



# International Journal of Surgery Science

E-ISSN: 2616-3470

P-ISSN: 2616-3462

© Surgery Science

<https://www.surgeryscience.com>

2024; 8(1): 14-21

Received: 10-11-2023

Accepted: 13-12-2023

**Dr. Cheppalli Sudheer Kumar Reddy**

Post-Graduate Resident,  
Department of General Surgery,  
Chalmeda Anand Rao Institute of  
Medical Sciences, Karimnagar,  
Telangana, India

**Dr. N Venkata Ramana**

Professor, Department of General  
Surgery, Chalmeda Anand Rao  
Institute of Medical Sciences,  
Karimnagar, Telangana, India

**Dr. Gubba Tarun Kumar**

Post-Graduate, Department of  
General Surgery, Chalmeda Anand  
Rao Institute of Medical Sciences,  
Karimnagar, Telangana, India

**Corresponding Author:**

**Dr. Cheppalli Sudheer Kumar Reddy**

Post-Graduate Resident,  
Department of General Surgery,  
Chalmeda Anand Rao Institute of  
Medical Sciences, Karimnagar,  
Telangana, India

## Clinical study of mesh repair in ventral hernia with co-morbidities (diabetes mellitus and/or obesity) in a Tertiary care hospital

**Dr. Cheppalli Sudheer Kumar Reddy, Dr. N Venkata Ramana and Dr. Gubba Tarun Kumar**

**DOI:** <https://doi.org/10.33545/surgery.2024.v8.i1a.1043>

### Abstract

**Introduction:** A ventral hernia is defined by a protrusion through the anterior abdominal wall fascia. The anterior abdominal wall is the site of variety of hernias due to mans erect posture which renders anterior abdominal wall weak. Almost all hernias protrude through the abdominal wall to form palpable swellings. These hernias present as a swellings and rarely go for complications like strangulation, incarceration and present with respective manifestations.

**Aims and Objectives:** 1.To study the various presentations of ventral hernias, age and sex distributions of ventral hernias.2. To study the influence of obesity and diabetes mellitus on postoperative complications of different types of hernias.3. To study clinically various forms of ventral hernias and management protocol with respect to different types of mesh repairs.4. To investigate relative effectiveness of mesh and suture repair of ventral hernias in terms of clinical outcome and post-operative complications. 5. To study the morbidity associated with obesity and diabetes on ventral hernia mesh repairs.

**Materials and Methods:** This was a single Centre study, randomized, prospective study conducted from October 2022 to September 2023. It was carried out on 42 patients with ventral hernia admitted in surgical wards of Chalmeda Anand Rao institute of medical sciences, Karimnagar.

**Results:** SSI being more common in cases of ventral hernia repair with comorbidities, it was documented in 22 cases out of over all cases. 71.42% cases of diabetes group experienced surgical site infection and 36.36% of obesity group. Post operative complications are more in patients with comorbidities.

**Conclusion:** The incidence of these complications can be reduced to minimum by measures such as strict Glycaemic control and loss of weight prior to surgery so that post operative course is uneventful or minimised to lowest morbidity. The proper surgical technique and wound care are crucial in minimising mesh infection and recurrence.

**Keywords:** Ventral hernia, diabetes mellitus, obesity

### Introduction

**Hernia:** Hernia is derived from the Latin word for rupture.

The protrusion of any organ (tissue) as a whole or part out of its boundary through an anatomical or acquired weak spot <sup>[1]</sup>. A hernia is defined as an abnormal protrusion of an organ or tissue through a defect in its surrounding wall <sup>[2]</sup>.

**External Hernia:** Are those which are visible from outside like inguinal, Incisional, femoral, epigastric hernias, etc.

**Internal Hernia:** Are those which are not visible from outside. They may be present between two adjacent cavities such as abdomen and thorax and they may herniate into a sub compartment of a pre-existing cavity. Common internal hernia are diaphragmatic hernia and hiatus hernia.

### Ventral Hernia

A ventral hernia is defined by a protrusion through the anterior abdominal wall fascia. The anterior abdominal wall is the site of variety of hernias due to mans erect posture which renders anterior abdominal wall weak.

Almost all hernias protrude through the abdominal wall to form palpable swellings. These hernias present as a swellings and rarely go for complications like strangulation, incarceration and present with respective manifestations. Commonly hernias do not require any special investigations to diagnose them (clinically diagnosed). Rarely they need investigations like computed tomography, ultrasound and herniography to confirm the diagnosis.

#### Aim of the study

1. To study the various presentations of ventral hernias.
2. To study the age and sex distributions of ventral hernias.
3. To study the influence of obesity and diabetes mellitus and hypothyroidism on postoperative complications of different types of hernias.
4. To study clinically various forms of ventral hernias and management protocol with respect to different types of mesh repairs.
5. To investigate relative effectiveness of mesh and suture repair of ventral hernias in terms of clinical outcome and post-operative complications.
6. To study the morbidity associated with obesity and diabetes on ventral hernia mesh repairs.

#### Materials and Methods

This was a single centre study, randomized, prospective study conducted from February 2021 to December 2022 for a period of 24 months. It was carried out on 42 patients with ventral hernia admitted in surgical wards of Chalmeda Anand Rao institute of medical sciences, Karimnagar.

#### Method of collection of data

A total of 42 patients presenting with ventral hernia meeting the inclusion and exclusion criteria were included in the study.

#### Inclusion Criteria

1. All cases of ventral hernia between 14 to 60 years of both sexes with comorbidities (obesity, diabetes mellitus).
2. Patients on whom mesh repair was indicated.
3. Patients willing for surgery and follow up.

#### Exclusion Criteria

1. Patients with Recurrent ventral hernias.
2. Patients with Collagen vascular diseases.
3. Patients associated with major co-morbidities.
4. Retroviral diseases positive patients.

#### Tools

##### Intake proforma

A structured proforma was designed to collect the socio-demographic and clinical details including age at onset, duration of illness and treatment history.

#### Procedure

A detailed study was carried out between February 2021 and December 2022 and was followed up further under the valuable guidance of Dr., Professor of General Surgery, Chalmeda Anand Rao institute of medical sciences, Karimnagar, who met the inclusion and exclusion criteria was recruited after obtaining informed consent from the patient and/or family member. This information was collected from medical records, family members, 50 previous physician notes, as well as general interview.

Diagnosis of ventral hernia was confirmed. MESH repair was done using polypropylene mesh and the suture repair was done by prolene. All patients were treated with preperitoneal mesh repair or onlay mesh repair. Mesh size was decided based on the size of the defect.

#### Ethical considerations

- Informed consent was taken from both patients and informants.
- Subjects had the right to withdraw consent at any stage.
- Confidentiality of all information was assured and maintained.
- Participation in the study had no effect on the treatment in any way.
- Approval was taken from Ethical committee.

#### Sample size estimation

- Prevalence - 10-15% (P)
- Level of significance - 5% (a)
- Allowable error - 10% (d)
- Sample size =  $4 \cdot PQ/d^2$
- At 5% level of significance, considering P as 12% the estimated sample size is 42% with an allowable absolute error of 10%.

#### Results

##### Clinical types of ventral hernias

Incisional hernias are the most common form in our study with 47.6% followed by umbilical and epigastric hernia with 14% each and left and right paraumbilical hernia 9.5% each and supraumbilical hernia 4.8%.

**Table 1:** Showing clinical types of ventral hernias.

S. No	Types of ventral hernia	Frequency	Percentage
1.	Epigastric	06	14.3%
2.	Incisional	20	47.6%
3.	LT Paraumbilical	04	9.5%
4.	RT Paraumbilical	04	9.5%
5.	Supraumbilical	02	4.8%
6.	Umbilical	06	14.3%
	Total	42	100%

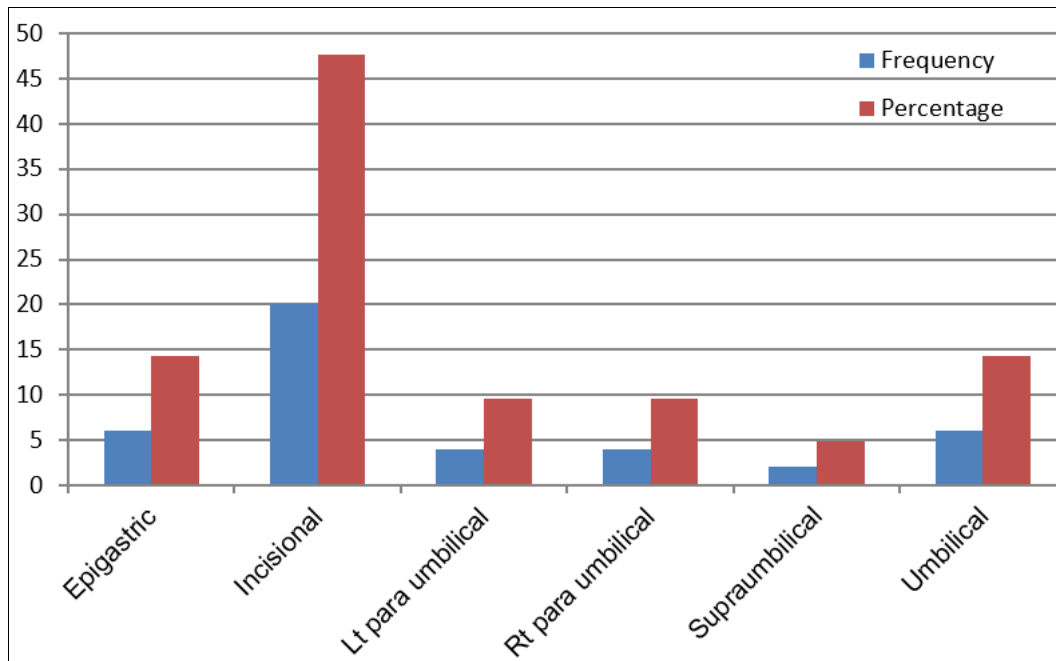


Fig 1: Showing clinical types.

**Age Distribution:** The age distribution of ventral hernias were from third decade to seventh decade with majority (26.19%) of cases were in both fifth and sixth decade.

Table 2: Showing Age distribution.

S. No	Age in years	Frequency	Percentage%
1.	21-30	02	4.76%
2.	31-40	09	21.43%
3.	41-50	11	26.19%
4.	51-60	11	26.19%
5.	61-70	09	21.43%
	Total	42	100%

**Gender Distribution:** Among the subjects in our study 45.2% (19) were males and 54.8% (23) were females.

Table 3: Showing Gender distribution.

S. No	Gender	Frequency	Percentage
1.	Male	19	45.2%
2.	Female	23	54.8%
	Total	42	100%

**Type of Mesh Repair:** All the subjects were treated with mesh preperitoneal mesh repair (78.6%). repair with majority of the patients were treated with

Table 4: Showing Type of mesh repair.

S. No	Mesh repair	Frequency	Percentage%
1.	Onlay	09	21.4%
2.	Preperitoneal	33	78.6%
	Total	42	100%

**Distribution of comorbidities:** All patients included in the study were with comorbidities obesity and diabetes mellitus. 52.3% of patients had obesity, 33.3% had diabetes mellitus and 14.4% had both obesity and diabetes mellitus.

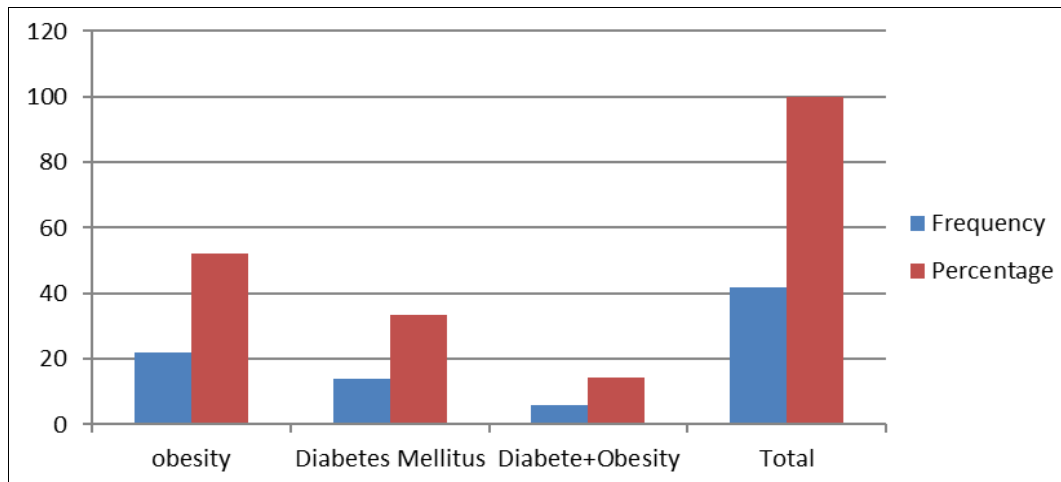


Fig 2: Showing distribution of comorbidities.

**Distribution of all comorbidities:** Hypothyroidism being one of the comorbidity was also associated with other comorbidities. The various comorbidities occurred in different combination with majority being obesity only (45.2%).

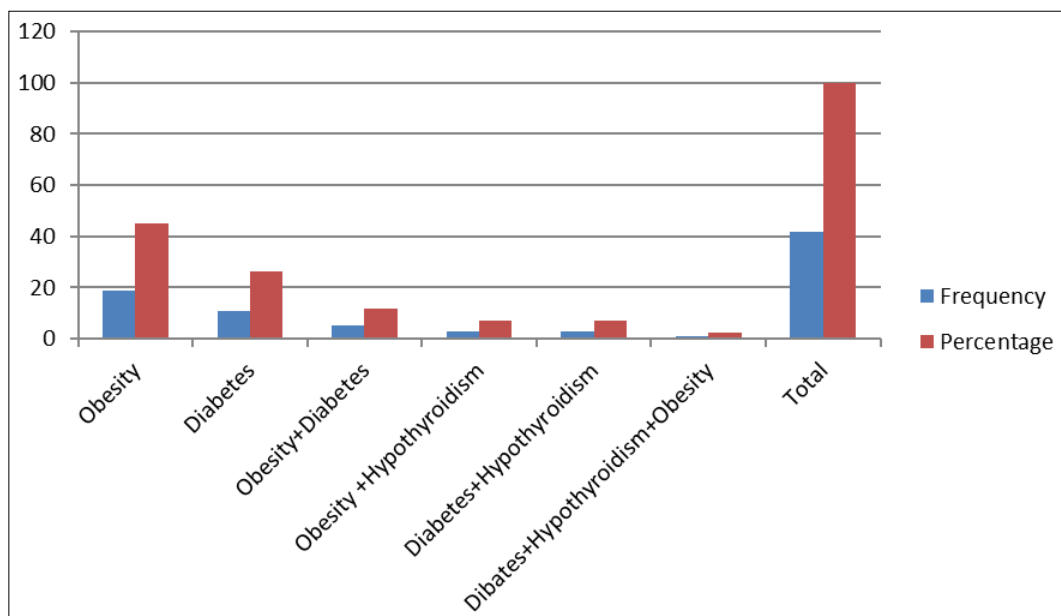


Fig 3: Showing distribution of all comorbidities.

**Duration of hospital stay:** The co-morbidities affecting the study population resulted in delayed hospital stay which varied from 3 days to 28 days among the population and maximum duration was seen in the group with both obesity and diabetes mellitus.

Table 5: Showing Duration of Hospital stay.

S. No	Comorbidities	Mean Duration of Hospital Stay
1.	Obesity	10.3
2.	Diabetes Mellitus	11.85
3.	Obesity + Diabetes Mellitus	12.66

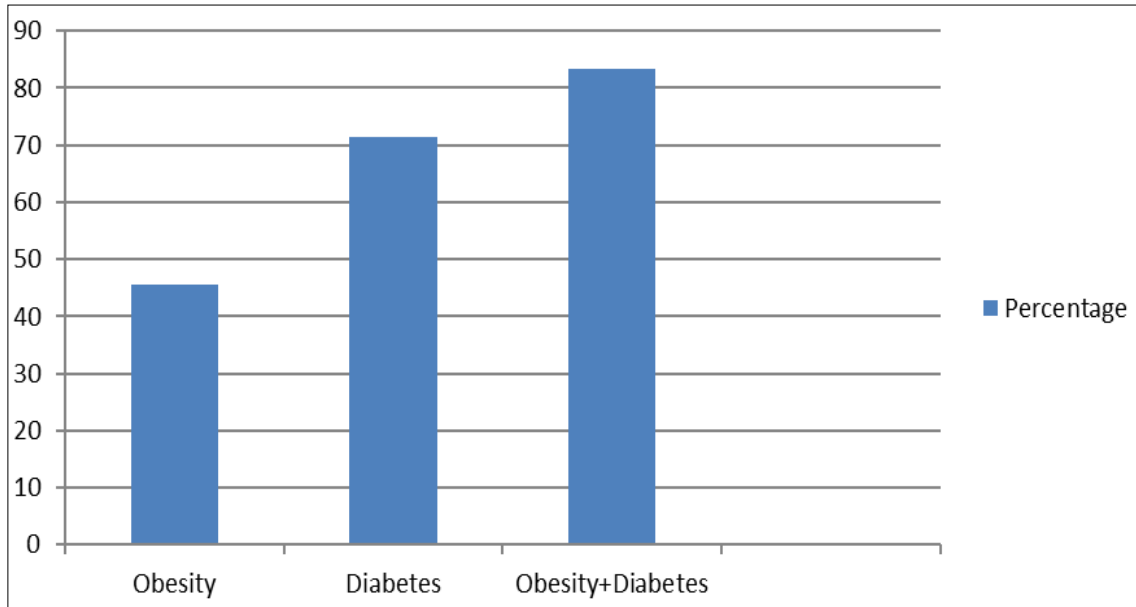
**Drain duration:** The placement of drain was routinely practised from 2 days to 6 days. in our study and the number of days the drain was kept ranged

Table 6: Showing Drain duration.

S. No	Comorbidities	Mean Duration of Drain
1.	Obesity	2.5
2.	Diabetes Mellitus	2.85
3.	Obesity + Diabetes Mellitus	2.83

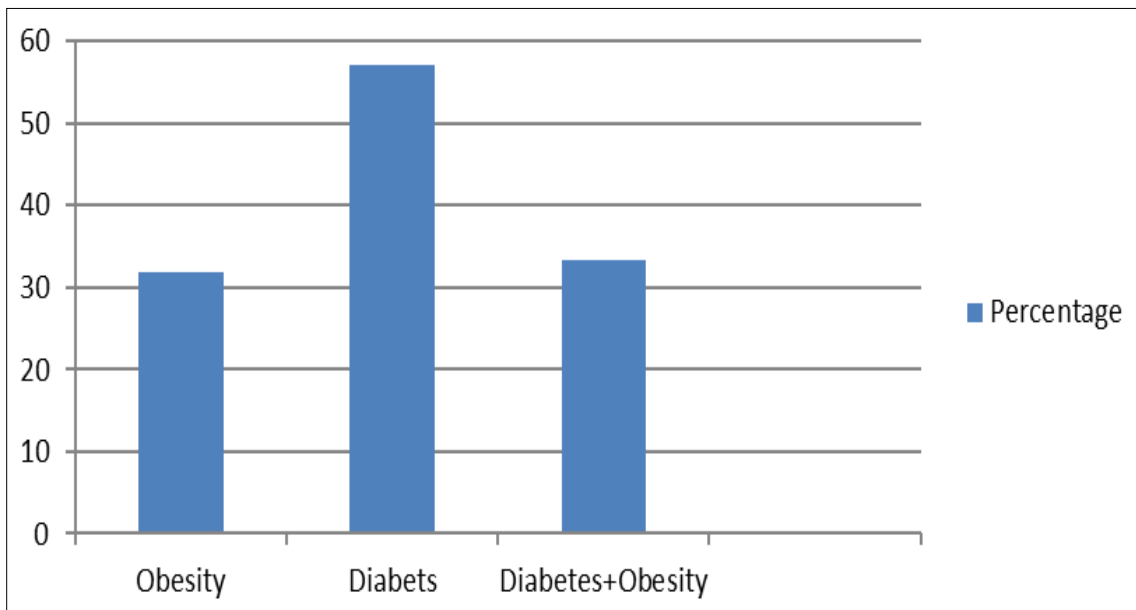
**SEROMA:** One of the most important complications of ventral hernia repair was seroma. The seroma was about 83.33% in both

obesity and diabetes mellitus group compared to obesity group (45.45%) and diabetes mellitus group (71.42%).



**Fig 4:** Showing percentage of occurrence of seroma.

**Wound Dehiscence:** The wound dehiscence was seen in 33.33% of both obesity and diabetes mellitus group. 31.81% of obesity group, 57.14% of diabetes mellitus group and



**Fig 5:** Showing occurrence of wound dehiscence.

**Surgical Site Infections:** The surgical site infections were seen in 22 patients in our study. It was seen in 36.36% of obesity group, 71.42% of diabetes mellitus group and 66.66% of obesity and diabetes mellitus.

**Table 7:** Showing Surgical site infections.

S. No	Comorbidities	Frequency	Percentage
1.	Obesity	8	36.36%
2.	Diabetes Mellitus	10	71.42%
3.	Obesity + Diabetes	4	66.646%

**Pneumonia:** The pneumonia complication was seen only in 2 patients in obesity group which was 9.09% of obesity group.

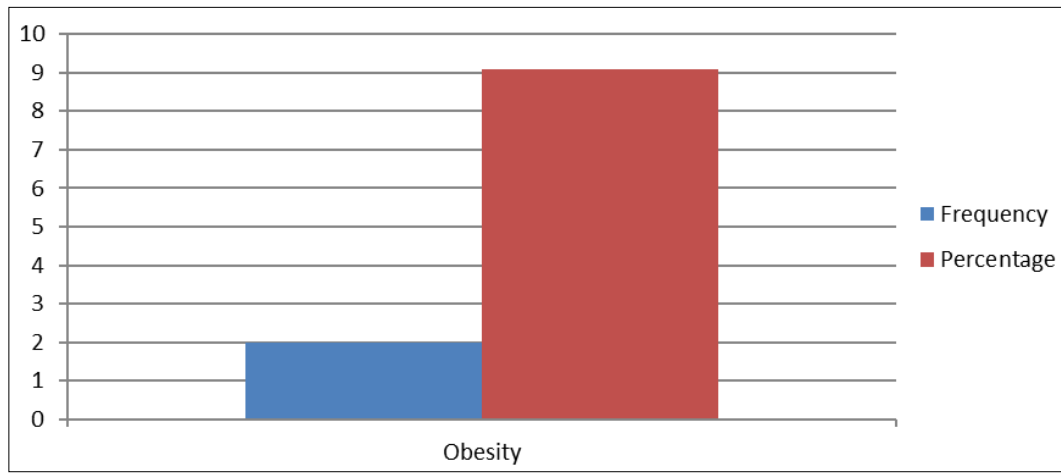


Fig 6: Showing occurrence of Pneumonia.

**ICU Admission:** The ICU admission was seen in 5 patients in the study group among which maximum is seen in obesity and diabetes mellitus group (33.3%).

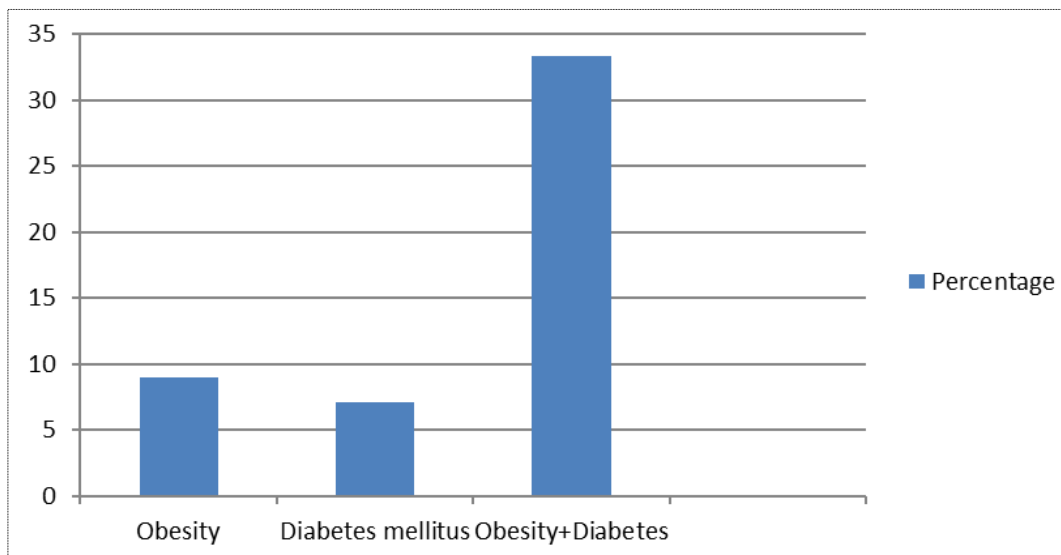


Fig 7: Showing ICU admissions.

**Mesh infection**

One of the most dreaded complications is mesh infection as it may require exploration and removal of the mesh. The mesh infection was nil in our study.

**Recurrence**

The patients in our study were followed up to 1 year post surgery for recurrence. In our study there was no recurrence even after one year of follow up.

**Discussion**

A study was conducted in K.R. Hospital, Mysore. The sample size was 42 and were selected from the patients admitted in K.R. Hospital in the department of surgery. The study was carried from January 2017 to June 2017 and all the patients were followed for 1 year. Patients with one or the other co morbidities were selected and their influence on ventral hernia repair was studied.

The ventral hernias in our study included epigastric hernia, incisional hernia, left and right para umbilical hernia, supra umbilical hernia and umbilical hernia. The majority of the cases were incisional hernia 47.6% (20 cases) followed by epigastric and umbilical hernia 14.3% (6 cases). The incidence of left and

right para umbilical hernia were equal and was 9.5% (4 cases each). The least incidence was seen in supra umbilical hernia 4.8% (2 cases).

The age distribution of ventral hernias were from third decade to seventh decade. The highest incidence of ventral hernias were found in the both fifth and sixth decade which was 26.19% (11 cases each). This was followed by fourth and seventh decade which was 21.43% (9 cases each). The least incidence is found in third decade which was 4.76% (2 cases).

The cases were almost equally distributed among both the genders with marginal female predominance. 54.8% (23 cases) were females and 45.2% (19 cases) were males. This prevalence probably is been attributed to equal number of patients from both genders utilising the hospital facilities. In our study all cases were operated with mesh repair. The mesh which was used was a standard polypropylene non absorbable mesh all patients were treated with same mesh to prevent confounding factors with respect to characteristics of the mesh.

All defects were carefully selected for mesh repair and the minimum size of the defect was 3 centimetres. Sufficient amount of overlapping of tissues was done with the mesh which was about 5 centimetre surrounding the defect. The surgical repair which was considered in our study was predominantly pre

peritoneal mesh repair. Few cases were treated with on-lay mesh repair. 78.6% (33 cases) were treated with pre peritoneal mesh repair and 21.4% (9 cases) were treated with on-lay mesh repair. India being the diabetic capital of world the newly detected cases of diabetic is increasing due to change in the life style of the population obesity is becoming more prominent. In our study the subjects were selected with either of the co-morbidities or even both. The influence of these co-morbidities on postoperative outcome of mesh repair of ventral hernias were studied in detail. 52.2% (22 cases) of subjects were obese and 33.3% (14 cases) were diabetic. 14.4% (6 cases) had both diabetes mellitus and obesity.

Hypothyroidism being one of the most important co-morbidities in ventral hernia in 7 cases, 3 of them were associated with obesity, 3 of them with diabetes and one of them with both obesity and diabetes. All these 7 cases were on treatment with thyroxin supplements and their measured thyroid function were normal. As the TSH level were normal the influence on post operative outcome will be minimal and importance to this co-morbidity was not considered.

One of the most important morbidity of these surgical patients with comorbidities is prolonged hospital stay and absent from work. In our study the duration of hospital stay ranged from 3 days to 28 days. The mean duration of the hospital stay with group with both diabetes and obesity was 12.66 days which was followed by diabetes mellitus group 11.85 days and least for obesity group which was about 10.3 days.

Seroma is one of the most common complication with any ventral hernia surgery as it involves dissection in the multiple planes and complex tissues suturing. In our study the group with diabetes and obesity had 83.33% seroma formation which was followed by diabetes group with 71.42% of seroma formation and 45.45% of obesity group. The high incidence of seroma is probably due to the super added influence of both the co-morbidities. Stoikes N. at al study showed that problem of seroma after ventral hernia repair was about 20% without co-morbidities. This enormous increase in seroma is directly attributed to the co-morbidities.

In our all mesh repairs we used suction drains of sufficient size at the plane of the mesh to drain the collection. The duration of the drain ranged from two days to six days. The mean duration of drains was maximum in diabetic group than the obesity group which was 2.85 days and 2.5 days respectively. The prolongation of drain was not entertained for longer duration as it was one off the source of microorganism inoculation. The drain was removed as early as possible when the collection was less than 50 ml because the drain was kept at the plane of mesh and the chances of mesh infection was very much increased even if prolonged for minimal duration of time than it is required. Wound dehiscence was seen in 17 cases out of over all 42 cases. 57.14 cases of diabetes mellitus group had wound dehiscence and 31.81% of obesity group. The dehiscence was secondarily influenced by the seroma formation and super added surgical site infection. Even though there was wound dehiscence there was no documented burst abdomen in our entire study.

Surgical site infections being more common in cases of ventral hernia repair with comorbidities, it was documented in 22 cases out of over all cases. 71.42% cases of diabetes group experienced surgical site infection and 36.36% of obesity group. Baucom R.B. *et al.*, 59 in there study of evaluation of surgical site infection in ventral hernia repairs the incidence of 31% is noted. The huge difference in surgical site infection in our study shows the effect of the co-morbidities on the immune system and there by increased rate of surgical site of infection.

ICU admission in our study were seen in 5 cases with majority of 33.3% was seen in diabetes and obesity group. It was also seen in 9% of obesity group and 7.1% of diabetes group. This ICU admission is probably influenced by the size of the defect, increased amount of dissection and also about the increased operative duration along with the co-morbidities.

Pneumonia which is an indirect complication was seen in 2 cases which was influenced by the ICU admission and the factors affecting it, which in turn increase the duration of hospital stay and postoperative morbidity.

Pain is the most common complication which was present in all the cases our study was influenced by the other complications. Being subjective and its occurrence in different co-morbid groups were complex, we could not obtain the quantifiable results among the groups which we have considered.

Mesh infections which is one of the dreaded complication in any mesh repair was found to be nil which may be attributed to timely removal of drain and proper wound care. Hematoma as a complication which occurs as a result of massive dissection and poor haemostasis was nil in our study which may be due to proper surgical technique and perfect haemostasis.

Recurrence as stated by Vikas Singhal *et al.* in their study was about 14% which was nil in our case probably due to careful procedural technique and can also be due to small sample size and short duration of follow up.

As with any other studies our study is not without limitations. The samples size in our study may be less to generalised the findings of the study. The importance of the recently detected diabetes patients was not taken into consideration and all diabetes were treated alike. The grades of obesity was not given importance and cases with BMI > 30 were grouped together. Only few comorbidities were included and other confounding factors like hypertension, COPD, smoking etc was not given much of significance. The duration of study limited and the late recurrence cannot be identified with this study.

## Conclusion

Ventral hernia repair being complicated by most prevalent co-morbidities, obesity and diabetes mellitus results in cumbersome post operative course with delayed hospital stay with enormously increased complication like seroma, surgical site infection and wound dehiscence. The incidence of these complications can be reduced to minimum by measures such as strict Glycaemic control and loss of weight prior to surgery so that post operative course is uneventful or minimised to lowest morbidity.

The proper surgical technique and wound care are crucial in minimising mesh infection and recurrence which was nil in our study.

## Conflict of Interest

Not available

## Financial Support

Not available

## References

1. Bennet HD, Kingsworth NA. Hernias, umbilicus and abdominal wall. In: Bailey and Love's Short practice of Surgery. 25th ed. London: Arnold Publishers; c2008. p. 967-90.
2. Zollinger Jr RM. Classification of ventral and groin hernias. In: Hernia, Nyhus LM, Condon (eds.). Philadelphia: JB Lippincott; c2002. p. 71-9.

3. Read RC. The Development of Surgical herniography. Surgical Clinics of North America. 1984;64(2):185-96.
4. Jennings WK, Anson BJ, Wright RR. A new method of repair for indirect Inguinal Hernia Considered in reference to parietal anatomy. Gynecology Obstetrics. 1942;74:697.
5. Babu GH. A clinical study of Ventral Hernia. Doctoral dissertation. RGUHS.
6. Boyd JD, Hamilton WJ. Development and structure of the human placenta from the end of the 3rd month of gestation. An International Journal of Obstetrics & Gynaecology. 1967 Apr 1;74(2):161-226.
7. Schoenwolf GC, Bleyl SB, Brauer PR, Francis-West PH. Larsen's human embryology E-book. Elsevier Health Sciences; c2014 Dec 1.
8. Smith W. Basic human embryology. 3rd ed. New York: Churchill Livingstone Publishers; c1987.
9. Anne MR Agur. Grants Atlas of anatomy. 9th ed. New York: Williams and Wilkins Publications; c1995.
10. Last RJ. Anatomy – regional and applied. 7th ed. New York: Churchill Livingstone Publishers; c1988.

**How to Cite This Article**

Reddy CSK, Ramana NV, Kumar GT. Clinical study of mesh repair in Sventral hernia with co-morbidities (diabetes mellitus and/or obesity) in a Tertiary care hospital. International Journal of Surgery Science. 2024;8(1):14-21.

**Creative Commons (CC) License**

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.