

Clinical Study of Different Modalities for Management of Ventral Hernia Repair

Dr. Sameer G. Parikh¹, Dr. Jainam K. Shah², Dr. Viraj D. Patel³, Dr. Yogesh N. Modiya^{4*}, Dr. Keyur N. Surti⁵, Dr. Nilesh J. Patel⁶

^{1,2,6} Associate Professor, Department of General Surgery, Smt. NHL Municipal Medical College, Ahmedabad.

³ Senior Resident, Department of General Surgery, Smt. NHL Municipal Medical College, Ahmedabad

⁴ Assistant Professor, Department of General Surgery, Smt. NHL Municipal Medical College, Ahmedabad.

Corresponding Author: Dr. Yogesh N. Modiya

Email: yogeshmodiya1984@gmail.com



Abstract

Background: Various Surgical modalities and Prosthetic mesh placement used for management in ventral hernia -requires scrutiny in the term of indications, recurrence rate to give benefit to patient. Their relevance and validity require to be assessed in present era. **Material & Method:** The study was carried out on patients admitted in municipal general hospitals of Ahmedabad .100 patients were observed and data were collected in the prescribed performa consisting details of patient's history, clinical diagnosis based on inspection and palpation, eti-pathological findings, radiological findings, operative findings, post operative outcome. **Results:** Observation and analysis of the data of present series was interesting and important aspects were compared with standard methods. Post operative wound infection & sepsis was important cause for development of Incisional hernias. **Conclusion:** Mesh repair is the technique of choice for most of Incisional hernias and for all ventral hernias with large defect and obesity.

Key words: Hernia, Ventral, Mesh

Introduction:

“No disease of the human body belonging to the province of the Surgeon requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than Hernia in all its varieties”: Sir Astley Paston Cooper. Abdominal wall hernias are a familiar surgical problem. Millions of patients are affected each year, presenting most commonly with primary ventral, incisional, and inguinal hernias. Whether symptomatic or asymptomatic, hernias commonly cause pain to patients. These concerns, coupled with the risk of incarceration, are the most common reasons patients seek surgical repair of hernias.

Advances in the basic and clinical sciences have allowed a better understanding of the pathophysiology of hernia formation¹. It is known, for example, based on Pascal's principle of hydrostatic forces and the law of Laplace that a hernia will continue to enlarge over time if not treated. Increased intra-abdominal pressure will exert its greatest force on the portion of the wall that is thinnest. As the hernia enlarges, the

wall thins at that point, and the diameter increases. This positive feedback loop virtually assures continued progression.

The presence of a ventral hernia is itself, an indication for repair when no substantial co morbid conditions exist. Elective ventral and incisional hernia repair are undertaken largely to alleviate symptoms and to prevent hernia incarceration with subsequent strangulation of the intestine. It is estimated that about 10-20% of all ventral hernias result in incarceration, although the actual percentage is not known¹⁷.

The field of hernia repair has evolved as a result of surgical innovation and has benefited significantly from technologic improvements. The tension-free repair is one of the key concepts that have revolutionized hernia surgery². Currently incisional hernias are repaired by mesh placement based on surgeon's preference intraoperatively. The use of mesh prosthesis to approximate the fascial defect has resulted in a decrease in recurrence rates for inguinal and incisional hernias. More recently, laparoscopic approaches to the inguinal and incisional hernia have extended the options and approaches for repairing the fascial defect⁴.

The Stoppa repair used a large mesh in the preperitoneal space to support the fascial defect, which is the concept upon which the laparoscopic inguinal hernia repair is based. Contemporary repair of abdominal wall hernias is supported by strong evidence and calls for a tension-free repair with placement of mesh in the majority of cases. Laparoscopic repair demands significant expertise to achieve outcomes comparable with those of open repair. In ventral incisional hernias, placement of the mesh in a sublay position has been found to be effective and to have low recurrence rate, although randomized trials have not been performed.

Aim

The Aims and Objectives of the study are: (1) To study the Patho-physiology of ventral hernia occurrence. (2) To identify risk factors & predisposing factors of ventral hernia. (3) To study the modes of presentations. (4) To study and assess effectiveness and outcome of different surgical modalities of management of ventral hernia. (5) To study Post-operative complications- morbidity. The study and conclusions are important in the sense of assessing various aspects in context of present time.

Material and Method

During the two-year period between May 2018 and May 2020, 100 patients with ventral hernia were studied after taking written and informed consent at one of Ahmedabad's municipal general hospitals.

All the patients were fulfilling following

Inclusion criteria:

- All patients above the age of 10years.
- Ventral hernias other than mention in exclusion criteria.

Exclusion criteria:

- Congenital hernias
- Parastomal hernias
- Groin hernias
- Supravesical hernias

The patients related factor age, sex, multi parity, obesity, cough/COPD, constipation, prostatism, diabetes mellitus, hyper tension, steroid therapy, consumption of tobacco and alcohol, past surgical history were recorded. Routine investigations viz Hematology, Urine examination, chest x-ray, ECG, Ultrasound abdomen and Pelvis for all patients and other special investigations were done for associated diseases wherever required.

Preoperative prophylactic broad spectrum antibiotic⁵ - injection ceftriaxone (dose according to weight) was given 45 minutes before surgery. All the patients received - standard care for preoperative

anesthesia risk assessment. Patients were assigned to undergo suture repair or mesh repair at operating surgeon's discretion.

In primary repair, continuous stitches with stitch width and interval of approximately 1cm was kept using polypropylene (prolene no. 1). The decision whether to do herniorrhaphy or hernioplasty depends on intraoperative findings like defect size, integrity of surrounding structures.

In hernioplasty, Prolen mesh was used with atleast 4cm of mesh overlapping the edges of the facial defect and secured with no.1 prolene interrupted stitches over the fascia.

On lay mesh repair was done in 9% patients, Retro rectus mesh repair in 30% patients, Pre-peritoneal repair in 33% patients and 2% patients required component separation.

Suction drain was used for all patients with incisional hernia and drain was removed after 48 to 72 hours interval or when the drain output decreases. Sutures were removed on POD 10

The goals of hernia repair should be as follows:

- * Prevention of visceral eventrations
- * Incorporation of the remaining abdominal wall in the repair
- * Provision of dynamic muscular support
- * Restoration of abdominal wall continuity in a tension-free manner

Results

Ventral hernias constituted – 53.76 % of all the varieties of abdominal wall hernias.

Table 1: Distribution of various types of ventral hernia

SN	Type of Hernia	No. of patients	Percentage
1	Incisional	40	40%
2	Umbilical	45	45%
3	Epigastric	8	8%
4	Spigelian hernia	3	3%
5	Other Rare Hernias	4	4%
	Total	100	100%

Distribution of ventral hernias with respect to age and sex is as shown in table-2.

Table 2: Age group – Sex correlation of patients

Age in yrs	Male		Female		Total	
	No. of patients	Percentage	No. of patients	Percentage	No. of patients	Percentage
11-20	0	0%	2	2.6%	2	2%
21-30	3	12.5%	12	15.8%	15	15%
31-40	5	20.9%	16	21.0%	21	21%
41-50	8	33.3%	19	25%	27	27%
51-60	5	20.9%	13	17.1%	18	18%
61-70	2	8.3%	09	11.9%	11	11%
>71	1	4.1%	05	6.6%	06	6%
Total	24	100%	76	100%	100	100%

Common presenting symptoms of ventral hernias were swelling in 70 patients, pain in 7 patients and 23 patients presented with both pain and swelling.

Commonest complications at the time of presentation of ventral hernias were irreducibility (6 patients), obstruction (4 patients), strangulation (2 patients), though most of them were uncomplicated (88 patients).

Types of incisions more prone for the development of ventral hernias ie resulting in incisional hernias are as shown in the table-3.

88 cases were treated by Open surgical repair and 12 cases out of 100 were treated by laparoscopic approach.

Table 3: Types of incisions resulting in ventral hernias

Type of Incision	No. of patients	Percentage
Upper Mid Line	6	15%
Lower Mid Line	15	37.5%
Tubectomy	5	12.5%
Upper Para median	4	10%
Lower Para median	0	0%
Pfannenstiel	8	20%
Grid Iron	1	2.5%
Sub Costal	1	2.5%
Total	40	100%

Table 4: Types of Open surgical ventral hernia repair

Type of Repair	No. of patients	Percentage
Mayo's repair	11	12%
Primary suturing	12	14%
On Lay mesh repair	8	9%
Retro rectus mesh repair	26	30%
Pre-peritoneal repair	29	33%
Component separation	2	2%
Total	88	100%

In Laparoscopic hernia repair 6 patients treated with Total Extra Peritoneal approach (TEP), 2 patients with Transabdominal Pre-Peritoneal (TAPP) procedure, and 4 patients with Intra Peritoneal On lay Meshplasty (IPOM).

There were no post-operative deaths, no major cardiovascular, pulmonary complications. One patient with Incisional hernia in umbilical region (developed as result of previous emergency Laparotomy and ileostomy for perforation peritonitis -7 years back, closure of ileostomy a year later) underwent on lay mesh repair. He developed wound dehiscence where sheath was separated for which secondary suturing was done. Another patient with Incisional hernia in Epigastric and umbilical region (developed after emergency Laparotomy) underwent Retro rectus mesh repair developed mesh infection and mesh was removed on fourth post operative week. Later full thickness grafting was done to close the defect.

Laparoscopic hernia repair patients did not develop any significant complication during the course of two years of study. Mean duration of hospital stay was 6 days (range 3-25 days) shortest stay was seen in patients treated by laparoscopic approach in workshop held in the institute. Longest duration of stay was seen with those who developed complications. Follow up of patients was done at interval of 1, 6, 12, 18 months.

Discussion

Ventral hernias are a familiar surgical problem. Millions of patients are affected each year, in incidence it is second only to inguinal hernias, accounting for 25-35 % of all hernias. Ventral hernias include Incisional and primary defects in the abdominal fascia, which can cause umbilical, epigastric, or spigelian hernias⁶. In adults, incisional hernias account for 80% or more of ventral hernias that surgeons repair. The prevalence of Incisional hernias after Laparotomy is 2% to 11% and increases substantially when certain risk factors for postoperative Incisional hernia, such as a wound infection or obesity, are present.

In our study ventral hernias constituted 53.76% and Incisional hernias 21.5% of all hernias. This is comparable to Hodgson N.C. F et, al and Robert J.Baker series⁷.

The overall sex ratio distribution ventral hernias showed that both sexes were affected equally however with respect to Incisional hernias female to male ratio was 2.3:1 (28 females (70%) patients, and 12(30%) males). Ellis H. et.al. have obtained 64.6% female population in their study of 342 patients⁸. This female preponderance of Incisional hernias could be due to relatively high frequency of employing lower midline incisions notoriously prone for herniation in women who undergo surgery for pelvic organ pathology. With respect to umbilical hernia female preponderance was seen with 36 females and 9 males with ratio of 4:1. For epigastric hernia female to male ratio of 4:1 was obtained with 8 females and 2 males are affected respectively.

Majority of the patients who underwent gynecological procedures (65%) namely Tubectomy – 12.5%, LSCS - 20%, hysterectomy – 32.5% developed incisional hernia through lower midline incisions. 22.5% of the patients who underwent Laparotomy for perforation peritonitis developed Incisional hernia.

Time of onset of hernia following previous surgery: In our study 35% of Incisional hernias developed within 6 months. 20% between 6 months to 1 yr and 22.5% between 1 to 5 yrs, 12.5% between 5 to 10 years and 10% after 10 years. Hence 65% of hernias developed within 1st year of surgery.

Modes of presentation: In our study swelling was the most common complaint (91%, i.e. 91 patients) followed by swelling with pain (23%, i.e. 23 patients); lastly pain alone (09%, i.e. 9 patients). Most of the ventral hernias were uncomplicated at the time of presentation. In our study 88% were uncomplicated (88 cases), 6% i.e. 6 cases presented with irreducibility, 4% i.e. 4 cases with obstruction, and 2% i.e. 2 cases with strangulation. Incisional hernia can cause pain and may lead to serious condition, such as incarceration (6-15%) or strangulation of bowel (2%) (Riet M. et al. 2002)⁹.

Associated risk factors and illness: Anemia, diabetes mellitus, obesity, alcoholism, smoking has been associated with high percentage of post-operative hernias (Jack Abrahamson). In our study 26% i.e. 26 patients were anemic, 23% i.e. 23 were diabetic, 48% i.e. 48 was obese, 16% i.e. 16 were smokers and 4% i.e. 4 were alcoholic. 19.9% were diabetic, 9.3% were obese and 3.7% were immune suppressed as quoted by Rios A et al. (2001)¹⁰.

Obesity has been cited as a risk factor for acute fascial dehiscence and Incisional hernia after major abdominal operations (Millikan K W, 2003)¹¹.

Operative Procedures: In techniques for the repair of Incisional hernias in which sutures are used, the edges of defect are brought together, which may lead to excessive tension and subsequent wound dehiscence or Incisional herniation as a result of tissue ischemia and the cutting suture through the tissues. In addition prolene mesh may by inducing inflammatory response, sets up scaffolding that in turn induces the synthesis of collagen (Rebecca Knight, Michael E. Fenoglio, 2002)¹².

Defect size: The size of the fascial defect and the appearance of fascia should dictate the selection of the most appropriate method of hernia repair (Santora and Roslyn, 1993)¹³. In current study 58 (59.792%) patients had defect size up to 10 cm², 18(18.55%) had between 10 to 20 cm², 9 (9.27%) between 20 to 30 cm², 5(5.15%) between 30 to 40 cm² and 7(7.21%) more than 40 cm².

Complications: Common etiological factors responsible for recurrence after Incisional hernia repair are postoperative wound infection, suturing under tension, persistent post-operative distention, missed defects of fascia not taken into repair (false recurrence) (Matapurkar, G, B et, al 1995)¹⁴.

There were no mortality and no recurrences in our study. All complications were treated appropriately.

When choosing a mesh, the surgeon must consider the context in which it is to be used. A polypropylene or polyester mesh is usually suitable (for example. Paritien1 Light. Optilene, Mersilene). These meshes will be more comfortable and have a lower risk of infection. If the mesh is to be placed inside the peritoneal cavity, an attempt should be made to minimise adhesions by choosing a composite mesh.

Despite manufacturers' claims, the differences between the various types of these are unproven and it is currently difficult to recommend a single material. In infected wounds, an absorbable mesh is preferred, for example, polyglactin (Vicryl) or polyglycolic (Dexon). Biomaterials may also be useful in this situation if the additional cost can be justified. Finally, the surgeon should not forget that how mesh is

placed is as important as the type of mesh used. If a mesh is too small or fixed under tension, there will be complications whatever its material.

Despite the new implants available. Surgical skill still has a role in preventing hernia recurrence.

Table 5: Complications in the present study compared to others

Complications	Present study		Luijendijk ¹⁵		Korenkov M ¹⁶	
	Suture repair	Mesh repair	Suture repair	Mesh repair	Suture repair	Mesh Repair
Local						
Wound infection	7	6	0	3	0	4
Hematoma	-	-	7	-	2	-
Seromas	-	9	3	4	1	3
Suture sinus	-	-	1	-	-	-
Post operative bleeding	-	-	-	1	-	-
Enterotomy	1	-	4	-	-	-
Paralytic ileus	-	-	1	5	-	-
Mesh infection	-	2	-	-	-	-
Wound dehiscence	-	2	-	-	-	-
Enterocutaneous fistula	-	-	-	1	-	-
Systemic						
Thromboembolism	-	-	-	-	1	-
DVT	-	-	-	-	-	-
Stroke	-	-	-	-	-	-
Pneumonia	-	-	4	-	1	-
MI	-	-	1	-	-	-
UTI	-	-	3	-	-	-
Respiratory infection	-	-	-	-	1	-
Recurrence	Nil	nil	43%	24%	12.12%	7.6%
Death	-	-	-	-	-	-

Conclusion

Ventral hernias accounted for 53.76% of all hernias. Incisional hernias were most common of all ventral hernias. Most of the ventral hernias except congenital varieties presented in 3rd to 7th decades. Previous surgery or trauma was the single most important cause for ventral (Incisional) hernias. Post operative wound infection was important cause for development of Incisional hernias. Simple suture repair and or Mayo's repair was the choice of repair in hernia in young, relatively small defect size & in emergencies in all age groups. It was done for all varieties of ventral hernias with smaller defect size of 15 mm or less. Mesh repair is the technique of choice for most of Incisional hernias and for all ventral hernias with large defect and obesity. Laparoscopic approach for ventral hernia repair is definitely method of choice with the advantages of good operative field visibility, lessened duration of hospital stay, minimal post operative scar.

References

1. Richard H. Turnage, MD et.al. SECTION X – Abdomen CHAPTER 43 – “Abdominal Wall, Umbilicus, Peritoneum, Mesenteries, Omentum, and Retroperitoneum”: Sabiston Textbook of Surgery, 18th ed. 2007
2. Read RC. “Milestones in the history of hernia surgery: prosthetic repair”. *Hernia* 2004; 8(1): 8–14.
3. Courtney CA, Lee AC, Wilson C, et al. “Ventral hernia repair: a study of current practice”. *Hernia* 2003; 7(1):44–6.
4. Franklin ME Jr, Gonzalez JJ Jr, Glass JL, et al. “Laparoscopic ventral and incisional hernia repair: an 11-year experience”. *Hernia* 2004; 8(1):23–7.

5. Feltis, J.M., Hamet, H.F.: Use of prophylactic anti-microbial drugs to prevent postoperative wound infection. *Am J Surg.*1967;114:867-70.
6. Andrew N Kingsworth et.al. "Hernias umbilicus and abdominal wall", Pg no. 968-990, Bailey & Love's Short Practice of surgery 25th Edition, Hodder Arnold 2008.
7. Condon RE. "Ventral abdominal hernia". In: Baker RJ, Fischer JE, editors. *Mastery of surgery*. 4th edition. Philadelphia: Lippincott Williams & Wilkins; 2001.
8. Lang B, Lau H, Lee F. "Epigastric hernia and its etiology". *Hernia* 2002; 6(3):148–50.
9. Riet M. Van't et.al, 2002 "Met-analysis of techniques for closure of midline abdominal incisions" *The British Journal of Surgery*, vol.89, p.1350-1356.
10. Rios .A.et, al., 2001 "Antibiotic prophylaxis in incisional hernia repair using a prosthesis", *The World journal of hernia and abdominal wall surgery*, *Hernia* (2001)5;148-152.
11. Millikan KW, Baptista M, Amin B, et al. "Intraperitoneal underlay ventral hernia repair utilizing bilayer ePTFE and polypropylene mesh". *Am Surg* 2003; 69:258–63.
12. Knight Rebecca and Fenoligo M.E., 2002 "The use of kugel mesh in ventral hernia repairs" *The American Journal of Surgery*, vol.183, p.642-645.
13. Santora T.A. and Roslyn J.J., 1993 'incisional hernias', *Surgical clinics of north America*, Vol.73, p.557-570.
14. Matapurkar B.G. et.al, 1995 "Large recurrent incisional hernia; ultrasonographic mapping of abdominal wall defects and repair by Marlex peritoneal sandwich technique" *The Indian Journal of Surgery*, p 321-325.
15. Burger JW, Luijendijk RW, Hop WC, et al. "Long term follow up of a randomized controlled trial of suture versus mesh repair of incisional hernia". *Ann Surg* 2004; 240(4): 578–83 [discussion: 583–5].
16. Korenkov M, et al. "Biomechanical and morphological types of the linea alba and its possible role in the pathogenesis of midline incisional hernia". *Eur J Surg* 2001; 167(12):909–14.
17. Sneiders, D., Yurtkap, Y., Kroese, L.F. et al. Risk Factors for Incarceration in Patients with Primary Abdominal Wall and Incisional Hernias: A Prospective Study in 4472 Patients. *World J Surg* 43, 1906–1913 (2019). <https://doi.org/10.1007/s00268-019-04989-x>