

Laparoscopic versus open repair of ventral hernia

Dr. Fadhil Yaba Muhamed. M.B.Ch.B; H.D.G.S; D.MAS.

GENERAL SURGEON MANAGER OF SORAN PUBLIC HOSPITAL
MEMBER KURDISTAN MEDICAL ASSOCIATION
MEMBER WORLD ASSOCIATION OF LAPAROSCOPIC SURGEON
ERBIL
IRAQ

Prof. Dr. R. K. Mishra; M.MAS; MRCS.

SENIOR CONSULTANT LAPAROSCOPIC SURGEON
DIRECTOR, LAPAROSCOPY HOSPITAL, NEW DELHI
MEMBER WORLD ASSOCIATION OF LAPAROSCOPIC SURGEON (WALS)
MEMBER INDIAN ASSOCIATION OF GASTROINTESTINAL ENDOSURGEONS (IAGES)
MEMBER SOCIETY OF AMERICAN GASTROINTESTINAL AND ENDOSCOPIC SURGEONS (SAGES)

Project to be submitted towards completion of Diploma in Minimal Access Surgery

Abstract :

Ventral hernia (VH) occur as a result of weakness in the musculofacial layer of anterior abdominal wall, the most popular classifications are congenital, acquired, incisional & traumatic [1]. According to several medical literatures the successful series of laparoscopic repair for (VH) were done by LeBlanc in 1993. Since then it has been proved that to be accepted surgical technique. New standards have been noted for various indication, contraindication, light mesh in incisional hernia, which is considered as a common surgical complication with long term incidence of 10 - 20% and controversies in laparoscopic repair ,operative costs may be optimized with selection of mesh& optimal use of trans-abdominal suture & fixation device .This review article reveals the recent advances & progression in laparoscopic ventral hernia repair technique even in patient with morbid obesity & old adult with incisional hernia.

Key words:

Ventral hernia, incisional hernia, open mesh repair, laparoscopic mesh repair, obesity & laparoscopic repair of Ventral Hernia, choice of mesh, Laparoscopic Repair of Ventral Hernia, Post-surgical ventral hernia.

Aims:

The aim of this article is to compare the effectiveness and safety of laparoscopic and open repair of Ventral Hernia to discuss important controversial issues for both procedures.

- 1.Patient selection.
- 2.Technique and operative care for Laparoscopic Repair of Ventral Hernia
- 3.Operative time of Laparoscopic Repair of Ventral Hernia
- 4.Intraoperative and postoperative complication
- 5.Postoperative pain and amount of different drugs used

6. Time until resumption of diet and movement.
7. Postoperative morbidity.
8. Length of hospital stay
9. Cost effectiveness and mesh selection
10. Quality of life analysis
11. Postoperative readmission.
12. Recurrence and re-recurrence after both procedures.

Materials and Methods:

A literature search was performed using search engine Google and our online facility of SpringerLink. The following search terms were used. Laparoscopic versus ventral hernia repair, 'laparoscopic repair of ventral hernia, controversies in laparoscopic ventral hernia repair, comparison of laparoscopic and open (Ventral Hernia) repair, Laparoscopic Repair of Ventral Hernia during obesity, value of CT scan in postoperative Laparoscopic Repair of Ventral Hernia. About 143 citations found in total. Criteria for selection of accepted procedures were selected) and centers where the study was done (specialized center for laparoscopic surgery).

Indication for Laparoscopic Repair of Ventral Hernia:

1. Ventral hernia more than 3 cm size.
2. Obesity and recurrent incisional hernia even in small size.
3. 'Swiss cheese type hernia, because more clear laparoscopically.

Contraindications:

1. Multiple scars on the abdominal wall which make intra-peritoneal access difficult.
2. Large defect where 3 to 5 cm mesh overlap is not possible intra-abdominally.
3. Patient with large amount of redundant skin and fat on the abdominal wall are better suited for abdominoplasty procedures.
4. Infection and peritonitis.
5. Acute and Sub acute intestinal obstruction.
6. Severe cardiopulmonary disease.
7. Portal hypertension.

Risk factors:

Morbid obesity, Prostatism, Chronic cough, wound infection, large incision, malnutrition are considered as risk factor for (Ventral Hernia) and incisional hernia.[11].

Diagnosis of Ventral Hernia:

The diagnosis is mainly clinical, symptoms and signs include bulging in anterior abdominal area, often painless but may cause discomfort or may be tender during straining physical effort such as lifting heavy objects, coughing or straining during micturition and bowel movement, bulge disappear when the patient lying down and more visible when standing up, in spite of visible previous scar in lower abdomen specially after gynecological procedures, some may complain of sign and symptoms of intestinal obstruction when part of bowel or omentum trapped in to the hernia sac causing adhesion and irreducibility, it depends upon type of Ventral Hernia whether it is epigastric, para-umbilical, incisional or suprapubic etc. Although the role of CT scan should not be forgotten in diagnosis of vague ventral hernia.

Evolution of Laparoscopic Repair of Ventral Hernia:

Laparoscopic Repair of Ventral Hernia is being done at a time when laparoscopic appendectomy and cholecystectomy has shown definite benefit over open procedures. Although technically demanding and time consuming [9], it is safe and feasible. With introduction of different prosthetic mesh and great improvement in the laparoscopic techniques, it is hoped that an improvement in the complication rate would be realized. Increasing application of laparoscopic surgery all over the world indicate that these goals might indeed be achieved, however there is many controversies but laparoscopic surgery continue to evolve latest development with regard to Laparoscopic Repair of Ventral Hernia and there is more data in the literatures available compared to the past due to increased popularity of this procedures.

Morbid Obesity and Laparoscopic Repair of Ventral Hernia:

Many literatures reveal that the patient who are morbidly obese have been considered as a poor surgical candidate for Laparoscopic Repair of Ventral Hernia because of their associated co morbidities and increased risk of post operative wound infection and hernia recurrence [3], especially when body mass index BMI exceeding 40. But according to one prospective study in one group of morbid obese patient there were 16 patient most of them women with BMI 40 to 60 and with age between 25 to 68 years. The operative time and length of stay in the hospital tends to be longer than other groups of less BMI. There were only minor postoperative complication and no recurrence during follow-up period of 1 to 35 months and shows Laparoscopic Repair of Ventral Hernia in morbid obese patient safe, feasible and could be done with minimal morbidity. Careful review of this article show no increase in operative mortality. Both lap chole and lap appendectomy have proved to be preferred procedure in obese patient [3] improved instrument design have made laparoscopic procedures technically more feasible and safe in obese patient. That's why now a day among surgeons Laparoscopic Repair of Ventral Hernia is popular because it is safe, effective with reduced hospital stay and quicker recovery time. It also evaluate clinically occult hernia in obese patient like 'swiss cheese type'. Some study have listed seroma as frequent complication of this procedures in morbidly obese patient.

Patient with morbid obese may face some technical problem in access, but it has been noted that putting veress needle in palmer's point is safe and effective as this area generally free from intra-abdominal adhesion to create pneumoperitoneum and trocar should be perpendicular to the abdominal wall to minimize the distance in between. It is useful to use counter pressure on hernia sac and anterior abdominal wall during securing the tacks and to lower intra abdominal pressure to 8 to 12 mmHg because this allows easier anterior abdominal wall manipulation. Finally this literature shows that Laparoscopic Repair of Ventral Hernia is preferable than open in terms of fewer wound complications, reduced peri-operative mortality, diagnosis of multiple occult hernia which can be missed during open procedures and low recurrent rate.[3].

Operative procedures:

In comparison articles both procedures used open and laparoscopic, in one article 469 (57%) laparoscopic compared with 415 (47%) open procedures in other article 66 patients 33 under laparoscopic and other 33 by open techniques.

Open mesh techniques:

Open surgical technique popularized by Rives, Stoppa and Wantz [7].

After taking patients to operative theater and under general anaesthesia, endotracheal intubation and close monitoring operation started. Foley's catheter was put for patient with lower abdominal ventral hernia repair and Nasogastric tube for upper abdominal hernia repair with perioperative single dose antibiotic in form of cefotaxime [5]. Then after proper cleaning, painting and draping of abdomen the skin incision made according to site and size of defect, subcutaneous flap raised up to 3 to 5 cm around the defect, the hernial sac found, contents reduced back then posterior rectus sheath and muscle dissected and between rectus muscle and peritoneum in lower abdomen. Posterior rectus and peritoneum closed primarily with 2:0 absorbable suture, then polypropylene mesh of suitable size with minimum of 3 cm overlap beyond the margin of defect is placed over posterior rectus sheath / peritoneum and rectus muscle, then fixed in four corners with 2:0 propylene sutures and taken out through abdominal muscle on the anterior rectus sheath, anterior rectus sheath closed over the mesh with a loop of polypropylene or nylon without tension, then skin closed over the drain depending upon size and extension of the wound [5].

Laparoscopic repair of ventral hernia:

Almost all types of Ventral Hernia can be repaired by minimal access surgical techniques and it should be clear to the patient that laparoscopic repair will not help cosmetically if the skin is lax, hanging loosely in large hernia. In Laparoscopic Repair of Ventral Hernia evacuation of urinary bladder in lower abdominal surgery and Nasogastric tube in upper abdominal surgery is a must, because in most cases the access is through Palmer's point 2 to 3 cm below left costal margin in mid clavicle line. Bowel should be prepared to make more room in abdominal cavity. Laparoscopic Repair of Ventral Hernia can be done with various methods either intraperitoneal or extraperitoneal.

Anaesthesia:

General anaesthesia with endotracheal intubation, close monitoring, I.V. cannula and proper water and electrolyte balance.

Patient position:

Supine position without any tilt, so that the bowel is distributed evenly [2]

Position of surgical team:

Surgeon stand left to the patient with camera man on his left or right depending upon the location of ventral hernia, if the hernia is below umbilicus the camera operator stands right to the surgeon and if the defect is above umbilicus camera operator should stand left to the surgeon. Monitor should be placed opposite to surgeon and instrument trolley should be toward leg of the patient.

Port position:

Port placement technique

The patient should be cleaned, painted and draped with checking light cable, insufflation tube, electro surgical cautery wires, suction irrigation tube and veress needle for spring action and patency with focusing and white balancing, then pneumoperitoneum is created by veress needle in the left hypochondria usually (should be no splenomegaly) other site can be selected like right hypochondrium (no hepatomegaly), flank or iliac fossa. Once pneumoperitoneum created then 10mm port and cannula to be put after desirable insufflation another one 5 mm port and 10mm port according to Baseball diamond concept put under vision ,after diagnostic laparoscopy the procedure started if there is any adhesion careful Adhesiolysis is performed and content of sac returned back which is either omentum or bowel then the extent of defect assessed thoroughly then measurement of the defect drawn on the external surface of anterior abdominal wall and adequate size mesh that cover the whole defect and overlapping up to 3 to 5cm from the edge of the defect selected, all the necessary precaution to be taken to avoid contamination of the mesh with skin pathogens, then the mesh rolled and inserted in port of adequate caliber to the abdominal cavity, then mesh unrolled and fixed by means of Tacker, Protack, or Endoanchor to abdominal wall with out dissecting peritoneum this is called onlay technique. Finally the omentum is laid over the under lying bowel loops to prevent direct contact with the mesh, some article prefer onlay procedures because where the rise in intra-abdominal pressure is totally diffused a long each square inch of the mesh and not along suture line and this pressure helps to keep the mesh in place rather than displace. After completing the procedure the ports withdrawn under vision and telescope port last to be removed with keeping some instrument or telescope by itself inside to prevent traction of any part of omentum or bowel. Ports of 10mm better to be repaired because cases of incisional hernia or re recurrence reported in some articles ,however numerous variations described but surgical principles are constant regarding access in ventral hernia .Recently two port laparoscopic ventral hernia repair reported [6].

Trans abdominal extra peritoneal repair:

Here mesh is placed in between peritoneum and muscular layer to prevent adhesion (inlay procedure) access principle are same as onlay apart from dissecting peritoneum to make a space.

Choice of mesh:

To repair the hernia laparoscopically meshes under go many changes over the last several years, in general the ideal mesh is characterized by economic aspects, functionality, and operative handling, sterility or even anti infective and optimized biocompatibility [8] and all seek to achieve two goals [1] [8].

1.Rapid and permanent ingrowth in to the prosthesis

2.Diminution of the risk of intestinal adhesion

There are two type of mesh synthetic and collagen based in most article ePTFE (expanded polytetrafluroethylene) were used with polypropylene, because of a low affinity for adhesion, the PTFE mesh is probably the first choice for intraperitoneal position of the prosthesis [8]. In summary the use of mesh can reduce the recurrence rate from 40 to 50% to about 10% only [1].

Ventral hernia and operation characteristics:

The most frequent content of hernial sac in most articles was omentum and there were no intra-operative complication such as bowel or vascular injury requiring conversion to open technique [5] and significantly there were no much blood loss, no patient required blood transfusion ,closed suction tube put more for open procedures ,only one patient in all articles had drain placed in the abdominal cavity to drain blood and irrigation fluid in laparoscopic repair. Majority of incisional hernias in lower abdomen were due to gynecological operations and primary ventral hernias were located at or around umbilicus.

Postoperative pain:

There were no significant difference in pain score or analgesia requirement in both procedures in first 24 hours postoperatively [5] [7]. The lack of difference during this period may be due to use of tackers but after 72 hrs the pain is decrease in laparoscopic repair and persistent pain at 6 to 12 months was similar in both groups of patient, they referred to pain clinic during follow-up. They got benefit from lidocain injection, Triamcinolone injection and Tricyclic antidepressant.

Hospital stay:

The mean hospital stay was shorter comparing to open groups, ranging between 1 to 3 days and statistically the difference was highly significant. [2] [3] [4] [7] [11].

Postoperative complication:

1.Wound infection.

Wound related infection in minority of cases of laparoscopic repair and few of them required drainage and antibiotic cover in comparison with open cases.

2.Mesh infection.

Mesh infection were very low when compared to open, skin pathogens responsible for most of infection. Infection with polypropylene mesh can be managed locally but infection with ePTFE need removal of mesh [1] [12].

3.Seroma formation.

It develops above the mesh and within retained hernia sac, the mean incidence at 4 to 8 weeks 11.4% [1]. It rarely result in long term problems, only aspiration may be recommended for those enlarge or persist before they reach large size. Some article do not prefer aspiration because it may introduce infection. The patient should be well informed about this problem preoperatively.

4.Recurrence

The incidence of recurrence of Ventral Hernia described in these literatures is decreasing depending upon treatment of infection, adequate mesh fixation, adequate overlap, diagnosing missed hernias laparoscopically, however few cases of re-recurrence were reported in some articles and readmission for another repair arranged.

5.Chronic pain

After Laparoscopic Repair of Ventral Hernia chronic pain at suture site is not uncommon, in some articles up to 1_3% [1]. A possible explanation may be due to transabdominal suture entrap on intercostals nerves as its courses through abdominal muscles and local ischaemia of the port is another possibility, treatment is by NSAID and local anesthetic injection.

6.Postoperative morbidity

Causes are due to unrecognized enterotomy, wound infection, intraperitoneal abscess, respiratory failure, such complication already increase hospital stay and cost effectiveness[11].

Value of CT scan after Laparoscopic Repair of Ventral Hernia;

Only in few articles CT scan done for patient with Laparoscopic Repair of Ventral Hernia, preliminary results suggest that it is useful imaging in Laparoscopic Repair of Ventral Hernia follow-up. It showed the correct site of the mesh and its fixation in the abdominal wall and it can show fluid collection at the repair site even when they are not palpable [10]. moreover a recurrent hernia can be detected clearly on CT scan.

Future prospects of Laparoscopic Repair of Ventral Hernia;

It appears that in most articles there are encouraging results being reported in comparative studies with open repair, so there is no doubt in the following next years the surgeon will be able to operate through computer interface, but future of any technology depends upon application and training [2].

Conclusion:

Now a day Laparoscopic Repair of Ventral Hernia being accepted by most of surgeons and patients, almost all Ventral Hernia can be repaired by laparoscopy, regardless of morbid obesity and all age groups. It is believed that laparoscopic repair is of less post operative pain, shorter hospital stay, less wound infection, less cost, less recurrence, even possible to reduce operative time because of standardized techniques, surgeons getting more skill, use of mesh fixation devices, new mesh implantation [1] [3] [4] [5] [7]. So Laparoscopic Repair of Ventral Hernia is considered as first choice for Ventral Hernia repair regardless different minimal access and procedures.

References:

- 1.Laparoscopic repair of ventral /incisional hernias, by chowbey pradeep k, sharma anil, mehrota magan, khuller rajesh, soni vandana, baijal manish, minimal access surgery & bariatric surgery center, Sir Ganga Ram Hospital, New Delhi 110060,India.
- 2.Text book of laparoscopic surgery part 2 procedures by Prof. Dr. R. K. Mishra M.MAS ,MRCS (U.K).
- 3.Obesity &laparoscopic repair of ventral hernia. G.Birgison'1', A.E.Part,'1' M.J.Mastrangelo'1'. D.B.Witzke'2'.U.B.Chu'1'. Department of surgery, university of Kentucky chandler medical center, Lexington, KY, USA. Department of pathology, university of Kentucky chandler medical center, Lexington, KY, USA.
- 4.Laparoscopic versus open incisional hernia repair. D.Earle, N.seymour, E.Fellinger, A.perez.Department of surgery , baystate medical center, Tufts university school of medicine,759 chestnut street, spring field MA 01199,USA.
- 5.Comparison of laparoscopic and open repair of incisional and primary ventral hernia: results of prospective randomized study. M.C.misra,V.K.bansal, M.P.kulkarni, D.Kpawar.Department of surgical discipline and anaesthesiology ,All India institute of medical science, 5th floor romm No.5031,Teaching Block, New Delhi 110029 India.
- 6.Two port laparoscopic repair of ventral hernia by Prof. Dr. R. K. Mishra M.MAS .MRCS (UK). http://www.laparoscopyhospital.com/two_port_repair_of_ventral_hernia.htm
- 7.Laparoscopic versus open ventral hernia mesh repair: prospective study D.lomanto, S.G.lyer, A,shabber, W.K. cheah. Minimally invasive surgical center, Department of surgery, National university hospital,5 floor kent ridge road, Singapore 119074, Singapore.
- 8.Light weight meshes in incisional hernia repair. Schumpelick Volker, Klinge uwe, Rosche Raphael, Junge karsten. Department of surgery ,university hospital Aachen, Germany.
- 9.The laparoscopic repair of suprapubic ventral hernia. A.M.carbonell,K.B.kercher,B.D.Matthews,R.F.sing,W.S.cobb,B.T.Heniford. Carolinas laparoscopic and advanced surgery program, Department of general surgery, Carolinas medical center,1000Blyth Boulevard MEB #601.charlotte, NC28203 USA.

10. Value of CT scan after laparoscopic repair of post surgical ventral hernia. K.Gossios¹, A.Zikou¹, P.vasakas¹, G.passas¹, A.Glantzounis¹, D. Kontogiannis², E.Tsimoyiannis², 1.Department of radiology , General hospital of Ioannina, Makriyianni str.45001, Ioannina, Greece. 2. Department of surgery, General hospital of Ioannina, Makriyianni str.45001 Ioannina, Greece.

11. Art of laparoscopic surgery. Text book and Atlas 2007. Volume two section x11 hernia laparoscopic repair of ventral hernia by: Prof.C.Palanivelu MS, DNB, MCh, (GE), FRCS Ed, FACS. Chairman, Division of surgical Gastroenterology and minimal access surgery. Director, Digestive Disease Research and national training institute. GEM Hospital, Combatores.

12. Controversies in laparoscopic repair of incisional hernia. Sarela Abeezar, consultant in upper GI and minimally invasive surgery, Hon. senior lecturer in surgery, The general infirmary at Leeds, the university of Leeds school of medicine, Leeds LS1 3EX, United Kingdom.

For more information please log on to <http://www.laparoscopyhospital.com>