

Prospective Study on Management of Adult Ventral Hernias

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Abstract

Abdominal wall hernias are very commonly encountered surgical problems faced by general surgeons and have attracted surgical skills and expertise. Innumerable number of studies have been done with varying results by experts. In this medical college hospital we have taken up a prospective study of all the adult ventral abdominal hernias (excluding inguinal hernias) in relation to age and sex distribution, clinical presentation, risk factors, complications as well as their management protocol adopted in our institution.

Keywords: Ventral hernias; Prospective study.

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 (1804).

Hernias of the anterior abdominal wall, or ventral hernias, represent defects in the parietal abdominal wall fascia and muscle through which

intraabdominal or preperitoneal contents can protrude. These defects can be categorized as spontaneous or acquired or by their location on the abdominal wall².

With a life incidence rate of 10% (although 3/4 of that is inguinal hernia) hernia repair has an enormous impact on the health of the individual, on society and health economics and thus deserves interest.

Among all abdominal wall hernias, incisional hernias are common; second to groin hernias, whereas umbilical and epigastric constitute 10%.

Incisional hernias are twice more common in women than men occurring as long-term complication of abdominal surgery and is estimated to occur in 11–23% of laparotomy incisions.

Ventral hernias are one of the most common problems confronting general surgeons. They can be treated surgically by procedure ranging from open anatomical repair to hernioplasty to minimally invasive techniques like laparoscopy and advanced techniques like robotic surgery. Despite this, there are no guidelines on the best surgical management.

As this is one of the very common conditions presenting to our hospital, there is a need to study the disease to know the various presentation and also to determine the best modality of treatment in our set-up.

Aims and Objectives

To study the ventral hernias in relation to the gender, clinical presentation, risk factors,

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complications as well as their management.

Objectives of the study

- * To study ventral hernias with respect to location and clinical modes of presentation.
- * To study risk factors of ventral hernias.
- * To study the complications of ventral hernias at the time of presentation.
- * To study the management protocol adopted in our institution.

Review of Literature

A hernia is defined as “the protrusion of viscera from the abdominal cavity through a natural, preformed, anatomical route, while an incisional hernia indicates the protrusion of viscera from the abdominal cavity through a route formed after trauma induced by cutting (surgical incision, laparoscopic trocar puncture wounds and stab wounds)².”

Incisional hernias are acquired hernias that usually occur at the site of surgical incisions². “Any abdominal wall gap with or without a bulge in the area of a postoperative scar perceptible or palpable by clinical examination or imaging³”.

Umbilical hernia: An umbilical hernia is protrusion of a viscus or part of a viscus through the umbilical cicatrix⁴.

In infants and children, umbilical hernia develops through a persistent defect at the umbilicus and the majority close spontaneously.

In adults, the hernia does not occur through the umbilicus but is a protrusion through the linea Alba just above or below the umbilicus.

Umbilical and para umbilical hernias occur at the umbilicus.

Epigastric hernia (EH): An epigastric hernia is a protrusion through a facial defect in the linea alba from the xiphoid process to the umbilicus.

Incidence: Prevalence of ventral hernias is 42% - Incisional hernia, 32% - umbilical hernia, 17% - paraumbilical hernia, 10% - epigastric hernia⁵.

The Centre for Disease Control estimates that approximately five million Americans live with abdominal wall defects, which include incisional, umbilical, and other hernias¹¹.

Incisional hernia: The incidence of an incisional hernia in the scar of abdominal operation is difficult

to estimate and probably the figure is considerably higher than generally believed.

According to Rodney Maingot, Incisional hernias have been reported in up to 20% of patients undergoing laparotomy⁴.

The incidence of umbilical hernia and paraumbilical hernia in the adult is largely unknown. It is more commonly seen in females than males with a female: male ratio of 3:1. The adult umbilical hernia may undergo strangulation at any time^{1,4}.

Epigastric hernia: Epigastric herniation is a rather common condition with a reported prevalence up to 10%. Epigastric hernias are 2–3 times more common in men, with a higher incidence in patients from 20 to 50 years.

Risk factors: Patient-related factors linked to ventral hernia formation include obesity, older age, female gender and smoking, emphysema, prostatic enlargement constipation, multi-parity, malnutrition, corticosteroid use, diabetes mellitus.

Many factors, singly or in various combinations may cause failure of wound to heal satisfactorily and lead to the development of incisional hernia.

These hernias commonly appear as a localised swelling involving a small portion of the scar but may present as a diffuse bulging of the whole length of the incision. There may be several discrete hernias along the length of the incision and unsuspected defects are often found at operation. Incisional hernias tend to increase steadily in size with time. Attacks of partial intestinal obstruction are common as there are usually coexisting internal adhesions. Strangulation is less frequent and most likely to occur when the fibrous defect is small and the sac is large. Most incisional hernias are broad-necked and carry a low risk of strangulation.

Complications of Ventral Hernia

Any hernia: if not treated, will lead to complications one day or other. The complications particularly occur in following order:

1. Irreducibility, 2. Incarceration, 3. Obstruction and 4. Strangulation

If the hernia contains bowel then it may become ‘obstructed’, partially or totally. The term ‘incarcerated’ is not clearly defined and used to imply a hernia which is irreducible and developing towards strangulation. When the blood supply to the incarcerated bowel is compromised, the hernia is then said to have ‘strangulated’. The risk

of strangulation is the highest in hernias which have a small neck of rigid tissue leading first to irreducibility and on to strangulation.

Classification of ventral hernias

Though ventral hernias are very common, to date, there is no standardized method for ventral hernia classification.

The most well-known ventral hernia classification system is the European Hernia Society Classification for Ventral Hernia (EHSCVH). The EHS classification for primary abdominal wall hernia distinguishes between midline and lateral hernia, and subdivides these into epigastric and umbilical – and Spigelian and lumbar – respectively. It furthermore considers defect size and divides between small, medium and large: <2 cm, ≥ 2-4 cm and ≥ 4 cm respectively.

Materials and Method

This was a hospital-based prospective observational study. All adult patients presenting to the department of general surgery with ventral hernias (with either clinically or confirmed by imaging) cases of considered as subjects of this study.

Inclusion criteria

- All patients aged above 18 yrs who were diagnosed with ventral hernias that were admitted in general surgical ward of NMCH during the period of December 2015 to June 2017.

Exclusion criteria

- Patients aged below 18 yrs.
- Patients who were diagnosed with groin hernia.

Patients who were not operated or not taken for surgery for any other reason.

Consent was obtained from all the subjects participating in the study. They were informed about the structure and purpose of the study and that the information will be used only for academic purpose.

Institutional ethics committee approval was obtained before conducting the study.

Sample size was calculated using

$$n = Z^2pq / d^2$$

{n = Sample size, Z= Z score value representing confidence interval, p = Prevalence of a factor in the population, q = (1-p)/(100-p), d = error allowed}.

Cochran equation for unknown population gave a sample size of 96. All patients were clinically examined for confirmation of ventral hernia.

Following data was recorded:

1. Patient demographics
2. History of smoking
3. BMI
4. Clinical presentation: swelling alone, pain alone, both swelling and pain
5. Complications: Irreducibility, obstruction or strangulation

Body Mass Index was divided into four categories:

- A BMI below 18.5 was considered underweight.
- A BMI of 18.5 to 24.9 was considered normal.
- BMI of 25 to 29.9 was considered overweight.
- BMI of 30 or higher was considered obese.

All patients were subjected to ultrasound abdomen to know the size of the defect and contents of the sac preoperatively.

Intraoperative findings like single or multiple defects, contents of the sac were noted. The patients were divided into 3 groups based on size of the defect according to EHSCVH.

Having obtained the data anatomical repair as well as hernioplasty was done based on type of hernia, location of hernia, size of the defect and as per patient's or surgeon's preference. Hernioplasty was done using prolene mesh. Whenever mesh was used, placement of the mesh was done by sub-lay or on-lay technique as per the choice of the surgeon. Mesh was secured with prolene sutures.

The data collected was analyzed by applying appropriate methods.

Results

In the present study, 96 cases of ventral hernia were studied and following observations were noticed.

Age Distribution

In the present study, youngest patient was 21-year-old male and oldest patient was 73-year-old male. The mean age of presentation was 49.1 years. Male to female ratio was 1:0.8 Table 1.

Table 1: Age distribution (n=96)

Age group (in yrs)	Number of patients (n=96)	Percentage(%)
21-30	8	8.33
31-40	17	17.70
41-50	24	25
51-60	28	29.16
61-70	17	17.70
>71	2	2.08
Total	96	100

The highest incidence of ventral hernias was noticed in 5th decade (29.16%) followed by 4th decade (25%). The least incidence was seen in 7th decade with only 2 cases (2%).

Sex Distribution

In the present study of 96 cases, 52(54.17%) were female and 44(45.83%) were male Table 2.

Table 2: Sex distribution (n=96)

Sex	Number of patients (n=96)	Percentage(%)
Female	52	54.17
Male	44	45.83
Grand Total	96	100.0

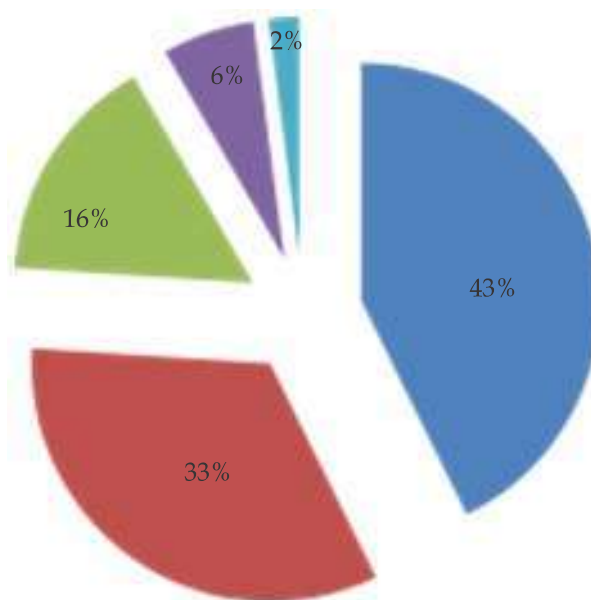
Clinical Presentation

Among the 96 cases of ventral hernia 43(44.79%) were incisional hernia; 32(33.33%) were umbilical hernia; 15(15.63%) were epigastric hernia and 6(6.25%) were para umbilical hernia in the present study (Table 3 and Graph 1).

Table 3: Types of ventral hernias (n=96)

Anatomical site	No. of patients(n=96)	Percentage(%)
Incisional	41	42.71
Umbilical	32	33.33
Epigastric	15	15.63
Paraumbilical	6	6.25
Recurrent incisional	2	2.08

Incisional Para umbilical
 Umbilical Epigastric Recurrent incisional



Graph 1: Types of ventral hernias (n=96)

In the present study of 96 patients, more than 90% of the patients presented with swelling; of which 6 patients presented with associated pain and remaining 6 patients presented with only pain.

Complaint

Table 4: Presenting Complaint (n=96)

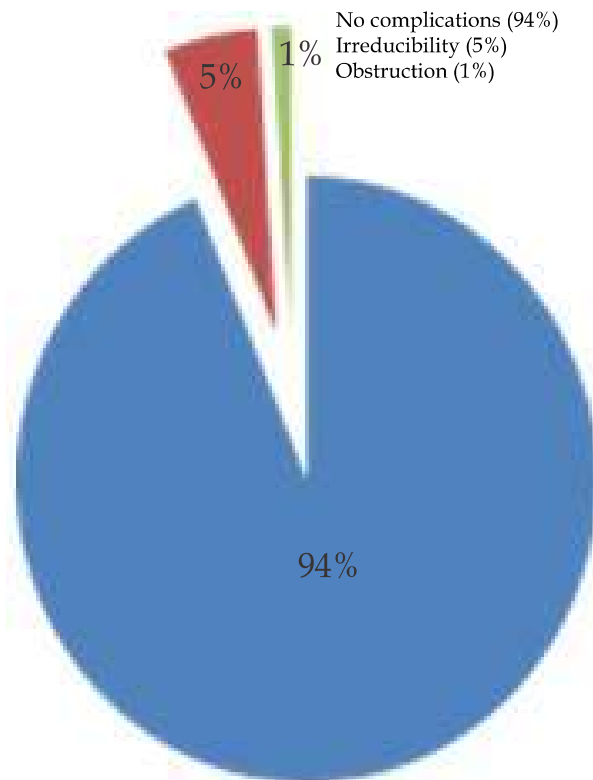
Presentation	Number of patients (n=96)	Percentage(%)
Pain	6	6.25
Swelling	84	87.50
Swelling + pain	6	6.25

Complications

Table 5: Complications at the time of presentation (n=96)

Complication	Number of patients(n=96)	Percentage(%)
Irreducibility	5	5.20
Obstruction	1	1.04

In the present study, more than 90% (93.75%) of the patients with ventral hernia presented without any complications. 5 among 96 patients presented with irreducibility and only 1 patient presented with obstruction. None of the patients had strangulation (Table 5 and Graph 2)



Graph 2: Complications at the time of presentation (n=96)

Risk Factors

In the present study, almost 71% (70.83%) of the patients were non-smokers.

Table 6: Number of smokers (n=96)

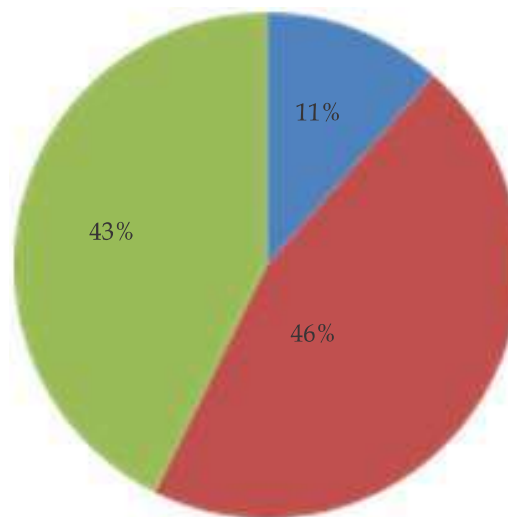
Smoking History	Number of patients (n=96)	Percentage(%)
No	68	70.83
Yes	28	29.17
Grand Total	96	100.00

Obesity

Table 7: Distribution of BMI (n=96)

BMI group	Number of patients(n=96)	Percentage(%)
Underweight	0	0
Normal	11	11.46
Overweight	44	45.83
Obese	41	42.71
Grand Total	96	100.00

In the present study, 41 (42.71%) patients were obese; 44 (45.83%) patients were overweight; 11 (11.46%) patients were normal and none of them were underweight. (Table 7 and Graph 3).



Graph 3: BMI distribution (n=96)

Number of Abdominal Wall Defects

About 86 out of 96 patients (90%) had a single defect; whereas 7 patients (7.29%) had two defects and 3 patients (3.13%) had 3 defects. Multiple defects were found in patients with epigastric hernia and those with incisional hernia.

Table 9: Number of abdominal wall defects (n=96)

Number of Defects	Number of patients (n=96)	Percentage(%)
Single	86	89.58
Two	7	7.29
Three	3	3.13

Size of Abdominal Wall Defects

In the present study of 96 patients, 28 (29.16%) of the patients had a small defect of less than 2 cm; 37 (38.2%) patients had defect of 2-4 cm; 31 (21.8%) patients had large defect of size more than 4 cm.

Table 10: Size of the abdominal wall defect (n=94)

Size of the defect	Number of patients(n = 94)	Percentage(%)
<2 cm	28	29.78
≥2-4 cm	37	39.36
≥4 cm	29	30.85

Types of Hernia Repair

Table 11: Surgical techniques of hernia repair (n=96)

Type of hernia repair	Number of patients	Percentage
Anatomical repair	5	5.20
Sub-lay hernioplasty	1	1.04
On-lay hernioplasty	88	91.6
On-lay hernioplasty + abdominoplasty	2	2.08

Discussion

The present study of management of ventral hernias was compared to other series of similar nature. 96 cases of ventral hernia were included in the study carried out between December 2015 and November 2017. Factors like age, sex, location of hernia, clinical presentation, risk factors such as obesity, smoking; number of hernial defects, size of the defect, and type of surgery done were taken into consideration.

In the present study, the mean age of presentation was 49.1 years ranging from 21 years to 73 years. Sexwise 54.17% patients were female and 45.83% patients were male with a male to female ratio of 0.8:1.

In this study of 96 cases of ventral hernia, 43/96 (44.79%) were incisional hernia; 32/96 (33.33%) were umbilical hernia; 15/96 (15.63%) were epigastric hernia and 6/96 (6.25%) were paraumbilical hernia. 2 cases were of recurrent incisional hernia.

In the present study, incisional hernia was the most common amongst the ventral hernias followed by umbilical and epigastric hernias; this is comparable to another study conducted by Shah PP *et al.* in 2016.

Out of 96 patients studied, 5(5.20%) patients (3-umbilical, 1-incisional, 1-epigastric) presented with irreducible swelling. All the patients with irreducible hernia presented with swelling and pain. Only one patient presented with obstruction.

Among the risk factors, Smoking-71% of the patients in this study were non-smokers. This may be because, more than 50% of the patients being female population.

Obesity-43% patients were obese and 46% patients were overweight showing a strong correlation between obesity and ventral hernia. Also, no patient was underweight.

In the present study, 37 out of 43 patients (86%) with incisional hernia were overweight or obese. And 34 out of 38 patients (89.5%) with umbilical and paraumbilical hernia were either overweight or obese. This finding is in agreement with other studies such as – Sinha SN T. Keith *et al.* study done in 2004.

In the present study, 29 patients (30.2%) had large hernial defect (≥ 4 -10 cm), out of which 15(51%) patients had bowel loops as content.

Omentum was found to be the most common content of small and moderate ventral hernias and pre-peritoneal fat was found to be the most

common content in epigastric hernias. In large ventral hernias, bowel loops were found to be the most common content.

In the present study, 86 out of 96 patients (89.5%) had a single defect; whereas 7 out of 96 patients (7.29%) had two defects and 3 out of 96 patients (3.13%) had 3 defects.

Multiple defects were usually encountered in patients with either incisional hernia or epigastric hernia. This finding was in agreement with the traditional literature^{2,28,29}.

Type of surgery; All the patients underwent open hernia repair. Most common method of ventral hernia repair done in the present study was on-lay mesh hernioplasty (94.80% cases; i.e. 91 out of 96 patients). Abdominoplasty was done in combination with on-lay mesh hernioplasty in two patients with morbid obesity. Anatomical repair was carried out in 5 patients out of 96 patients (5.20%).

Conclusion

Ninety six cases of adult ventral hernia which were admitted in Narayana Medical College, Nellore during December 2015 to November 2017 were studied. The statistical data and analysis of the cases studied during this period are presented in this study.

The Incidence of ventral hernia was highest in the age group ranging from 31 yrs- 50 yrs. Incisional hernia was most common type of ventral hernia followed by umbilical, epigastric and paraumbilical hernia in that order.

Ventral hernia was more common in females than in males with a ratio of approximately 1:0.8.

Most of the patients with ventral hernia presented with swelling alone (94%). Some of the patients with ventral hernia presented with swelling and pain.

Obesity was a common risk factor for both primary and incisional hernia. The most common content of ventral hernia sac was omentum followed by intestinal loops. Hernial defect was less than 4 cm in diameter in 70% of the cases in the present study. In 90% of the ventral hernias in the present study had single hernia defect. In the present study, multiple hernia defects were rare and were found only in epigastric and incisional hernias.

In the present study, the most common surgical repair technique was mesh repair (92%). There was no mortality in this study.

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