

Laparoscopic Ventral Hernia Repair-Early Experience In 30 Patients

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Abstract:

Hernia Is The Latin Word Means Rupture, There Are Various Types Of Hernias Based On The Location And Etiology. The Only Method Of Treatment For Hernia Is Surgery, Open Anatomical Repair Or Laparoscopic Repair With Mesh Reinforcements, There Is Increased Recurrence Rate With Primary Anatomical Repair. Laparoscopic Intraperitoneal Onlay Mesh Repair (Ipom) Now Days Is A Method Of Choice For Ventral Hernia Repair Of Various Causes .Laparoscopic Incisional And Ventral Hernia Repair Was First Reported By Le Blanc And Booth In 1993. . It Has Benefits Of Lesser Pain Also And Fixation Of A Large Sized Mesh ApartFrom The Cosmetic Benefit. Although, It Remains A Challenging Procedure More So In Re-Operative Abdomen And Malignancy. Many Research Studies Have Suggested That Minimal Access Repair Of Ventral Hernias Has A Lower Recurrence Rate And Shorter Hospital Stay With Quick Recovery. This Is A Prospective Study Conducted In Department Of Surgery, Mahatma Gandhi Medical College And Hospital, Jaipur From January 2017 To September 2018. In Our Study, Of The Total 30 Patients, 20 Were Female And 10 Were Male Where The Female Outnumbered The Male Group And Constitute About 67% Of The Total Study Population. In Our Study Maximum Number Of Patients Were Between 41-60 Age Group. The Mean Age Is 47.7 With Age Ranging From 30-70 Years. Average Duration Of Stay Was 3.4 Days. 2 Patients Had To Be Admitted For Longer Duration Because Of Complications Developed Intraoperative And Postoperatively. The Incisional Hernias Are Most Commonly Seen In Patient Who Have Undergone Previous Gastrointestinal Surgeries And Post-Surgical Site Infections. Ventral Abdominal Hernias Mainly Present In Middle Age Group And MostlyAfter Previous History Of Surgery. Laparoscopic Repair Have Early Recovery, Less Wound Infections, LessRecurrence And Has More Patient Compliance. As The Duration Of Surgery Is Longer, Appropriate Choice Of Patients IsNecessary To Prevent Morbidity Of Patients. The Size Of Defect Increases The Size Of The Polypropylene Mesh Used And Further The Duration Of Surgery. Previous Surgeries Have Increased The Duration Of Surgery As There Was NeedOf Adhesiolysis In Many Cases. With The Learning Curve The Duration Of Surgery Has Reduced And TheMorbidity Has Reduced.Since The Cost Of The Procedure Is High, The Affordability Is Less

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I. INTRODUCTION:

Hernia word is derived from latin language meaning “rupture”. Ventral abdominal wall hernias are defined as protrusion of a portion of organ or tissue through an abdominal wall defect.^{1,2} Ventral hernias are one of the common problems especially the incisional hernias are seen in 11-20% of post-operative cases and there incidence is on rise (3,4)

Incisional hernia is a common long-term complication of abdominal surgery. Almost 50% of incisional hernias develop within the first 2 years after the primary surgery, and 74% develop after 3 years.^{5,6}

Surgical intervention is the only method of repair⁷, with two techniques available: open anatomical primary repair with or without mesh reinforcement, and laparoscopic mesh repair.

The recurrence rate of incisional hernia after primary anatomical suturerepair is more than 50%⁸ on long term follow up. The traditional repair require laparotomy with suture approximation of strong fascial sutures on either side and the recurrence rate has been reduced to 10–23% after the introduction of prosthetic materials (meshes) in hernia repair.⁹

Unfortunately positioning of mesh makes it necessary to perform an extensive soft tissue dissection in open technique which leads to increased incidence of postoperative pain, seroma formation, haematomas and

wound infection.^{10-12,14} Despite the improvement in the methods of repair, there is still significant morbidity and even mortality associated with repairs¹³.

There are a wide variety of surgical techniques which have been developed and upgraded over a period of time ranging from fascial suture repair followed by reinforcement with prosthetic mesh then by minimal access approach with mesh and fixation devices followed by improvements in synthetic meshes and use of biosynthetic meshes.

The common sites for mesh placement are sublay (retromuscular and preperitoneal), onlay (overlying the muscle and fascia) and intraperitoneal (inlay-mesh is sutured to both edges of fascia and underlying peritoneum)

Laparoscopic intraperitoneal onlay mesh repair (IPOM) now days is a method of choice for ventral hernia repair of various causes. Laparoscopic incisional and ventral hernia repair was first reported by Le Blanc and Booth in 1993²⁰⁻²². There is considerable learning curve of the procedure and the surgery is not without complications.

Laparoscopic ventral hernia repair (IPOM) has gained popularity in recent past, there is still debate or difference in opinion about the optimal approach to ventral hernia repair. Many research studies have suggested that minimal access repair of ventral hernias has a lower recurrence rate and shorter hospital stay with quick recovery.¹⁴⁻¹⁵

Indications for laparoscopic incisional ventral hernia repair may depend on defect size and site. As regards to size, a recent American review reports that the total percentage of laparoscopic incisional ventral hernia repair is less than 10 % and that a prosthesis used only by half of all surgeons in defects under 3 cm in diameter. Therefore, this is an indirect indication of a minimum size limit for laparoscopy. As regards the maximum limit, literature values vary widely. Several groups report positive experiences with ventral hernias larger than 15 cm in diameter. It has benefits of lesser pain also and fixation of a large sized mesh apart from the cosmetic benefit. Although, it remains a challenging procedure more so in re-operative abdomen and malignancy.

As laparoscopic repair reduced the length of hospital stay compared with open repair, mainly owing to the disadvantages of the open technique that include the need for soft-tissue dissection and undermining to raise subcutaneous skin flaps, which have the potential for increased morbidity and prolonged convalescence²⁰.

The laparoscopic procedure is expensive as the mesh used is costly along with its fixation devices. The recurrence and morbidity rate is usually higher initially when surgeons are gaining experience as is the risk of enterotomy, which is probably related to the learning curve.²¹

II. AIM AND OBJECTIVES:

The aim of this study is to evaluate our initial experience of Laparoscopic ventral hernia repair on various parameters such as:

- postoperative pain,
- requirement of postoperative analgesia,
- Operating time and complications
- Time of hospital stay, recovery
- Outcome and recurrence.

To analyse the influence of past operative interference in effecting the duration of surgery.

The size of mesh and ease of its placement affecting duration of surgery.

III. MATERIALS AND METHODS:

This is a Prospective study conducted in Department of Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur from January 2017 to September 2018.

Institute Ethics Committee Clearance was obtained before start of study. Written and informed consent of all the patients was taken prior to their enrolment in the study with a sample size 30 patients. Patients presenting to surgical OPD with hernia on the ventral aspect of the abdomen excluding inguinal hernia was evaluated. Any patient with ventral hernia who was fit for general anaesthesia are included in this study. Those Patient who are unfit for general anaesthesia, incarcerated or strangulated bowel loops or any evidence of vascular compromise on imaging and with pregnancy, Inguinal hernia were excluded. Uncontrolled hypertension, Unfit for general anaesthesia and pneumoperitoneum.

The principle used in laparoscopic repair of ventral hernia is the same concept as that of open repair popularised by Stoppa, Rives et al^{30,31,32}. These include using large polypropylene mesh, adequate overlap of hernia defect (more than 3-5cm) and with tension free repair. All the findings-clinical examination, investigations, ultrasonography, size and CT scan/USG scan location of defect was recorded in the study proforma. Evaluation was made in form of Height, weight and BMI of the patients Past history of operative interference to assess the intra-abdominal adhesions. Size, number and location of the defect by CT scan/USG abdomen.

Preoperative preparation- All patient's detailed medical history was documented, underwent a thorough general examination with estimation of size of the hernia defect. All routine blood parameters including, complete blood counts, renal and hepatic function tests, coagulation profile was evaluated. Patient with medical co morbidities like diabetes, hypertension, underlying malignancy etc., were evaluated and declared fit by them for surgery by specialist physicians. CT abdomen/USG abdomen was done to every patient to confirm the size of defect and its contents of hernia and other associated hernia for estimating the size of the prosthesis to be used. COPD patients were started on chest physiotherapy and incentive spirometry prior to surgery. The patients were catheterised prior to surgery especially if the defect is large or involving the lower abdomen. Perioperative antibiotic prophylaxis was given at the time of induction. All the instruments used were reusable after adequate sterilisation technique except for the polypropylene mesh and tacker used for mesh fixation. Tacker used is PROFOUND –N non absorbable mesh fixation device (code: MFD30N) and the polypropylene mesh used is FILAPROP polypropylene mesh manufactured by MERIL Life sciences.

IV. SURGICAL TECHNIQUE:

The patient was placed in supine position with arm adducted and after induction of general anaesthesia, a single dose of Inj. ceftriaxone 1 gm I/V was given as routine after sensitivity testing. Pneumoperitoneum was created with veress needle at variable position mostly away from defect (opposite side or palmer's point) depending on the location of defect and an intra-abdominal pressure of 14 mm Hg was considered safe. Umbilicus or 2 cm below left costal margin in the mid- clavicular line (palmer's point) was also be utilized for initial access⁽²⁴⁾. Port were introduced in previously non operated area. Usually 3 ports were used, 5 mm visual port for 30 degrees telescope. It is usually the port converted to 12 mm for the placement of large size of mesh. Another two 5 mm port for access were made depending on location and size of defect of hernia. Preoperatively, the margins of hernia defect were marked. Gentle reduction of content and adhesiolysis (both omentum and bowel) was done if adhesions were present with the help of sharp scissors or harmonic scalpel. The margins and periphery of hernial defect was evaluated by direct vision and palpation after complete reduction of contents (two, three or four fingers). After complete reduction of hernia contents the abdomen was deflated and the margins were reconfirmed and mesh size is ascertained and in case of multiple defect extra meshes were used to cover the defect. Primary suturing of the defect was done with the help of vicryl 1-0(RB) under vision through the skin, if not completed repaired atleast decreased to least size. Suitable sized mesh (with overlap of 5 cm from the defect margin) was prepared by placing preplaced non absorbable sutures for transfascial fixation. We routinely use 1 central and 4 peripheral sutures of prolene 1-0. In all patients we used polypropylene mesh. Prepared mesh was rolled and then introduced into abdomen through 12 mm port. This is usually the optic port although any port could be exchanged with 12 mm based on the surgeons' preference. The time was recorded starting from placing the ports in the abdomen and till the final port closure. The mesh was unrolled inside the abdomen taking care of the orientation before fixation. The preplaced sutures at the periphery and center of mesh was pulled out using transfascial fixation needle after very small skin incision. We have usually picked the central fixation first as it helps in orientation of a larger sized mesh. These sutures are ligated subcutaneously and required no skin sutures. Mesh was then duly fixed with 5 mm absorbable tackers in all cases. Tacker was placed at the corner at the distance of 2.5 cm between each and then a second layer of tacker were fired near the defect to secure the mesh. Abdomen was deflated and all port sites were closed with vicryl 2-0 (RB) and skin approximated with help of Ethilon 2-0(CB). A ball of gauze is placed over the defect and dressed with dynaplast and foleys catheter was removed post operatively. It deserves attention that the use of mesh and its proper placement, such as exceeding the edge of the incision by about 5 cm, could reduce hernia recurrence, no matter which approach is used^{63,64}. Postoperative pain was managed with INJ.DICLOFENAC SODIUM I.V and if not controlled then INJ.TRAMADOL was used and postoperative pain was analysed using VAS SCALE and numbered from 0(no pain) to 10(severe pain). Postoperative follow up was called after 1 week and then 4 weeks, 12 weeks and 6 months interval and later on was in contact telephonically.



Figure 1: lateral view showing protrusion of bowel through defect



Figure 2: Cross sectional view of bowel protruding through the defect



Figure 3: 30 optics, tacker needle holder, grasper, needle holder, maryland and harmonic and disposable ports



Figure 4: Cobble needle and epidural needle

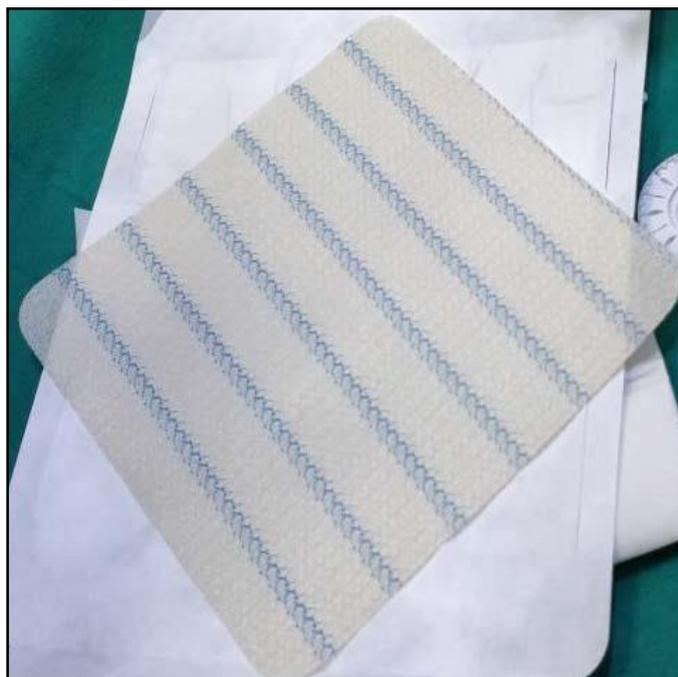


Figure 5: 15*15cm absorbable polypropylene mesh



Figure 6: Defect externally after pneumoperitoneum

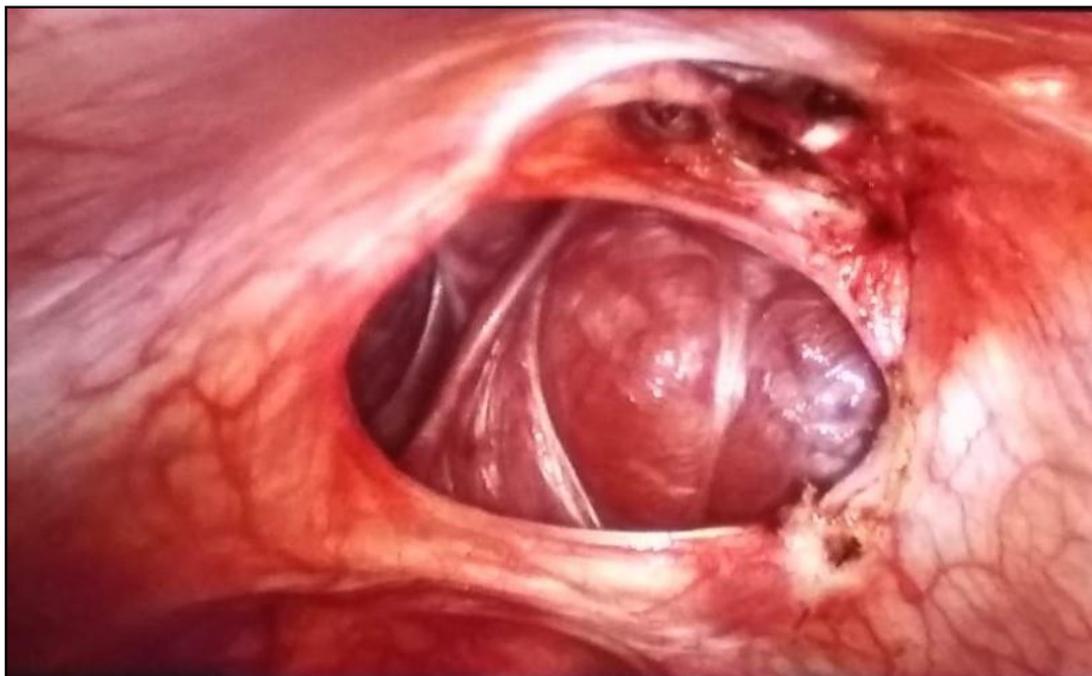


Figure 7: Defect visualised intraperitoneally after pneumoperitoneum



Figure 8: Defect being anatomically repaired

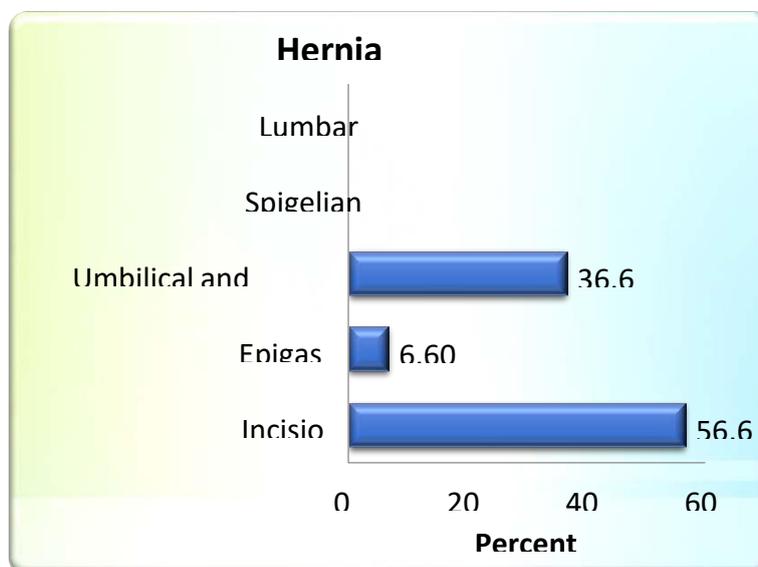
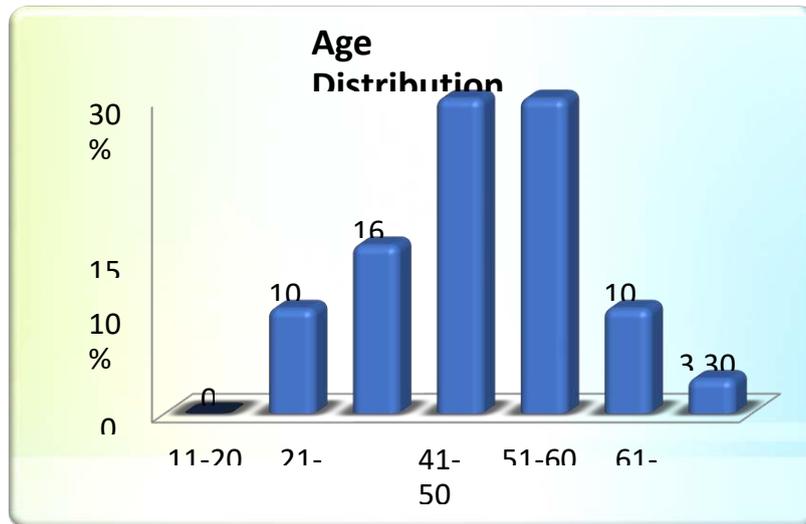
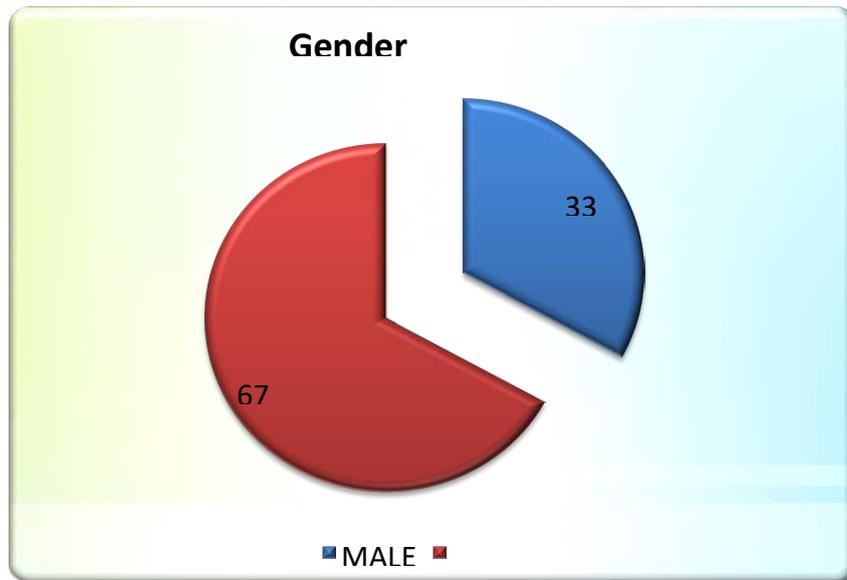


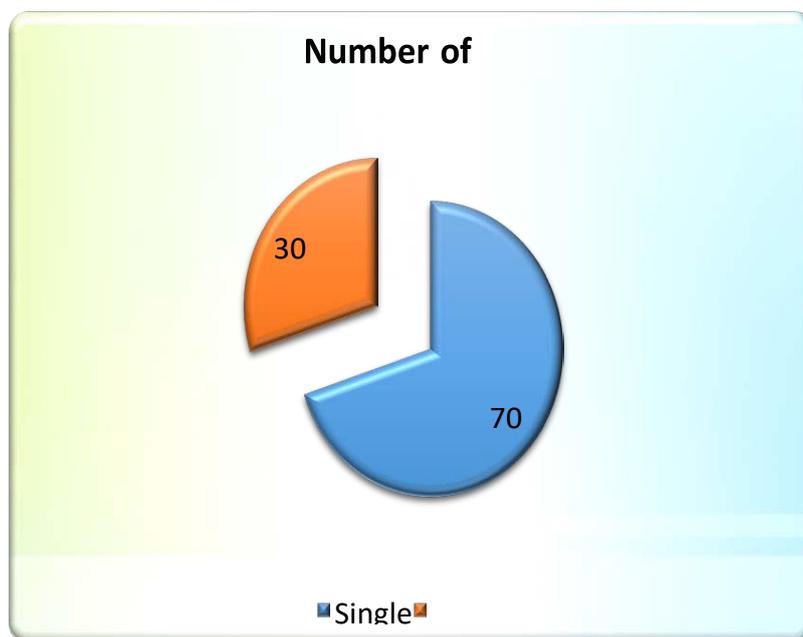
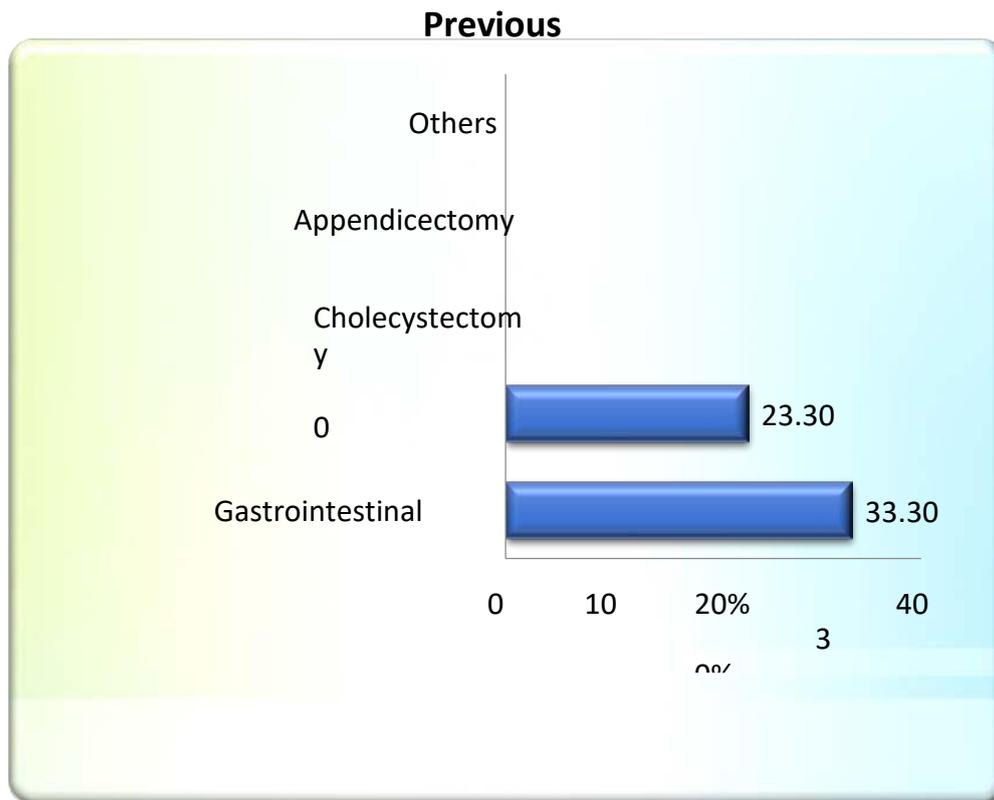
Figure 9: Use of cobble needle for transfascial suture fixation

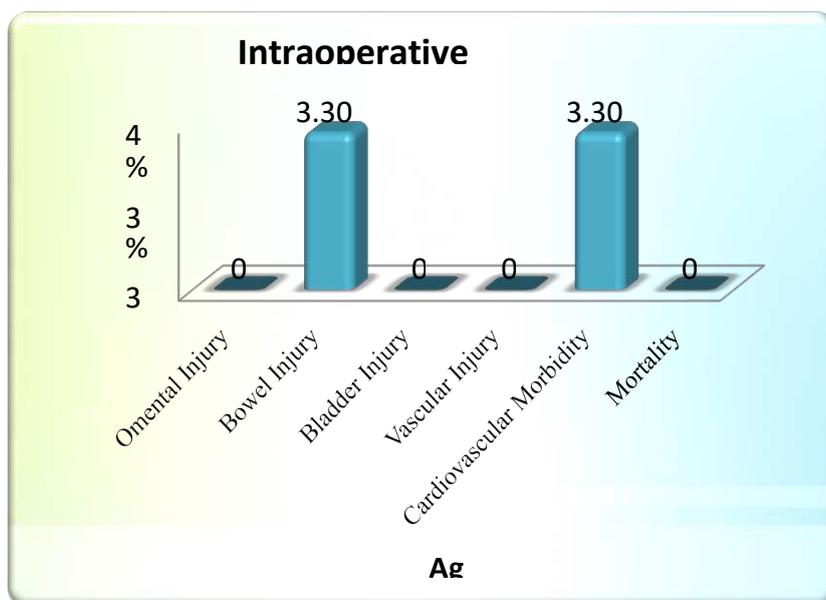
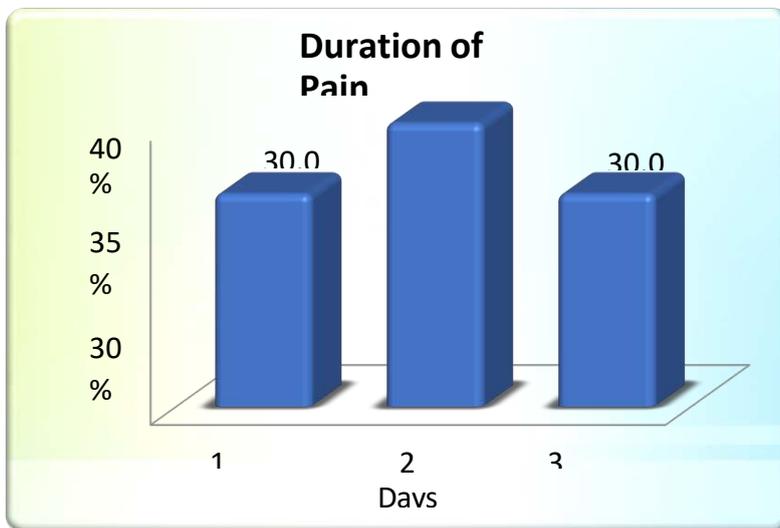
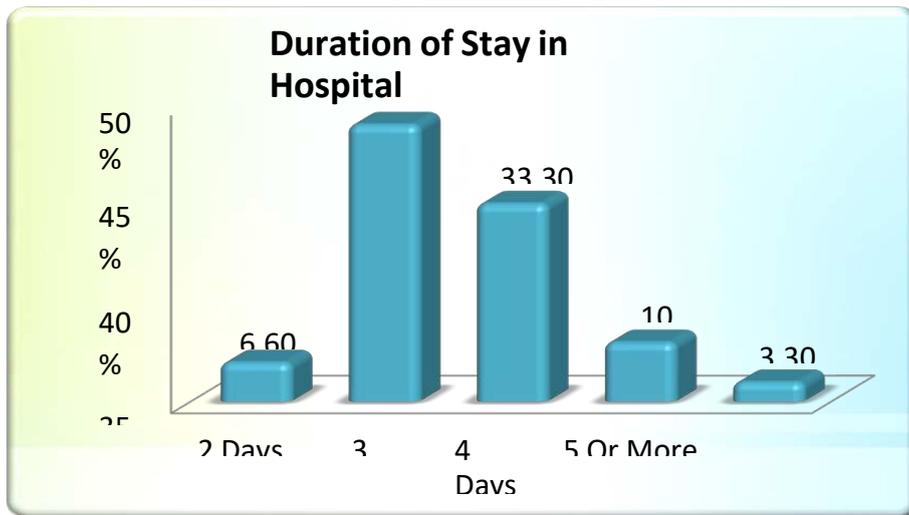
V. RESULTS:

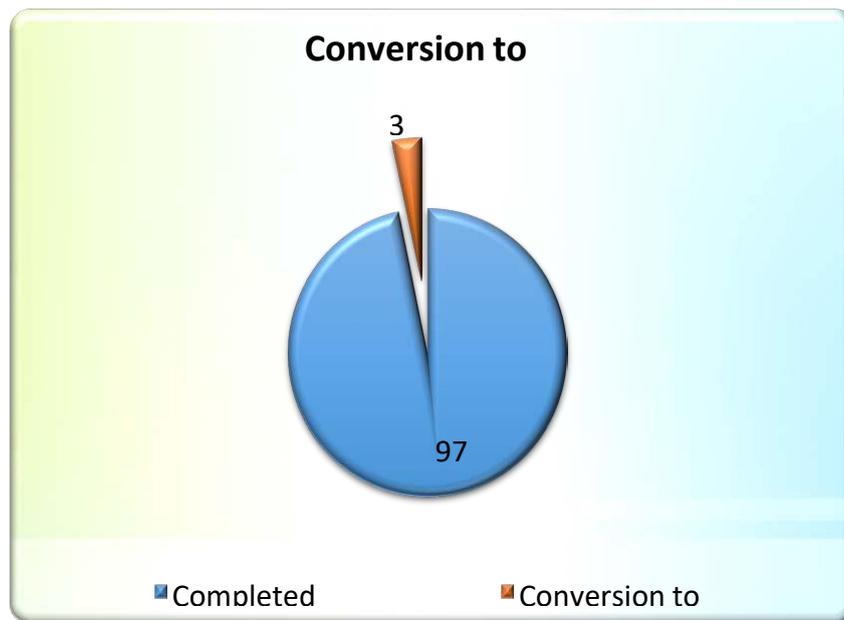
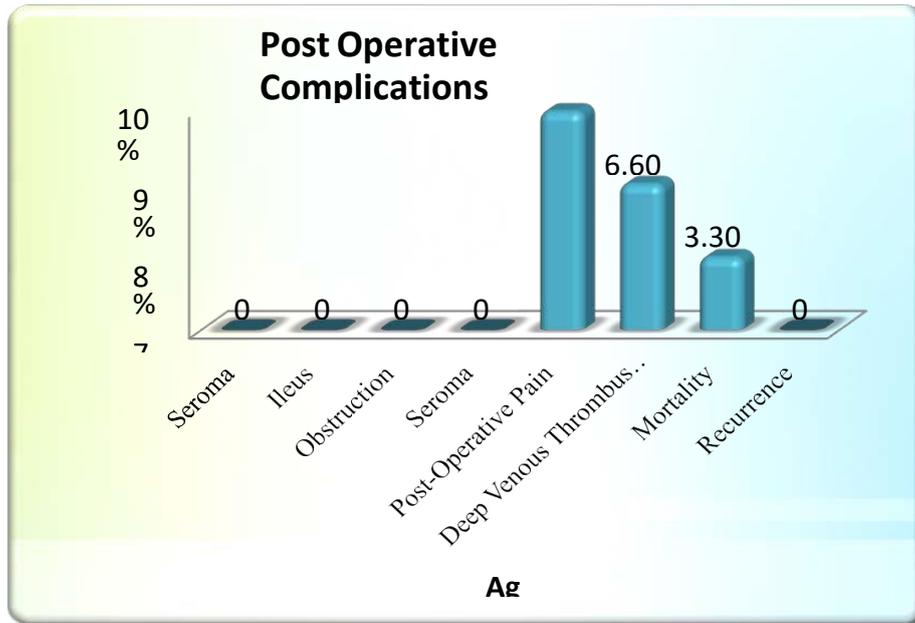
In our study, of the total 30 patients, 20 were female and 10 were male where the female outnumbered the male group and constitute about 67% of the total study population. In our study maximum number of patients were between 41-60 age group. The mean age is 47.7 with age ranging from 30-70 years. Maximum incidence is seen in incisional hernia(56%) followed by umbilical and paraumbilical hernias(36%). The hernia mostly contained omentum as content (53.3%) as content followed by bowel and omentum together constituting 40%. The most common associated medical co morbidity is respiratory insufficiency followed by hypothyroid and obesity. Average duration of stay was 3.4 days. 2 patients had to be admitted for longer duration because of complications developed intraoperative and postoperatively. Pain was assessed by Vong-balker VAS(visual analog scale) scoring system and mild pain was taken as cut off for assessment .most of the patients had very less pain by 2nd post-operative day. The incisional hernias are most commonly seen in patient who have undergone previous gastrointestinal surgeries and post-surgical site infections. One patient who had undergone sterilisation later developed port site hernia which was repaired by open mesh hernia repair came with recurrence which was repaired laparoscopically. The patient had bowel injury while adhesiolysis was done and so had increased the duration of laparoscopic surgery which caused the carbondioxide retention in the patient, postoperatively developed DVT (deep venous thrombus) and PE(pulmonary embolism) and expired. All the patients the corners were fixed with suture along with the center stitch and fixed additionally with tacker to prevent the herniation of bowel and omentum between the mesh and anterior abdominal wall. Only 1 case had to be converted to open due to bowel injury and carbondioxide narcosis due to longer duration of pneumoperitoneum. Maximum number of patients were satisfied only 2 patients were not

satisfied because of the postoperative complications which has substantially raised the cost of the treatment and one patient had mortality









VI. DISCUSSION:

The management of ventral hernias include open anatomical ventral hernia repair, mesh hernioplasty, component separation techniques if the defect are large and under tension and newer techniques like laparoscopic intraperitoneal onlay meshrepair are being used recently.

The minimal invasive technique or the laparoscopic techniques have upper hand in decreased morbidity and very good patient compliance and minimal scaring.It also has added benefits of less hospital stay and less chance of mesh infection.

So the laparoscopic hernia repair is being steadily accepted as a better alternative by patients as well as surgeons.

In our study, 30 patients who presented to surgical OPD with ventral hernias (excluding inguinal hernias) were studied.

In the present study the majority of the ventral hernias were seen in female intheir reproductive age group who have undergone previous gynaecological operationor gastrointestinal operation with a lower abdominal scar .The lower abdominal hernia repair has technical difficulty due to less space for mesh fixation due to proximity to bladder and major vessels. Mean age in the present study is 47.7 ranging from 30 to 70 age group

In our study the commonest risk factor for ventral hernia is previous history of abdominal surgery

(incisional hernia) which was seen in 17 (56%) patients followed by umbilical and paraumbilical hernias, of which post op infection in previous surgery was seen in 7. Other risk factors were chronic cough (7), constipation (2), smoking (5), prostatism (2), trauma (1), metabolic abnormality (3- one who suffered with obesity and hypothyroidism and 3 with only obesity (BMI- >30)). Few patients had multiple risk factors like cough and smoking together in 4 patients and cough, prostatism and smoking in 1 patient, cough and previous history of surgery in 1 patient and smoking, cough and previous history of surgery in 1 patient. The mean BMI is 25.9, ranging from 22-36 kg/m². In the study by CD Mann et al (2015) and Basseri et al, it was put forth that large defect and more BMI are factors which increase the recurrence rate.

In the present study, Maximum incidence of incisional hernias occurred in lower midline (30%) followed by upper midline (23.3%) especially those who have undergone gynaecological procedures and gastrointestinal procedures.

In the present study, Maximum number of patients fall into defect size of 4- 10cm, followed by patients with large defects of more than 10 cm. These patients had concurrent wound infection of previous surgeries leading to wound dehiscence. The patients who had multiple defects (30%) usually had history of prior abdominal surgery or post-surgical wound site infection. The mean defect size is 59.8 cm². With defect size ranging from 20 cm² to 120 cm².

Large ventral hernias had more chance of recurrence and at least a mesh overlap of more than 5 cm is required to decrease the recurrence rate as per the SAGES guidelines as well as the study conducted by Le Blanc et al in year 2015 and Nardi M JR et al in year 2017 which was practised in our study.

In the present study, the patients who underwent previous laparotomy for various reasons developed adhesions though they have not lead to obstructions in any of our cases. But the adhesiolysis has significantly increased the overall operative duration of surgery and the mean duration of surgery 95.1 min. though the duration of surgery ranged from 80 min to 200 min. most of the surgery (60%) took less than 2 hours to complete correlating with the studies conducted by B Todd Heniford et al (2000), Martona G et al (2007).

The duration of surgery is effected by various factors, the larger the defect the more time has taken, the more adhesions as in case of post perforation has taken more time, and the ease of performing surgery has improved with learning curve and consumed less time after performing more surgeries.

In the present study, various sized polypropylene mesh made by MERYL INDIA were used, depending on defect size. Various previous studies have used prosthetic biomaterials like ventralax, micromesh, dualmesh, sepramesh and marlex long with polypropylene meshes though these studies didn't show significant difference in outcome. Studies by LeBlanc et al on transfascial fixation, the one with transfascial fixation along with tacker and one group without the transfascial sutures (i.e, only tacker). The recurrence rate is less from 9% to 4% which is attributed to transfascial sutures. The mean polypropylene mesh used is 216.6 cm² ranging from 100-400 cm²

The associated preoperative comorbid conditions have resulted in intraoperative as well as postoperative morbidity in patients. About 23.3 % of patients had chronic obstructive pulmonary disease (COPD) of which one of the patient had previous history of laparotomy for gynaecological pathology and had adhesions which further increased the duration of surgery (CO₂ retention) and also lead to small bowel injury and post operatively managed in Intensive care unit, she further developed Deep venous thrombosis (DVT) leading to pulmonary embolism and death of patient. One more elderly female with COPD developed DVT and pulmonary embolism post operatively but has recovered well and was discharged. In the study by JM Peronne et al (2005) there was perforation of bowel (3.3%) and resulted in death of patient secondary to sepsis.

In the present study, of the 30 cases, in 29 cases hernia was repaired by laparoscopic technique and 1 case had to be converted to open technique because of small bowel injury which has primarily repaired and the hernia was anatomically repaired making the conversion rate to be 3.3%. This is consistent with various studies by Martorana G (2007) (3.6%) and CD mann et al (2015) (2.8%).

These complications suggest that appropriate patient selection is must for laparoscopic repairs as the duration of surgery is more and so there is high chances of CO₂ retention due to prolonged pneumoperitoneum and can lead to postoperative DVT and pulmonary embolism due to longer duration of surgeries.

These morbidity lead to further increase in total expenditure of procedure in managing the morbidity and duration of hospitalisation and further decreasing the patient satisfaction and compliance to the procedure.

One of the benefit of laparoscopic repair is less wound infections. The incidence of wound infections in open technique was around 3.5-18% and in laparoscopic repair it is around 2% as per the study conducted by M.C.Misra et al (2006). In our present study there were no cases of wound infections in laparoscopic repair.

In the present study, the average duration of hospital stay is 3.4 days (range 3- 9 days). Most of the patients were discharged by 3rd postoperative day but 2 patients have increased duration of hospital stay because of postoperative morbidity, these are consistent with studies conducted by M C Misra et al (2006).

In the present study, the average duration of pain was 1.4 days. Pain was assessed by Vong-balker VAS (visual analog scale) scoring system and mild pain was taken as cut off for assessment. Most of the patients had very less pain by 2nd post-operative day.

In various guidelines by SAGES (society of American gastrointestinal and endoscopic surgeons of india) which has analysed the four meta-analysis regarding the efficacy of laparoscopic ventral hernia repair and open ventral hernia repair and has concluded that there is less recurrence and wound infections in comparison to the open ventral hernia repair (consistent with Yanyan Zhang et al (2004)).one RCT has even concluded that 5 day quicker return to work after laparoscopic repair of hernia. The patients in our study were usually discharged on postoperative day 3.

In our present study there no cases of recurrence of hernia. Mean period of follow up is 11.9 months. The follow up ranges from 19 months to 5 months.

VII. CONCLUSIONS

From the present study, it can be concluded that:

1. Ventral abdominal hernias mainly present in middle age group and mostly after previous history of surgery.
2. Laparoscopic repair have early recovery, less wound infections, less recurrence and has more patient compliance.
3. As the duration of surgery is longer ,appropriate choice of patients is necessary to prevent morbidity of patients
4. The size of defect increases the size of the polypropylene mesh used and further the duration of surgery.
5. Previous surgeries have increased the duration of surgery as there was need of adhesiolysis in many cases.
6. With the learning curve the duration of surgery has reduced and the morbidity has reduced.
7. Since the cost of the procedure is high, the affordability is less.

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