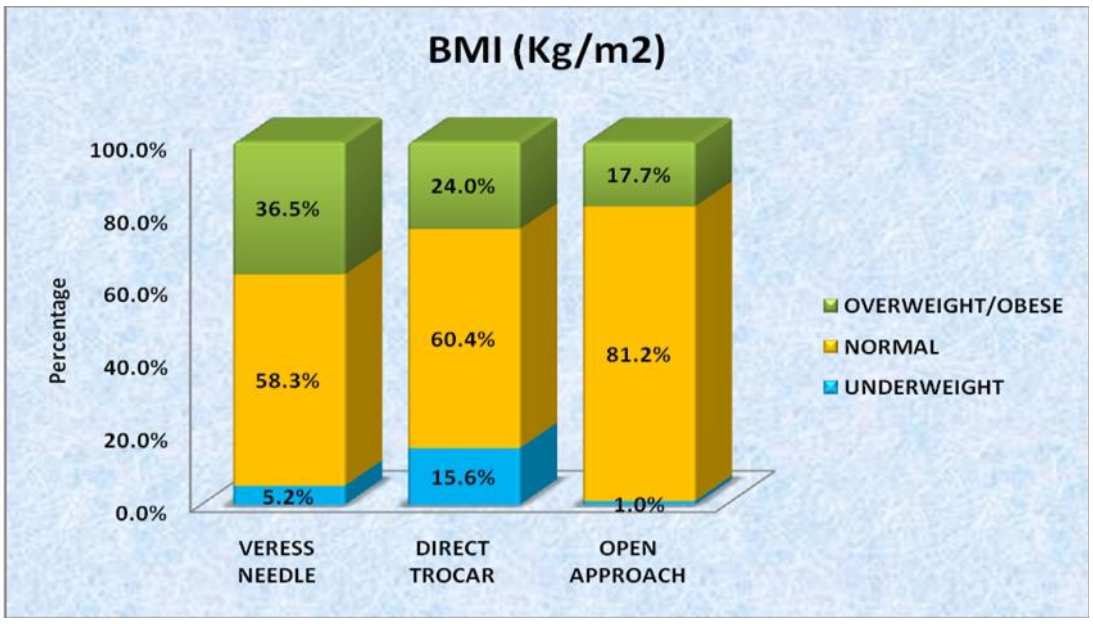


IN OUR STUDY MALE AND FEMALE RATIO IN DIFFERENT ENTRY TECHNIQUES IS ALMOST EQUAL.

Table 3: Distribution of BMI (Kg/m2) by different procedures

BMI (Kg/m2)	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH		p value
	N	%	N	%	N	%	
UNDERWEIGHT	5	5.2%	15	15.6%	1	1.0%	<0.001 (Sig)
NORMAL	56	58.3%	58	60.4%	78	81.2%	
OVERWEIGHT/OBESE	35	36.5%	23	24.0%	17	17.7%	
TOTAL	96	100.0%	96	100.0%	96	100.0%	
Mean±SD	22.7±3.2		22.6±4.0		22.5±2.6		0.884

Graph 4 : Distribution of BMI (Kg/m2) by different procedures

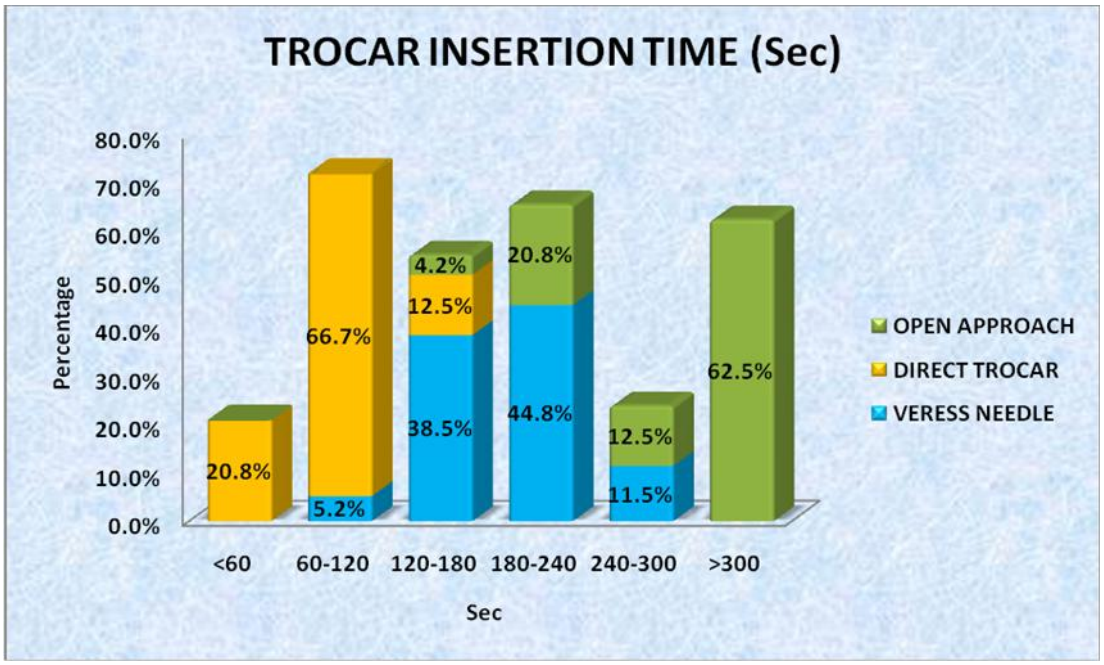


IN OUR STUDY VERESS NEEDLE, DIRECT TROCAR AND OPEN APPROACH BMI IS NORMAL IN 58%, 60% AND 81% RESPECTIVELY. OVERWEIGHT IN 36%, 24% AND 18% RESPECTIVELY, UNDERWEIGHT IN 5%, 16% AND 1% RESPECTIVELY.

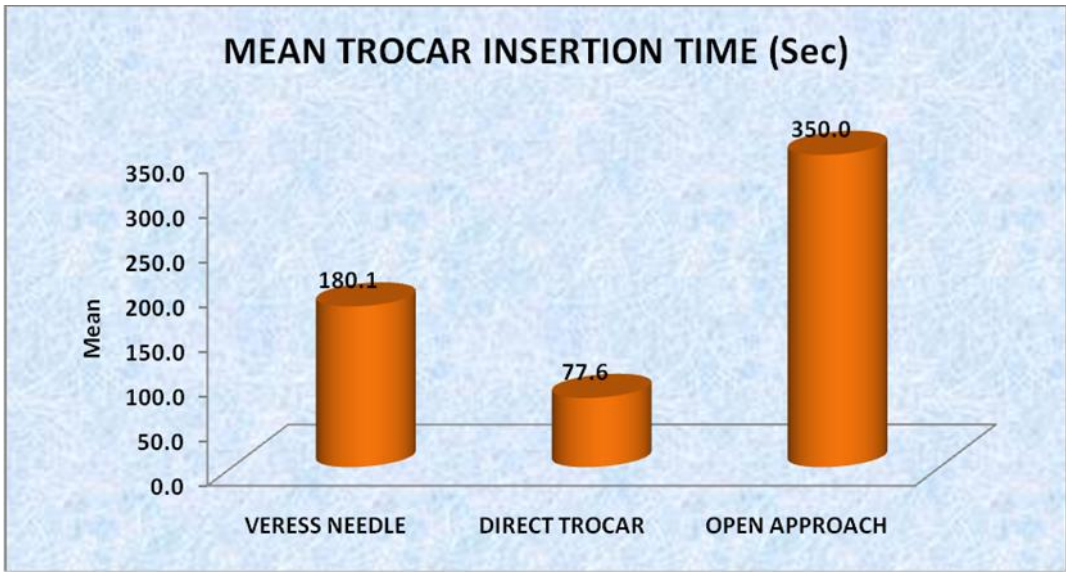
Table 4 : Distribution of Trocar Insertion Time (Sec) by different procedures

TROCAR INSERTION TIME (Sec)	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH		p value
	N	%	N	%	N	%	
<60	0	0.0%	20	20.8%	0	0.0%	
60-120	5	5.2%	64	66.7%	0	0.0%	
120-180	37	38.5%	12	12.5%	4	4.2%	
180-240	43	44.8%	0	0.0%	20	20.8%	<0.001 (Sig)
240-300	11	11.5%	0	0.0%	12	12.5%	
>300	0	0.0%	0	0.0%	60	62.5%	
Total	96	100.0%	96	100.0%	96	100.0%	
Mean±SD	180.1±39.8		77.6±22.4		350±127.9		<0.001 (Sig)

Graph 5 : Distribution of Trocar Insertion Time (Sec) by different procedures



Graph 6 : Mean Trocar Insertion Time (Sec) by different procedures

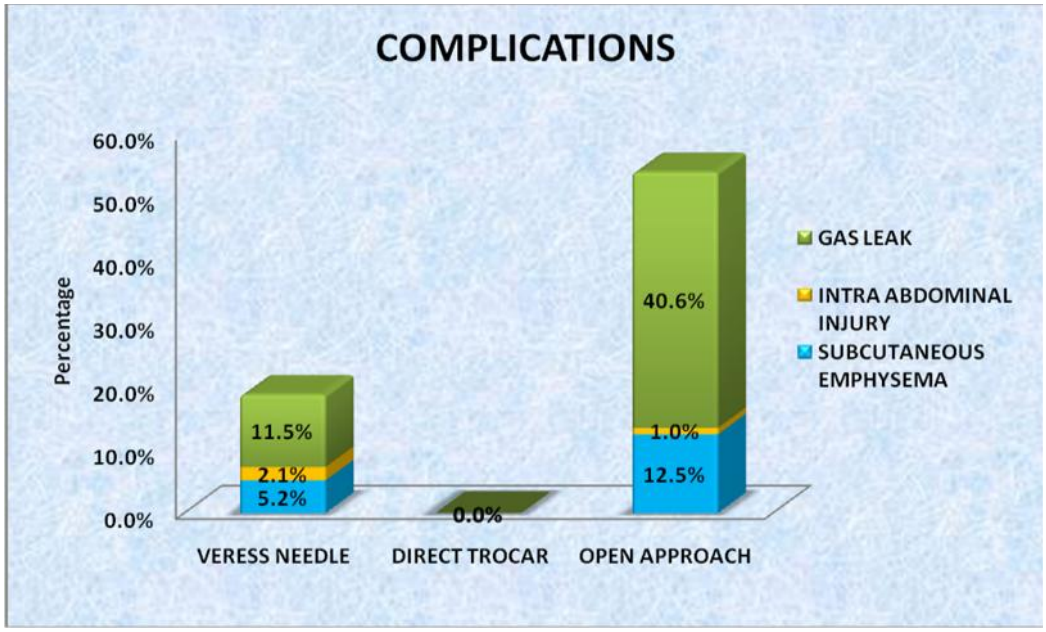


IN OUR STUDY MEAN TROCAR INSERTION TIME IN VERESS, DIRECT TROCAR AND OPEN APPROACH IS 180 , 77 AND 350 SECONDS RESPECTIVELY.

Table 5 : Distribution of Complications by different procedures

COMPLICATIONS	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH		p value
	N	%	N	%	N	%	
SUBCUTANEOUS EMPHYSEMA	5	5.2%	0	0.0%	12	12.5%	0.001 (Sig)
INTRA ABDOMINAL INJURY	2	2.1%	0	0.0%	1	1.0%	0.364
GAS LEAK	11	11.5%	0	0.0%	39	40.6%	<0.001 (Sig)

Graph 7 : Distribution of Complications by different procedures



IN OUR STUDY GAS LEAK IS OBSERVED IN VERESS NEEDLE, DIRECT TROCAR AND OPEN APPROACH IS 11, ZERO AND 39 PATIENTS RESPECTIVELY.

SUBCUTANEOUS EMPHYSEMA IS OBSERVED IN 5 , ZERO AND 12 PATIENTS RESPECTIVELY.

INTRA ABDOMINAL INJURY IS OBSERVED IN 2, ZERO AND 1 PATIENTS RESPECTIVELY.

Table 6 : Distribution of Operative Procedure by different procedures

OPERATIVE PROCEDURE	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH		p value
	N	%	N	%	N	%	
DIAGNOSTIC LAPAROSCOPY	18	18.8%	15	15.6%	17	17.7%	
LAPAROSCOPIC APPENDICECTOMY	32	33.3%	25	26.0%	37	38.5%	
LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	3	3.1%	10	10.4%	0	0.0%	
LAPAROSCOPIC CHOLECYSTECTOMY	30	31.2%	31	32.3%	37	38.5%	0.004
LAPAROSCOPIC CHOLECYSTECTOMY AND APPENDICECTOMY	1	1.0%	3	3.1%	0	0.0%	(Sig)
LAPAROSCOPIC FUNDOPLICATION	0	0.0%	0	0.0%	2	2.1%	
TAPP LAPAROSCOPIC HERNIOPLASTY	12	12.5%	12	12.5%	3	3.1%	
TOTAL	96	100.0%	96	100.0%	96	100.0%	

Graph 8 : Distribution of Operative Procedure by different procedure

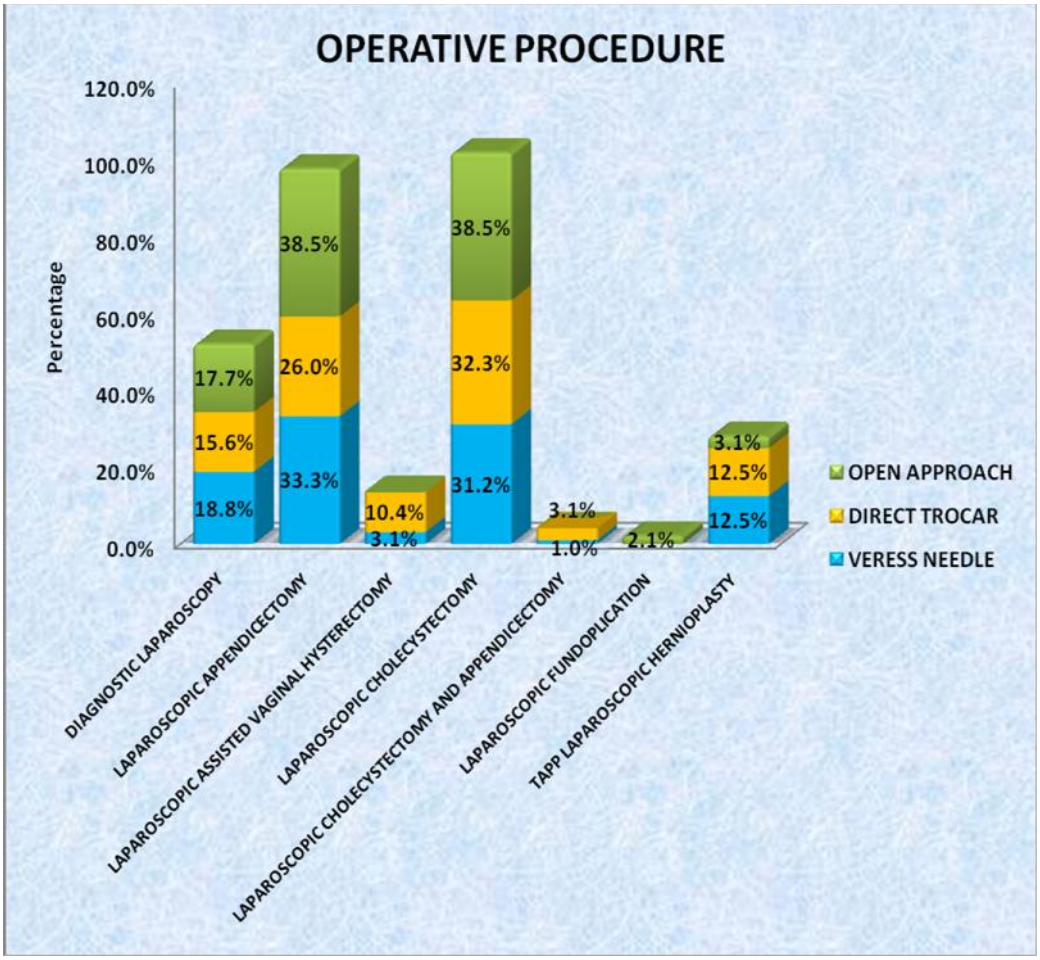


Table 7 : Distribution of Diagnosis by different procedures

DIAGNOSIS	VERESS NEEDLE		DIRECT TROCAR		OPEN APPROACH	
	N	%	N	%	N	%
APPENDICITIS	32	33.3%	25	26.0%	37	38.5%
APPENDICITIS AND CHOLELITHIASIS	1	1.0%	3	3.1%	0	0.0%
CHOLELITHIASIS	30	31.2%	31	32.3%	34	35.4%
FIBROID UTERUS	0	0.0%	7	7.3%	0	0.0%
GALLBLADDER POLYP	0	0.0%	0	0.0%	3	3.1%
HIATUS HERNIA	0	0.0%	0	0.0%	2	2.1%
INGUINAL HERNIA	12	12.5%	12	12.5%	3	3.1%
INTESTINAL OBSTRUCTION	0	0.0%	0	0.0%	5	5.2%
MESENTRIC LYMPHADENOPATHY	15	15.6%	7	7.3%	9	9.4%
OVARIAN CYST	1	1.0%	8	8.3%	3	3.1%
PELIC INFLAMMATORY DISEASE	0	0.0%	3	3.1%	0	0.0%
URACHAL CYST	2	2.1%	0	0.0%	0	0.0%
UTERINE FIBROID	3	3.1%	0	0.0%	0	0.0%
TOTAL	96	100.0%	96	100.0%	96	100.0%

MOST COMMONLY PERFORMED SURGERIES LAPAROSCOPICALLY ARE CHOLECYSTECTOMY AND APPENDICECTOMY.

DISCUSSION

Age: Distribution of Age of cases by different procedures

In our study mean age of Veress needle, Direct trocar and Open approach technique is 33.8 , 37.1 and 32.5 respectively.

Table 8 : Mean Comparison Of BMI In Different Techniques

TECHNIQUE	**Hamid Shayani-Nasab et al**	**F. Agresta et al**	**Mary Jacobson et al**	**Our study**
VERESS NEEDLE	26.8 ± 13.1	21.2 ± 5.3	24.6±3.2	22.7±3.2
DIRECT TROCAR	25.2 ± 6.3	21.6 ± 4.4	24.3±4.0	22.6±4.0
OPEN APPROACH	24.4 ± 5.8	21.4 ± 3.4	25.6±2.6	22.5±2.6

Table 9 : Comparision of Mean trocar insertion time of different studies

TECHNIQUE	**Hamid Shayani-Nasab et al**	**Our study**
VERESS NEEDLE	331.02 ± 64.405	180.1±39.8
DIRECT TROCAR	176.94 ± 96.426	77.6±22.4
OPEN APPROACH	375.36 ± 63.808	350±127.9

Table 10 : Comparision of Mean trocar insertion time Direct trocar vs Veress Needle Technique

TECHNIQUE	**Ghulam AC et al**	**Ertgrul I et al**	**Our study**
DIRECT TROCAR	3.18±0.66 minutes	79.6 ±94.6 seconds	77.6±22.4
VERESS NEEDLE	6.80±1.36 minutes	217±111 seconds	180.1±39.8

The mean trocar insertion time of Direct trocar technique is less compared to Veress needle technique.

Table No 11 : Complications

COMPLICATIONS	**VERESS NEEDLE**		**DIRECT TROCAR**		**OPEN APPROACH**		**p value**
	N	**%**	**N**	**%**	**N**	**%**	
SUBCUTANEOUS EMPHYSEMA	5	5.2%	0	0.0%	12	12.5%	0.001 (Sig)
INTRA ABDOMINAL INJURY	2	2.1%	0	0.0%	1	1.0%	0.364
GAS LEAK	11	11.5%	0	0.0%	39	40.6%	<0.001 (Sig)

Table No 12 : Comparision of subcutaneous emphysema of other studies

TECHNIQUE	**Hamid Shayani-Nasab et al**	**Our study**
VERESS NEEDLE	5 (3.0%)	5 (5.2%)
DIRECT TROCAR	1 (1.0%)	0 (0%)
OPEN APPROACH	6 (3.3%)	12 (12.5%)

Table No 13 Comparision of gas leak of other studies

Technique	Hamid Shayani-Nasab et al	Our study
VERESS NEEDLE	16 (9.5%)	11 (11.5%)
DIRECT TROCAR	4 (3.8%)	0 (0%)
OPEN APPROACH	27 (15%)	39 (40.6%)

Gas leak is observed more in open approach.

CONCLUSION

Our results suggest that direct insertion of the first trocar without previous pneumoperitoneum is a rapid, safe and efficient alternative procedure, easily learned by surgeons and resulting in a probable low incidence of complications.

Various methods are available for safe creation of pneumoperitoneum at laparoscopy. One of the advantages of the direct trocar entry technique is the reduced number of blind insertions to gain abdominal access , no gas leakage and subcutaneous emphysema.

But further study for comparison of Veress with Direct Trocar Entry is required to find the difference in duration required. We also feel the technique should be tried in more number of obese patients to test safety in them.

SUMMARY

The purpose of this study is to compare the results obtained from three laparoscopic techniques , Direct Trocar entry, Veress Needle, and Open Approach (Hassons technique) and to see which is the best method of establishing pneumoperitoneum.

288 patients admitted to our hospital for laparoscopic surgeries, in a randomised prospective design, 96 patients were assigned each to Direct trocar (DTI), Veress needle(VN) and Open Hassons Approach(OA).The variables analysed were : Mean trocar insertion time, Gas leak, Subcutaneous emphysema and Intra abdominal injuries.

Mean trocar insertion time DTI, VN and OA are 77.6±22.4, 180.1±39.8 and 350±127.9 sec,p = <0.001 (Sig), gas leak in 0 (0%), 11(11%) and 39(40.6%) p =<0.001 (Sig) ,subcutaneous emphysema in 0 (0%), 5(5.2%) and 12(12.5%) p=0.001 (Sig),and intra abdominal injuries 0 (0%), 2(2.1%) and 1(1.0%)

Our results show DTI to be a safe, efficient, rapid and easily-learned alternative technique, reducing the number of procedure-related complications.

BIBLIOGRAPHY

1. .Philips PA, Amaral JF. Abdominal access complications in laparoscopic surgery. J Am Coll Surg. 2001;192:525-36.
2. Agresta F, De Simone P, Ciardo LF, Bedin N. Direct trocar insertion vs Veress needle in nonobese patients undergoing laparoscopic procedures: a randomized prospective single-center study. Surg Endosc. 2004;18:1778-81.
3. Agarwala N, Liu CY. Safe entry techniques during laparoscopy: left upper quadrant entry using the ninth intercostals space--a review of 918 procedures. J Minim Invasive Gynecol. 2005;12:55-61.
4. Vilos GA, Ternamian A, Dempster J. Laparoscopic entry: a review of techniques, technologies, complications. Society of Obstetricians, Gynecologists (SOGC) clinical practice guideline no.1993. J Obstet Gynecol Can. 2007;29:433–47.
5. Altun H, Banli O, Kavlakoglu B, Kucukkayikci B, Kelesoglu C, Erez N. Comparison between direct trocar and Veress needle insertion in laparoscopic cholecystectomy. J Laparoendosc Adv Surg Tech A. 2007;17:709-12.
6. Simforoosh N, Basiri A, Ziaee SAM, Tabibi A, Noralizadeh A. Complications of laparoscopic access techniques in urology: open access versus blind access. *30th World Congress of Endourology & SWL; WCE 2012*. Istanbul, Turkey; 2012:MP 11-14.
7. Simforoosh N, Soltani MH, Ahanian A, Lashay A. Initial series of mini-laparoscopic live donor nephrectomy using a novel technique. Complications of laparoscopic access techniques in urology: open access

versus blind access. *30th World Congress of Endourology & SWL; WCE 2012*. Istanbul, Turkey; 2012:MP 18-04.

8. Mousavi-Bahar SH, Amir-Zargar MA, Gholamrezaie HR. Laparoscopic assisted percutaneous nephrolithotomy in ectopic pelvic kidneys. Int J Urol. 2008;15:276-8..
9. HamidShayani-Nasab et alComplications of Entry Using Direct Trocar and/or Veress Needle Compared with Modified Open Approach Entry in Laparoscopy. Urology Journal 2013 Vol 10(2) 861-65.
10. Six-Year ExperienceE. Prieto-Díaz-Chávez*, Direct Trocar Insertion without Pneumoperitoneum and the Veress Needle in Laparoscopic Cholecystectomy : a Comparative StudyActachirbelg, 2006, 106, 541-544.
11. PawanLal, 'Open port placement of first laparoscopic port : A safe technique,JSLS.2004 Oct-Dec;8(4):364-366.
12. SiavashFalahatkar'Comparitive study of ease of use, safety, and efficacy between Direct trocar and Open access (Hassons technique) in laparoscopic study'.UroTodayInt J.2009 Dec;2(6). Doi:10.3834/uij.1944-5784.2009.12.03.
13. LIU Hai-fangA multi-center study of a modified open trocar first-puncture approach in 17 350 patients for laparoscopic entry *Chinese Medical Journal 2009;122(22):2733-2736*.
14. Flament JB. [Functional anatomy of the abdominal wall]. Chirurg 2006; 77:401.
15. Ellis H. Applied anatomy of abdominal incisions. Br J Hosp Med (Lond) 2007; 68:M22.

16. Langer K, Cleavage of, the curia, et al. Presented at the Meeting of the Royal Academy of Sciences, April 25, 1861. Clin Orthop 1973; 91:3.
17. Wong VW, Bhatt KA, Vial IN, et al. Beyond Langer's Lines: Manipulating wound mechanical forces to control hyperochic scar formation in the red Duroc pig. J Am Coll Surg 2010; 211:S77.
18. Tobin CE, Benjamin Ja. anatomic and clinical re-evaluation of camper's, scarpa's, and colles' fasciae. surg gynecol obstet 1949; 88:545.
19. Tokita K. Anatomical significance of the nerve to the pyramidalis muscle: a morphological study. Anat Sci Int 2006; 81:210.
20. Mwachaka PM, Saidi HS, Odula PO, et al. Locating the arcuate line of Douglas: is it of surgical relevance? Clin Anat 2010; 23:84.
21. Beer GM, Schuster A, Seifert B, et al. The normal width of the linea alba in nulliparous women. Clin Anat 2009; 22:706.
22. Rozen WM, Ashton MW, Taylor GI. Reviewing the vascular supply of the anterior abdominal wall: redefining anatomy for increasingly refined surgery. Clin Anat 2008; 21:89.
23. Krupski WC, Sumchai A, Effeney DJ, Ehrenfeld WK. The importance of abdominal wall collateral blood vessels. Planning incisions and obtaining arteriography. Arch Surg 1984; 119:854.
24. Gardner GP, Josephs LG, Rosca M, et al. The retroperitoneal incision. An evaluation of postoperative flank 'bulge'. Arch Surg 1994; 129:753.
25. Sippo WC, Burghardt A, Gomez AC. Nerve entrapment after Pfannenstiel incision. Am J Obstet Gynecol 1987; 157:420.

26. Whiteside JL, Barber MD, Walters MD, Falcone T. Anatomy of ilioinguinal and iliohypogastric nerves in relation to trocar placement and low transverse incisions. Am J Obstet Gynecol 2003; 189:1574.
27. Stulz P, Pfeiffer KM. Peripheral nerve injuries resulting from common surgical procedures in the lower portion of the abdomen. Arch Surg 1982; 117:324.
28. Palmer R. Safety in laparoscopy. J Reprod Med 1974;13:1–5.11. Hasson HM. A modified instrument and method for laparoscopy. Am JObstet Gynecol 1971;110:886–7.
29. Dingfelder JR. Direct laparoscopic trocar insertion without prior pneumoperitoneum. J Reprod Med 1978;21:45–7.
30. Byron JW, Fujiyoshi CA, Miyazawa K. Evaluation of the direct trocar insertion technique at laparoscopy. Obstet Gynecol 1989;74:423–5.
31. Nezhat FR, Silfen SL, Evans D, Nezhat C. Comparison of direct insertion of disposable and standard reusable laparoscopic trocars and previous pneumoperitoneum with Veress needle. Obstet Gynecol 1991;78:148–50.
32. Lanvin D, Elhage A, Querleu D. Does the use of pneumoperitoneum and disposable trocars prevent bowel injury at laparoscopy? A randomized experimental study in the rabbit. Gynaecol Endosc 1996;5:343–8.
33. Riek S, Bachmann KH, Gaiselmann T, Hoernstein F, Marzusch K. A new insufflation needle with a special optical system for use in laparoscopic procedures. Obstet Gynecol 1994;84:476–8.
34. McGurgan P, O'Donovan P. Optical Veress as an entry technique. Gynaecol Endosc 1999;8:379–92.

35. Kaali SG. Introduction of the Opti-Trocar. J Am Assoc Gynecol1993;1:50–3.
36. Mettler L, Schmidt EH, Frank V, Semm K. Optical trocar systems: laparoscopic entry and its complications (a study of case in Germany). Gynaecol Endosc 1999;8:383–9.
37. Turner DJ. A new radially expanding access system for laparoscopic procedures versus conventional cannulas. J Am Assoc Gynecol Laparosc 1996;34:609–15.
38. Turner DJ. Making the case for the radially expanding access system. Gynaecol Endosc 1999;8:391–5.
39. Ternamian AM. Laparoscopy without trocars. Surg Endosc 1997;11:8159–68.
40. Ternamian AM. A second-generation laparoscopic port system: EndoTIP_. Gynaecol Endosc 1999;8:397–401.
41. Woolf SH, Battista RN, Angerson GM, Logan AG, Eel W. Canadian Task Force on Preventive Health Care. New grades for recommendations from the Canadian Task Force on Preventive Health Care. Can Med Assoc J 2003;169(3):207-8.
42. Harrell AG, Heniford BT. Minimally invasive abdominal surgery: lux et veritas past, present, and future. Am J Surg 2005;190:239–43.
43. Gomel V, Taylor PJ, Yuzpe AA, Rioux JE. Laparoscopy and Hysteroscopy in Gynecologic Practice. Chicago: Year Book Medical Publishers; 1986..

44. Yuzpe AA. Pneumoperitoneum needle and trocar injuries in laparoscopy: a survey on possible contributing factors and prevention. J Reprod Med 1990;35 485–90.

45. Sigman HH, Fried GM, Garzon J, Hinchey EJ, Wexler MJ, Meakins JL. Risks of blind versus open approach to celiotomy for laparoscopic surgery. Surg Laparosc Endosc 1993;3:296–9.

46. Garry R. Towards evidence based laparoscopic entry techniques: clinical problems and dilemmas. Gynaecol Endosc 1999;8:315–26.

47. Chandler JG, Corson SL, Way LW. Three spectra of laparoscopic entry access injury. J Am Coll Surg 2001;192:478–91.

48. Corson SL, Chandler JG, Way LW. Survey of laparoscopic entry injuries provoking litigation. J Am Assoc Gynecol Laparosc 2001;8:341–7

49. Lingam K, Cole R. Laparoscopy entry port visited: a survey of practices of consultant gynaecologists in Scotland. Gynaecol Endosc 2001;10:335–42.

50. Merlin T, Hiller J, Maddern G, Jamieson GG, Brown AR, Kolbe A. Systematic review of the safety and effectiveness of methods used to establish pneumoperitoneum in laparoscopic surgery. Br J Surg 2003;90:668–70.

51. Sanders RR, Filshie GM. Transfundal induction of pneumoperitoneum prior to laparoscopy. J Obstet Gynaecol Br Cmwlth 1994;107:316–7.

52. Morgan HR. Laparoscopy: induction of pneumoperitoneum via transfundal puncture. Obstet Gynecol 1979;54:260–1.

53. Wolfe WM, Pasic R. Transuterine inertion of Veress needle in laparoscopy. Obstet Gynecol 1990;75:456–7.

54. Trivedi AN, MacLean NE. Transuterine insertion of Veress needle for gynecological laparoscopy at Southland Hospital. NZ Med J 1994;107:316–7.

55. Pasic R, Levine RL, Wolfe WM Jr. Laparoscopy in morbidly obese patients. J Am Assoc Gynecol 1999;6:307–12.

56. Santala M, Jarvela I, Kauppila A. Transfundal insertion of a Veress needle in laparoscopy of obese subjects: a practical alternative. Hum Reprod 1999;14:2277–8.

57. Neely MR, McWilliams R, Makhlouf HA. Laparoscopy: routine pneumoperitoneum via the posterior fornix. Obstet Gynecol 1975;45:459–60.

58. Van Lith DA, van Schie KJ, Beekhuizen W, du Plessis M. Cul-de-sai insufflation: an easy alternative route for safely inducing pneumoperitoneum. Int J Gynaecol Obstet 1980;17:375–8.

59. Reich H, Levie L, McGlynn F, Sekel L. Establishment of pneumoperitoneum through the left ninth intercostal space. Gynaecol Endosc 1995;4:141–3.

ANNEXURES

ETHICAL CLEARANCE CERTIFICATE

Institutional Ethical Committee BIJAPUR-586 103 OUTWARD No. 621 Date 27/11/14 BLDE(U)'s Shri B.M. Patil Medical College

B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 22-11-2014 at 3-30 pm to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.

Title "A Comparative Study Between Direct Trocar, Veress Needle and open Approach Entry in Laparoscopic Surgeries."

Name of P.G. student Dr. Varun Kumar Damera
Dept of General Surgery

Name of Guide/Co-investigator Dr. Hemanth Kumar M. Asso. Professor.
Dept of General Surgery.

for
DR.TEJASWINI. VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

SAMPLE INFORMED CONSENT FORM

B.L.D.E.U.'s SHRI B.M. PATIL MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTRE, VIJAYPUR – 586103, KARNATAKA

TITLE OF THE PROJECT: **A COMPARATIVE STUDY BETWEEN DIRECT TROCAR, VERESS NEEDLE AND OPEN APPROACH ENTRY IN LAPAROSCOPIC SURGERIES**

PRINCIPAL INVESTIGATOR: **Dr. VARUN KUMAR DAMERA**
Department of General Surgery

PG GUIDE: **Dr. HEMANTH KUMAR M**
M.S. (GENERAL SURGERY)
ASSOCIATE PROFESSOR
DEPARTMENT OF SURGERY

PURPOSE OF RESEARCH:

I have been informed that this study will analyse the comparison of Direct trocar, veress needle and open approach in laparoscopic surgeries.

I have been explained about the reason for doing this study and selecting me/my ward as a subject for this study. I have also been given free choice for either being included or not in the study.

PROCEDURE:

Patient will be explained about the need of the surgery and posted for surgery and patient will also be explained about the required investigations as per standard protocol.

RISKS AND DISCOMFORTS:

I understand that I/my ward may experience some pain, may be pain at the operated site, there may be leak from the wound that I /my ward these are expected complications of any hernioplasty and I understand that necessary measures will be taken to reduce these complications as and when they arise.

BENEFITS:

Prevention of intra and post-operative complications and to improve quality of life.

CONFIDENTIALITY:

I understand that medical information produced by this study will become a part of this hospital records and will be subjected to the confidentiality and privacy regulation of this hospital. Information of a sensitive, personal nature will not be a part of the medical records, but will be stored in the investigator's research file and identified only by a code number. The code key connecting name to numbers will be kept in a separate secure location.

If the data are used for publication in the medical literature or for teaching purpose, no names will be used and other identifiers such as photographs and audio or video tapes will be used only with my special written permission. I understand that I may see the photograph and videotapes and hear audiotapes before giving this permission.

REQUEST FOR MORE INFORMATION:

I understand that I may ask more questions about the study at any time. **Dr.Varun kumar damera** is available to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during the course of this study, which might influence my continued participation.

If during this study, or later, I wish to discuss my participation in or concerns regarding this study with a person not directly involved, I am aware that the social worker of the hospital is available to talk with me.

And that a copy of this consent form will be given to me to keep it and for careful reading.

REFUSAL OR WITHDRAWL OF PARTICIPATION:

I understand that my participation is voluntary and I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice to my present or future care at this hospital.

I also understand that **Dr.Varun kumar damera** will terminate my participation in this study at any time after he has explained the reasons for doing so and has helped arrange for my continued care by my own physician or therapist, if this is appropriate.

INJURY STATEMENT:

I understand that in the unlikely event of injury to me/my ward, resulting directly to my participation in this study, if such injury were reported promptly, then medical treatment would be available to me, but no further compensation will be provided.

I understand that by my agreement to participate in this study, I am not waiving any of my legal rights.

I have explained to _____ the purpose of this research, the procedures required and the possible risks and benefits, to the best of my ability in patient's own language.

Date:

Dr. Hemanth Kumar M **Dr. Varun Kumar D**

(Guide) (Investigator)

PROFORMA

B.L.D.E.U'S SHRI B. M. PATIL MEDICAL COLLEGE

HOSPITAL AND RESEARCH CENTRE, VIJAYPUR.

GENERAL SURGERY

SL NO

NAME:

AGE: IP NO:

SEX: UNIT:

RELIGION: DOA:

OCCUPATION: DOO:

ADDRESS: DOD;

BMI :

COMPLAINTS:

HISTORY OF PRESENT ILLNES

SYSTEMIC SYMPTOMS:

PAST HISTORY:

PERSONAL HISTORY: SMOKER/ALCOHOLIC

GENERAL PHYSICAL EXAMINATION

BUILT: WELL/MODERATE/POOR

NOURISHMENT: WELL/MODERATE/POOR

PALLOR

ICTERUS

FEBRILE

PEDAL EDEMA

GENERAL LYMPHADENOPATHY

VITAL DATA:

TEMPERATURE:

PULSE

RESPIRATORY RATE

BLOOD PRESSURE:

LOCAL EXAMINATION:

INSPECTION

PALPATION

PERCUSSION

AUSCULTATION

PER RECTAL

SYSTEMIC EXAMINATION:

RESPIRATORY SYSTEM

CARDIOVASCULAR SYSTEM

CENTRAL NERVOUS SYSTEM

CLINICAL DIAGNOSIS:

LABORATORY TESTS

HB%

TOTAL COUNT

DIFFERENTIAL COUNT

N/L/E/B/M:

URINE ROUTINE:

RBS

B.UREA

S.CREATININE

HIV

HBsAg

CHEST X RAY:

ULTRASONOGRAPHY OF ABDOMEN AND PELVIS:

OTHERS: OPERATIVE PROCEDURE (DATE AND TIME):

INTRA-OPERATIVE FINDINGS:

1. **Mean trocar insertion time.**
2. **Gas leak**
3. **Intra abdominal injury**
4. **Subcutaneous emphysema**

POST OPERATIVE COMPLICATIONS

1. BLEEDING.
2. POST OPERATIVE SURGICAL SITE INFECTIONS.

BIO–DATA

P. G. GUIDE:

NAME : Dr. HEMANTH KUMAR M

DESIGNATION : ASSOCIATEPROFESSOR OF SURGERY
B.L.D.E.U.'s SHRI B.M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE, VIJAYAPUR – 586103
KARNATAKA.

CONTACT : +91-9844811397

DATE OF BIRTH : 11 MARCH 1979

EDUCATION : M S SURGERY.DMAS.

PREVIOUS EXPERIENCE

1. UNDERGONE BASIC AND ADVANCED LAPAROSCOPIC TRAINING IN 2006
2. WORKED IN TATA MEMORIAL HOSPITAL FOR SIX MONTHS AND CERTIFIED TRAINEE.
3. DIPLOMA IN MINIMAL ACCESS SURGERY AT WORLD LAPAROSCOPY HOSPITAL IN 2013. ENDOUROLOGY TRAINING IN SEPTEMBER 2014.

MASTER CHART										
VEREES NEEDLE TECHNIQUE										
SI NO	**AGE**	**SEX**	**BMI KG/M2**	**DIAGNOSIS**	**OPERATIVE PROCEDURE**	**TECHNIQUE FOR PNEUMOPERITONEUM**	**TROCAR INSERTION TIME**	**GAS LEAK**	**INTRA ABDOMINAL INJURY**	**SUBCUTANEOUS EMPHYSEMA**
1	65	M	24.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	140	ABSENT	ABSENT	PRESENT
2	12	M	20.8	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	165	ABSENT	ABSENT	ABSENT
3	60	M	27.6	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	140	ABSENT	ABSENT	ABSENT
4	58	M	28.3	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	164	PRESENT	ABSENT	ABSENT
5	32	F	25.2	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	192	ABSENT	ABSENT	ABSENT
6	33	M	25.5	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	200	ABSENT	ABSENT	ABSENT
7	45	F	20	UTERINE FIBROID	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	VERESS	135	ABSENT	ABSENT	ABSENT
8	48	F	25.5	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	142	ABSENT	ABSENT	ABSENT
9	60	M	26.4	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	160	ABSENT	ABSENT	ABSENT
10	16	F	19.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	100	ABSENT	ABSENT	ABSENT
11	35	M	25.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	204	ABSENT	ABSENT	ABSENT
12	29	F	25.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	144	ABSENT	ABSENT	ABSENT

13	11	F	16	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	260	ABSENT	ABSENT	ABSENT
14	30	M	25.4	URACHAL CYST	DIAGNOSTIC LAPAROSCOPY	VERESS	150	ABSENT	ABSENT	ABSENT
15	6	F	21.8	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	100	ABSENT	ABSENT	ABSENT
16	68	M	26.1	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	164	ABSENT	ABSENT	ABSENT
17	42	M	26.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	220	ABSENT	ABSENT	ABSENT
18	18	F	19.2	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	VERESS	192	ABSENT	ABSENT	ABSENT
19	29	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	144	ABSENT	ABSENT	ABSENT
20	12	F	19.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	174	ABSENT	ABSENT	ABSENT
21	30	F	26.6	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	220	ABSENT	ABSENT	ABSENT
22	12	M	22.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	132	ABSENT	ABSENT	ABSENT
23	30	F	21	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	134	ABSENT	ABSENT	ABSENT
24	28	F	22.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	140	ABSENT	ABSENT	ABSENT
25	34	F	23.4	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	192	ABSENT	ABSENT	ABSENT
26	20	F	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	168	ABSENT	ABSENT	ABSENT
27	14	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	204	ABSENT	ABSENT	ABSENT
28	25	F	22.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	264	ABSENT	ABSENT	ABSENT
29	23	F	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	242	PRESENT	ABSENT	ABSENT
30	14	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	208	ABSENT	ABSENT	ABSENT
31	25	F	20.8	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	132	ABSENT	ABSENT	ABSENT
32	30	M	27	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	182	ABSENT	ABSENT	ABSENT
33	21	M	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	162	ABSENT	ABSENT	ABSENT
34	37	F	25.2	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	252	ABSENT	ABSENT	ABSENT

35	52	M	25.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	200	ABSENT	ABSENT	ABSENT
36	11	F	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	102	ABSENT	ABSENT	ABSENT
37	17	F	17.3	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	132	ABSENT	ABSENT	ABSENT
38	45	F	28.2	UTERINE FIBROID	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	VERESS	144	PRESENT	ABSENT	ABSENT
39	22	M	20	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	192	ABSENT	ABSENT	ABSENT
40	11	F	16.6	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	164	ABSENT	ABSENT	ABSENT
41	28	M	23.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	192	ABSENT	ABSENT	ABSENT
42	62	F	28.3	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	140	ABSENT	ABSENT	ABSENT
43	57	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	192	PRESENT	ABSENT	ABSENT
44	60	M	22.4	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	260	ABSENT	ABSENT	ABSENT
45	35	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	200	ABSENT	ABSENT	ABSENT
46	19	M	19.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	152	ABSENT	PRESENT	PRESENT
47	45	M	25.5	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	200	ABSENT	ABSENT	ABSENT
48	14	F	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	180	ABSENT	ABSENT	ABSENT
49	38	M	22.4	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	195	ABSENT	ABSENT	ABSENT
50	18	M	20	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	200	ABSENT	ABSENT	ABSENT
51	25	F	19.4	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	204	PRESENT	ABSENT	ABSENT
52	55	F	23.5	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	144	ABSENT	ABSENT	PRESENT
53	77	F	25.3	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	195	PRESENT	ABSENT	ABSENT

54	24	F	19.6	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	200	ABSENT	ABSENT	ABSENT
55	50	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	190	PRESENT	ABSENT	ABSENT
56	20	F	18.6	APPENDICITIS AND CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY AND APPENDICECTOMY	VERESS	182	ABSENT	ABSENT	ABSENT
57	65	M	22.4	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	200	PRESENT	ABSENT	ABSENT
58	60	M	25	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	185	ABSENT	ABSENT	PRESENT
59	29	F	22	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	242	ABSENT	ABSENT	ABSENT
60	13	M	24.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	200	ABSENT	ABSENT	ABSENT
61	22	M	20	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	192	ABSENT	ABSENT	ABSENT
62	11	F	16.6	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	164	ABSENT	ABSENT	ABSENT
63	28	M	23.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	192	ABSENT	ABSENT	ABSENT
64	62	F	28.3	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	140	ABSENT	ABSENT	ABSENT
65	57	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	192	PRESENT	ABSENT	ABSENT
66	60	M	22.4	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	260	ABSENT	ABSENT	ABSENT
67	35	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	200	ABSENT	ABSENT	ABSENT
68	19	M	19.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	152	ABSENT	PRESENT	PRESENT
69	45	M	25.5	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	200	ABSENT	ABSENT	ABSENT
70	14	F	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	180	ABSENT	ABSENT	ABSENT
71	38	M	22.4	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	195	ABSENT	ABSENT	ABSENT
72	18	M	20	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	200	ABSENT	ABSENT	ABSENT

73	60	M	27.6	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	140	ABSENT	ABSENT	ABSENT
74	58	M	28.3	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	164	PRESENT	ABSENT	ABSENT
75	32	F	25.2	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	192	ABSENT	ABSENT	ABSENT
76	33	M	25.5	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	200	ABSENT	ABSENT	ABSENT
77	45	F	20	UTERINE FIBROID	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	VERESS	135	ABSENT	ABSENT	ABSENT
78	48	F	25.5	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	142	ABSENT	ABSENT	ABSENT
79	60	M	26.4	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	160	ABSENT	ABSENT	ABSENT
80	16	F	19.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	100	ABSENT	ABSENT	ABSENT
81	35	M	25.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	204	ABSENT	ABSENT	ABSENT
82	29	F	25.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	144	ABSENT	ABSENT	ABSENT
83	11	F	16	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	260	ABSENT	ABSENT	ABSENT
84	30	M	25.4	URACHAL CYST	DIAGNOSTIC LAPAROSCOPY	VERESS	150	ABSENT	ABSENT	ABSENT
85	6	F	21.8	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	VERESS	100	ABSENT	ABSENT	ABSENT
86	68	M	26.1	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	164	ABSENT	ABSENT	ABSENT
87	42	M	26.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	220	ABSENT	ABSENT	ABSENT
88	34	F	23.4	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	192	ABSENT	ABSENT	ABSENT
89	20	F	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	168	ABSENT	ABSENT	ABSENT
90	14	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	204	ABSENT	ABSENT	ABSENT
91	25	F	22.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	264	ABSENT	ABSENT	ABSENT
92	23	F	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	242	PRESENT	ABSENT	ABSENT
93	14	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	208	ABSENT	ABSENT	ABSENT

94	25	F	20.8	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	132	ABSENT	ABSENT	ABSENT
95	30	M	27	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	VERESS	182	ABSENT	ABSENT	ABSENT
96	21	M	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	VERESS	162	ABSENT	ABSENT	ABSENT
97	37	F	25.2	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	252	ABSENT	ABSENT	ABSENT
98	52	M	25.5	CHOLECYSTITIS	LAPAROSCOPIC CHOLECYSTECTOMY	VERESS	200	ABSENT	ABSENT	ABSENT

MASTER CHART										
DIRECT TROCAR TECHNIQUE										
CASES	**AGE**	**SEX**	**BMI KG/M2**	**DIAGNOSIS**	**OPERATIVE PROCEDURE**	**TECHNIQUE FOR PNEUMOPERITONEUM**	**TROCAR INSERTION TIME (SEC)**	**GAS LEAK**	**INTRA ABDOMINAL INJURY**	**SUBCUTANEOUS EMPHYSEMA**
1	44	M	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
2	27	F	26.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
3	30	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
4	23	F	26.9	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
5	40	F	28.1	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	85	ABSENT	ABSENT	ABSENT
6	40	M	25	APPENDICITIS AND CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY AND APPENDICECTOMY	DIRECT TROCAR	100	ABSENT	ABSENT	ABSENT
7	23	M	20.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	53	ABSENT	ABSENT	ABSENT

8	22	M	16.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	64	ABSENT	ABSENT	ABSENT
9	15	M	17.3	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
10	60	M	31.1	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
11	48	F	20.7	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	70	ABSENT	ABSENT	ABSENT
12	25	M	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	55	ABSENT	ABSENT	ABSENT
13	47	F	30.8	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
14	45	M	22.9	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
15	15	F	16.4	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
16	30	F	26.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
17	18	F	20.1	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
18	64	F	30	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
19	60	F	28.8	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT	72	ABSENT	ABSENT	ABSENT

						TROCAR				
20	38	M	21.4	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	65	ABSENT	ABSENT	ABSENT
21	45	F	20.7	PELIC INFLAMMATORY DISEASE	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
22	50	M	24	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	104	ABSENT	ABSENT	ABSENT
23	26	M	22	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
24	60	M	18	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
25	23	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	124	ABSENT	ABSENT	ABSENT
26	62	F	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	105	ABSENT	ABSENT	ABSENT
27	17	F	18	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	75	ABSENT	ABSENT	ABSENT
28	45	M	28	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
29	25	F	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
30	63	M	25	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT

31	19	F	19	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
32	22	M	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
33	50	M	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
34	28	F	20	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
35	44	M	22	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	45	ABSENT	ABSENT	ABSENT
36	38	M	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
37	18	F	19	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
38	54	F	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	84	ABSENT	ABSENT	ABSENT
39	30	M	20	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	45	ABSENT	ABSENT	ABSENT
40	44	M	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	55	ABSENT	ABSENT	ABSENT
41	38	M	20	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
42	30	F	22	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT	55	ABSENT	ABSENT	ABSENT

						TROCAR				
43	50	F	19	PELIC INFLAMMATORY DISEASE	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	100	ABSENT	ABSENT	ABSENT
44	50	M	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	64	ABSENT	ABSENT	ABSENT
45	22	M	18	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	40	ABSENT	ABSENT	ABSENT
46	44	M	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
47	45	F	23	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	74	ABSENT	ABSENT	ABSENT
48	50	M	24	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	104	ABSENT	ABSENT	ABSENT
49	26	M	22	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
50	60	M	18	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
51	23	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	124	ABSENT	ABSENT	ABSENT
52	62	F	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	105	ABSENT	ABSENT	ABSENT
53	17	F	18	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	75	ABSENT	ABSENT	ABSENT

54	45	M	28	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
55	25	F	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
56	63	M	25	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
57	19	F	19	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
58	22	M	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
59	50	M	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
60	28	F	20	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
61	44	M	22	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	45	ABSENT	ABSENT	ABSENT
62	38	M	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
63	30	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
64	23	F	26.9	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
65	40	F	28.1	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL	DIRECT	85	ABSENT	ABSENT	ABSENT

					HYSTERECTOMY	TROCAR				
66	40	M	25	APPENDICITIS AND CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY AND APPENDICECTOMY	DIRECT TROCAR	100	ABSENT	ABSENT	ABSENT
67	23	M	20.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	53	ABSENT	ABSENT	ABSENT
68	22	M	16.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	64	ABSENT	ABSENT	ABSENT
69	15	M	17.3	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
70	60	M	31.1	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
71	48	F	20.7	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	70	ABSENT	ABSENT	ABSENT
72	25	M	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	55	ABSENT	ABSENT	ABSENT
73	47	F	30.8	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	90	ABSENT	ABSENT	ABSENT
74	45	M	22.9	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
75	15	F	16.4	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
76	30	F	26.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT

77	18	F	20.1	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
78	64	F	30	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
79	44	M	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
80	27	F	26.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
81	30	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT
82	23	F	26.9	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
83	40	F	28.1	FIBROID UTERUS	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	85	ABSENT	ABSENT	ABSENT
84	40	M	25	APPENDICITIS AND CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY AND APPENDICECTOMY	DIRECT TROCAR	100	ABSENT	ABSENT	ABSENT
85	23	M	20.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	53	ABSENT	ABSENT	ABSENT
86	22	M	16.9	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	64	ABSENT	ABSENT	ABSENT
87	15	M	17.3	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
88	60	M	31.1	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT	120	ABSENT	ABSENT	ABSENT

						TROCAR				
89	15	F	16.4	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
90	30	F	26.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
91	18	F	20.1	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
92	64	F	30	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	60	ABSENT	ABSENT	ABSENT
93	60	F	28.8	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	DIRECT TROCAR	72	ABSENT	ABSENT	ABSENT
94	38	M	21.4	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	65	ABSENT	ABSENT	ABSENT
95	45	F	20.7	PELIC INFLAMMATORY DISEASE	LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY	DIRECT TROCAR	120	ABSENT	ABSENT	ABSENT
96	50	M	24	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	DIRECT TROCAR	104	ABSENT	ABSENT	ABSENT
97	26	M	22	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	DIRECT TROCAR	54	ABSENT	ABSENT	ABSENT
98	60	M	18	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	DIRECT TROCAR	80	ABSENT	ABSENT	ABSENT

MASTER CHART										
OPEN APPROACH										
CASES	**AGE**	**SEX**	**BMI KG/M2**	**DIAGNOSIS**	**OPERATIVE PROCEDURE**	**TECHNIQUE**	**TROCAR INSERTION TIME**	**GAS LEAK**	**INTRA ABDOMINAL INJURY**	**SUBCUTANEOUS EMPHYSEMA**
1	60	F	28.3	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	280	ABSENT	ABSENT	ABSENT
2	20	F	18.7	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	320	ABSENT	ABSENT	ABSENT
3	40	F	21.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	252	PRESENT	ABSENT	ABSENT
4	15	F	19	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	344	ABSENT	ABSENT	ABSENT
5	28	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	345	ABSENT	ABSENT	ABSENT
6	33	F	23.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	322	PRESENT	ABSENT	ABSENT
7	52	F	26.6	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	288	PRESENT	ABSENT	ABSENT
8	36	F	25.8	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	312	PRESENT	ABSENT	ABSENT

9	19	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	372	PRESENT	ABSENT	ABSENT
10	70	F	27.1	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	192	ABSENT	ABSENT	ABSENT
11	22	F	25.8	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	260	ABSENT	ABSENT	ABSENT
12	70	M	23.5	HIATUS HERNIA	LAPAROSCOPIC FUNDOPLICATION	OPEN	164	PRESENT	ABSENT	ABSENT
13	65	F	25.6	HIATUS HERNIA	LAPAROSCOPIC FUNDOPLICATION	OPEN	192	ABSENT	ABSENT	ABSENT
14	32	F	28.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	192	ABSENT	ABSENT	ABSENT
15	11	M	19.2	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	280	PRESENT	ABSENT	ABSENT
16	35	M	24.2	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	184	ABSENT	ABSENT	ABSENT
17	66	M	28.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	392	ABSENT	ABSENT	ABSENT
18	27	M	23.5	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	384	PRESENT	ABSENT	ABSENT
19	13	F	22.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	324	ABSENT	ABSENT	ABSENT
20	22	F	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	400	ABSENT	ABSENT	ABSENT
21	17	F	20	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	340	ABSENT	ABSENT	ABSENT

22	45	M	26	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	215	PRESENT	ABSENT	ABSENT
23	35	F	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	380	PRESENT	ABSENT	ABSENT
24	48	F	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	280	PRESENT	ABSENT	ABSENT
25	45	M	22	INTESTINAL OBSTRUCTION	DIAGNOSTIC LAPAROSCOPY	OPEN	224	PRESENT	ABSENT	ABSENT
26	45	F	20	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	220	PRESENT	ABSENT	ABSENT
27	40	M	28.8	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	214	PRESENT	ABSENT	ABSENT
28	11	M	19	INTESTINAL OBSTRUCTION	DIAGNOSTIC LAPAROSCOPY	OPEN	192	PRESENT	ABSENT	ABSENT
29	28	F	22	GALLBLADDER POLYP	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	144	PRESENT	ABSENT	ABSENT
30	20	F	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	228	ABSENT	ABSENT	ABSENT
31	34	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	200	PRESENT	ABSENT	ABSENT
32	30	M	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	192	PRESENT	ABSENT	ABSENT
33	54	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	200	PRESENT	PRESENT	PRESENT
34	30	M	19.4	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	422	ABSENT	ABSENT	ABSENT

35	14	F	18.9	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	OPEN	160	ABSENT	ABSENT	ABSENT
36	28	F	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	424	ABSENT	ABSENT	PRESENT
37	13	F	18	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	462	ABSENT	ABSENT	ABSENT
38	34	M	22	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	228	PRESENT	ABSENT	PRESENT
39	40	M	26.6	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	228	PRESENT	ABSENT	ABSENT
40	28	M	24	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	288	PRESENT	ABSENT	ABSENT
41	20	F	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	189	ABSENT	ABSENT	ABSENT
42	40	F	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	200	PRESENT	ABSENT	ABSENT
43	60	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	277	PRESENT	ABSENT	ABSENT
44	53	M	20.8	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	221	ABSENT	ABSENT	ABSENT
45	35	F	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	328	ABSENT	ABSENT	ABSENT
46	11	F	19.8	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	424	ABSENT	ABSENT	ABSENT
47	24	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	188	ABSENT	ABSENT	ABSENT

48	45	F	25	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	522	PRESENT	ABSENT	ABSENT
49	18	M	21	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	422	ABSENT	ABSENT	ABSENT
50	21	F	22	INTESTINAL OBSTRUCTION	DIAGNOSTIC LAPAROSCOPY	OPEN	424	ABSENT	ABSENT	ABSENT
51	59	M	20.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	142	ABSENT	ABSENT	ABSENT
52	22	F	22.2	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	422	ABSENT	ABSENT	ABSENT
53	45	M	28.2	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	620	ABSENT	ABSENT	PRESENT
54	22	M	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	522	ABSENT	ABSENT	ABSENT
55	24	M	22	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	466	ABSENT	ABSENT	PRESENT
56	14	M	24	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	660	ABSENT	ABSENT	ABSENT
57	33	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	527	PRESENT	ABSENT	ABSENT
58	60	M	23	INTESTINAL OBSTRUCTION	DIAGNOSTIC LAPAROSCOPY	OPEN	428	ABSENT	ABSENT	ABSENT
59	13	F	19	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	523	PRESENT	ABSENT	ABSENT
60	26	M	25	GALLBLADDER POLYP	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	422	ABSENT	ABSENT	ABSENT

61	23	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	633	ABSENT	ABSENT	PRESENT
62	25	F	22	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	OPEN	321	ABSENT	ABSENT	ABSENT
63	43	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	322	ABSENT	ABSENT	ABSENT
64	61	M	23.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	453	PRESENT	ABSENT	PRESENT
65	20	M	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	432	ABSENT	ABSENT	ABSENT
66	50	M	21	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	OPEN	321	ABSENT	ABSENT	ABSENT
67	25	M	20.1	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	OPEN	211	PRESENT	ABSENT	PRESENT
68	10	M	18.5	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	322	PRESENT	ABSENT	ABSENT
69	36	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	394	PRESENT	ABSENT	ABSENT
70	42	M	23	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	470	ABSENT	ABSENT	ABSENT
71	33	F	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	288	PRESENT	ABSENT	ABSENT
72	43	M	24	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	432	PRESENT	ABSENT	ABSENT
73	39	M	21	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	500	ABSENT	ABSENT	ABSENT

74	22	M	19.8	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	470	ABSENT	ABSENT	ABSENT
75	23	M	23	INGUINAL HERNIA	TAPP LAPAROSCOPIC HERNIOPLASTY	OPEN	300	ABSENT	ABSENT	PRESENT
76	22	F	22.2	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	422	ABSENT	ABSENT	ABSENT
77	45	M	28.2	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	620	ABSENT	ABSENT	PRESENT
78	22	M	22	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	522	ABSENT	ABSENT	ABSENT
79	24	M	22	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	466	ABSENT	ABSENT	PRESENT
80	14	M	24	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	660	ABSENT	ABSENT	ABSENT
81	33	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	527	PRESENT	ABSENT	ABSENT
82	60	M	23	INTESTINAL OBSTRUCTION	DIAGNOSTIC LAPAROSCOPY	OPEN	428	ABSENT	ABSENT	ABSENT
83	13	F	19	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	523	PRESENT	ABSENT	ABSENT
84	26	M	25	GALLBLADDER POLYP	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	422	ABSENT	ABSENT	ABSENT
85	23	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	633	ABSENT	ABSENT	PRESENT
86	25	F	22	OVARIAN CYST	DIAGNOSTIC LAPAROSCOPY	OPEN	321	ABSENT	ABSENT	ABSENT

87	43	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	322	ABSENT	ABSENT	ABSENT
88	20	F	18.7	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	320	ABSENT	ABSENT	ABSENT
89	40	F	21.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	252	PRESENT	ABSENT	ABSENT
90	15	F	19	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	344	ABSENT	ABSENT	ABSENT
91	28	F	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	345	ABSENT	ABSENT	ABSENT
92	33	F	23.4	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	322	PRESENT	ABSENT	ABSENT
93	52	F	26.6	MESENTRIC LYMPHADENOPATHY	DIAGNOSTIC LAPAROSCOPY	OPEN	288	PRESENT	ABSENT	ABSENT
94	36	F	25.8	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	312	PRESENT	ABSENT	ABSENT
95	19	M	21	APPENDICITIS	LAPAROSCOPIC APPENDICECTOMY	OPEN	372	PRESENT	ABSENT	ABSENT
96	70	F	27.1	CHOLELITHIASIS	LAPAROSCOPIC CHOLECYSTECTOMY	OPEN	192	ABSENT	ABSENT	ABSENT