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A comparative study on post-operative complications of mesh repair in ventral hernia in obese and non-obese individuals.

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Abstract
Introduction- *Protrusion of intra-abdominal contents through weak point of abdominal wall muscle forms ventral hernia. Most common cause of ventral hernia is previous surgical incisions (Laparotomy incision) which accounts for 3 to 20%.*
Objective- *To study the short term post-operative complications following repair of Ventral hernia using two different types of suture materials among obese and non-obese patients.*
Materials and methods - *A Prospective Randomized, comparative study is designed with the patients who met inclusion criteria. 40 patients are selected out of which 20 are obese and 20 are non-obese and are further divided into two groups such as obese and non-obese.*
Result - *A Comparatives study is conducted for ventral hernia patients among Obese and non-obese patients for the following characteristics. Occurrence of complication, suture material use, Age and gender*
Conclusion - *The study concluded that the obesity plays a major role in ventral hernia and its complications compared to non-obese patients, obese patients have more chances of recurrence and complications. Among the materials, Prolene have lesser complication compared to vicryl.*

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I. Introduction

Ventral hernia is the protrusion of intra-abdominal contents via an opening of weak areas within abdominal wall muscles caused by partially cured surgical Incisions. It includes Incisional hernia and Umbilical hernia. It is caused by previous operations, obesity, collagen deficiencies. It is more common in female gender (1). With older techniques like simple suturing, the incidence of ventral hernia is approximately 54%.Hence certain techniques are used to repair ventral hernias like Simple facial sealing (Mayo's approach), Kal protocol: It utilizes releasing of surgical cuts in lateral parts of ventral layers, Nuttal method: It substitutes rectus sheath repair. Instead of all the improvisation, there is no much benefit (2). In 1963, for the first time mesh repair has been introduced for ventral hernia repair. In this study, obesity is estimated using BMI as an indicator. BMI= weight in kg /height in meter square (3). It is also called Quetelet index. A BMI above 30 is considered obese according to standard scale and it is taken into consideration. Two different suture materials namely Vicryl and Prolene are used to close the defect of hernia and compared in this study (4).

II. Materials And Methods

The Study is done in Vinayaka mission's Medical College, Karaikal. Within the duration of 1 year with Sample size of 40 patients. It is the Prospective Randomized control study.Inclusion criteria includes Patients diagnosed Umbilical hernia and Patients with diagnosis of Incisional hernia.Exclusion criteria includes recurrent incisional or umbilical hernia, Patients on Glucocorticoid therapy and other immunosuppressive drugs and Patients with complications of Wound infection, chronic lower respiratory tract infection, Constipation, Ascites.

III. Method

After applying inclusion and exclusion criteria, 20 patients are selected with the diagnosis of ventral hernia, based on their BMI and two groups are made.Each group is further divided into 10 each and vicryl suture is used to fix mesh for 20 patients(10 each in obese and non-obese) is placed. Same is done with prolene.On-lay mesh repair technique is followed for everyone.Postoperatively, each and every patient is followed for one month for short term complications. Mesh is placed as an additional support to the abdominal wall.In this study, Prolene and Vicryl suture materials are used to fix the mesh in 20 patients each in Obese and

Non-obese groups. Prolene is a synthetic, monofilament, non-absorbable polypropylene material, .Vicryl is an absorbale, synthetic, braided material .

IV. Result

Demographic and clinical characteristics of study subjects

The demographic and clinical characteristics of postoperative complications of mesh repair in ventral hernia in obese and non-obese individuals are summarized and explained as follows. A total of 40 patients were included in this study, divided into two main groups and sub-groups based on the mesh material respectively. The below bar chart explains male and female subjects among the two groups in which in Group-B vicryl had only males and other groups had both males and females.

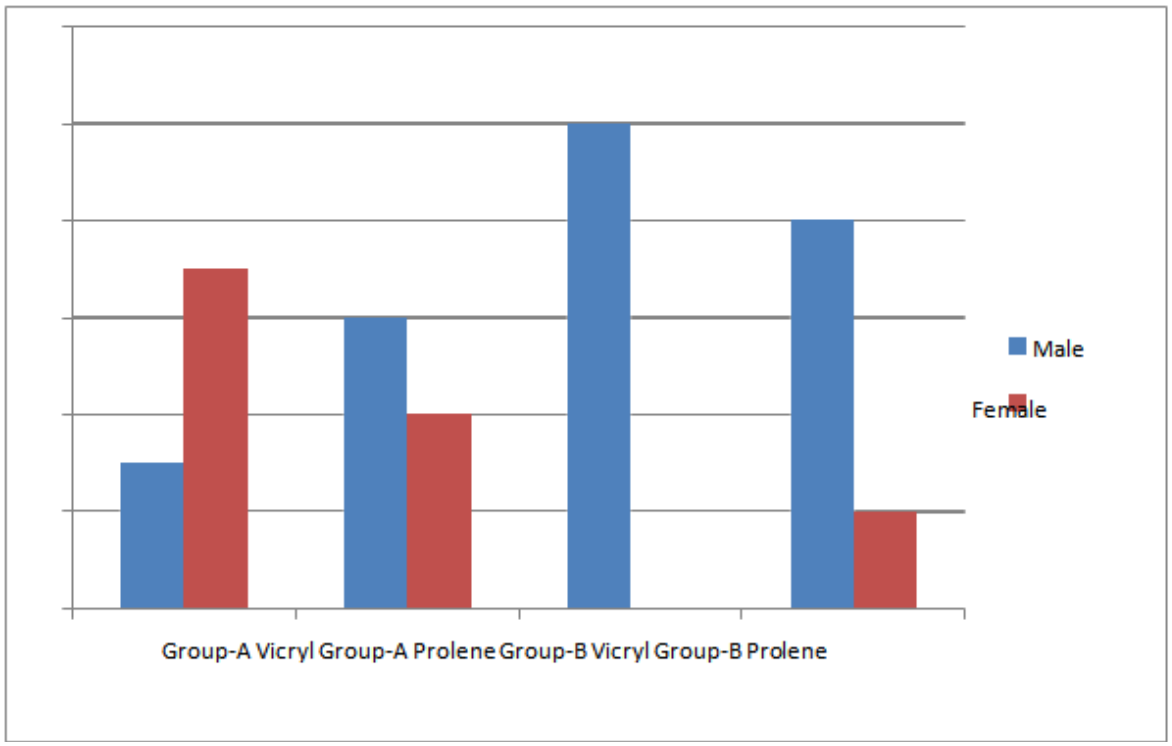


FIGURE 1 : Bar chart illustrating males and females among the study groups

Likewise, the patients were grouped based on their age below 50 years, above 51 years among the study subjects which revealed that Group-A with Vicryl and Group-A with Prolene mesh had 70% of males who were aged below 50 among the total patients. They are illustrated below.

Bar graphs illustrating other complications among thestudy groups

The other major complications associated with hernia were studied such as Seroma, Wound Infection, Sinus Formation, Early Recurrence, Chronic Pain, and Hernia were documented from all the collected subjects.

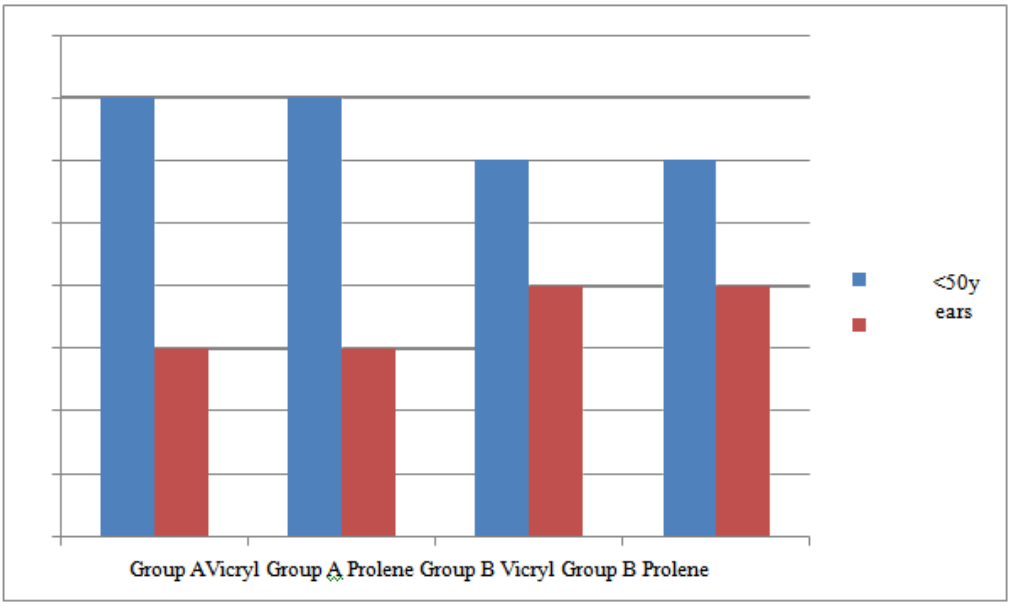


FIGURE 2: Bar chart illustrating age among the study groups

Bar graphs illustrating seroma formation among the study groups

The seroma status was analysed among the two groups which revealed us that it was high in Group-B having the vicrylfollowed by Group-A vicryl.

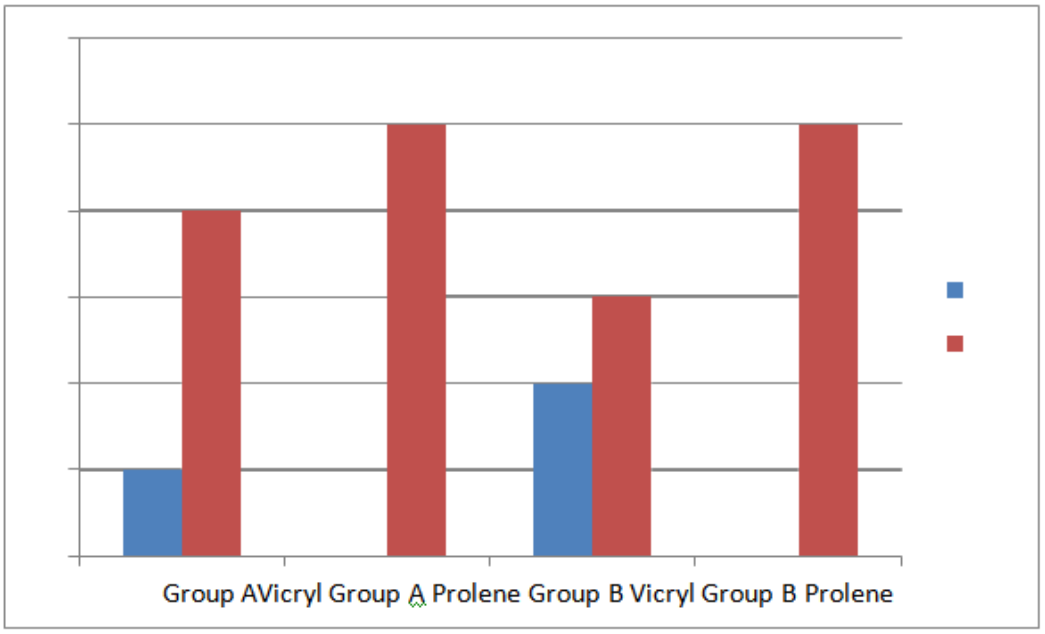


FIGURE 3: Bar chart illustrating Seroma status among the study group

Bar graphs illustrating sinus formation among thestudy groups

The sinus formation was analysed among the two groups which revealed us that it was observed in Group-B having the Prolene mesh followed by Group-A vicryl and in other groups it was not observed which is demonstrated in the below figure.

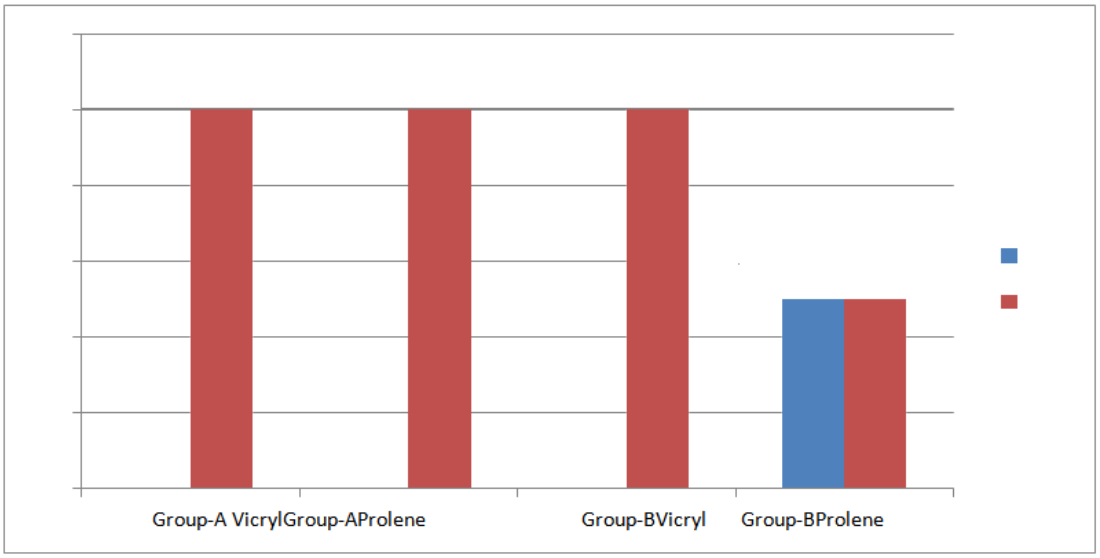


FIGURE 4: Sinus formation among the study groups

Bar graphs illustrating chronic pain among the study groups

The chronic pain among the study participants was analysed between the two groups which revealed us that it was observed in Group-A having the Prolene mesh followed by Group-B Prolene mesh and in other groups it was not observed which is showed in the figure below.

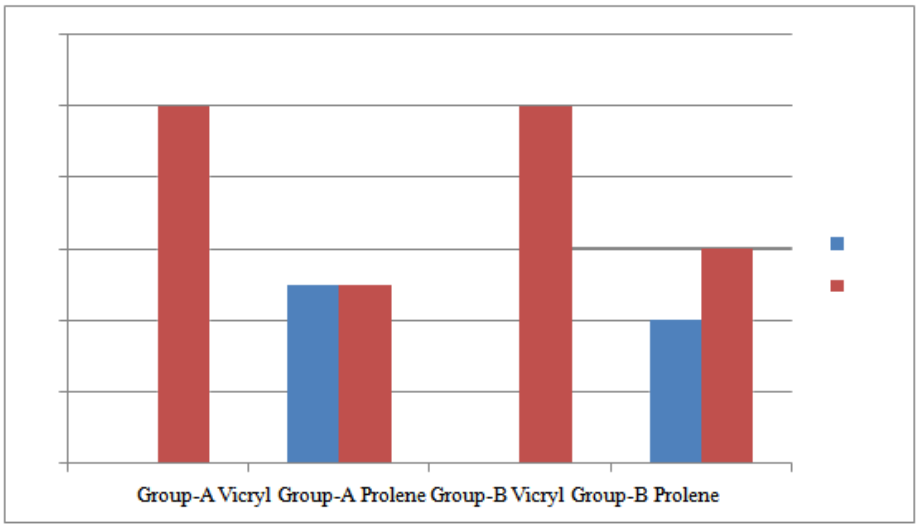


FIGURE 5: Bar chart illustrating chronic pain among the study groups

Anthropometric Assessment among the study groups

The anthropometric measurements (age, height and weight) were recorded for all the study participants and were screened for the presence of obesity based on their BMI. The mean and standard deviation of Age, Height and weight among the study groups were tabulated in the table below. The mean age among the groups was 49, 45.3, 51.5 and 50.3 respectively. Mean weights of the groups were higher in Group-A having vicryl is compared with other groups, lesser mean weight was observed in Group-A having vicryl. The mean height of the groups were high in Group-A having the Prolene mesh followed by other groups and less in Group-A Vicryl respectively.

Table 1: Average Age, Weight, and Height among the study groups

Study Groups	Age Mean ± SD	Weight (kgs) Mean ± SD	Height (cms) Mean ± SD
Group-A Vicryl	49±8.94	55.3±9.25	154.7±8.78
Group-A Prolene	45.3±7.92	65.8±4.89	166.5±6.69
Group-B Vicryl	51.5± 7.63	71.7±2.28	159.7±2.93
Group-B Prolene	50.3±11.01	69.4±1.56	158.5±4.82

Body Mass Index Assessment among the study groups

The mean BMI of the study groups were calculated and compared with published values of the IAP guidelines (2015) and are illustrated in the table below. The BMI in Group-B (Vicryl and Prolene) were higher than the Group-A (Vicryl and Prolene) respectively.

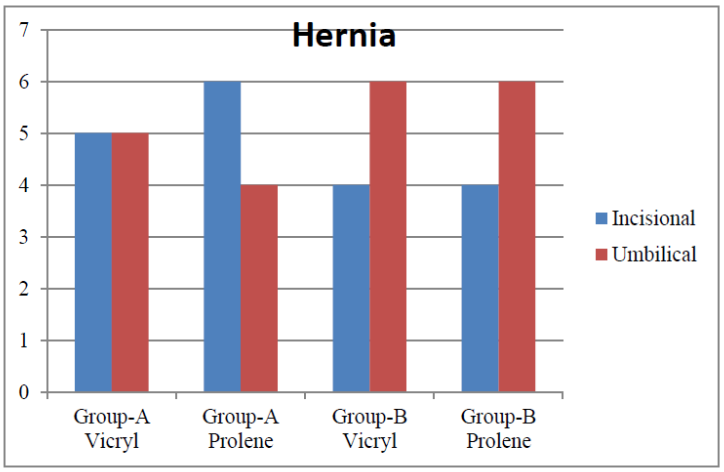
Table 2: Body Mass Index among the study groups

Study Groups	BMI Mean ±SD
Group-A Vicryl	22.89±1.18
Group-A Prolene	23.73±0.74
Group-B Vicryl	28.12±1.06
Group-B Prolene	27.68±1.45

Comparison of Hernia (umbilical hernia, incisional hernia) types among the study groups

The comparison of Hernia with study groups was carried out for the collected samples, which revealed us equal proportion of hernia (umbilical, incisional) was observed in Group-A Vicryl followed by other groups respectively.

FIGURE 6: Bar chart illustrating Hernia types among the study groups



BMI range among the study groups

The BMI was measured according to the standard scales of measurement, they can be classified as Underweight, Normal weight, Overweight and Obese, the results from our study revealed Group-A subjects were classified under normal weight and Group-B subjects were classified as Overweight which are illustrated in the figure below.

FIGURE 7: Bar chart illustrating BMI range among the study groups

Comparison of Hernia (umbilical hernia, incisional hernia) types among males and females

The comparison of Hernia with study groups among the males and females was carried out for the collected samples, which revealed us mixed proportion were observed in the study groups which are shown in the figure below.

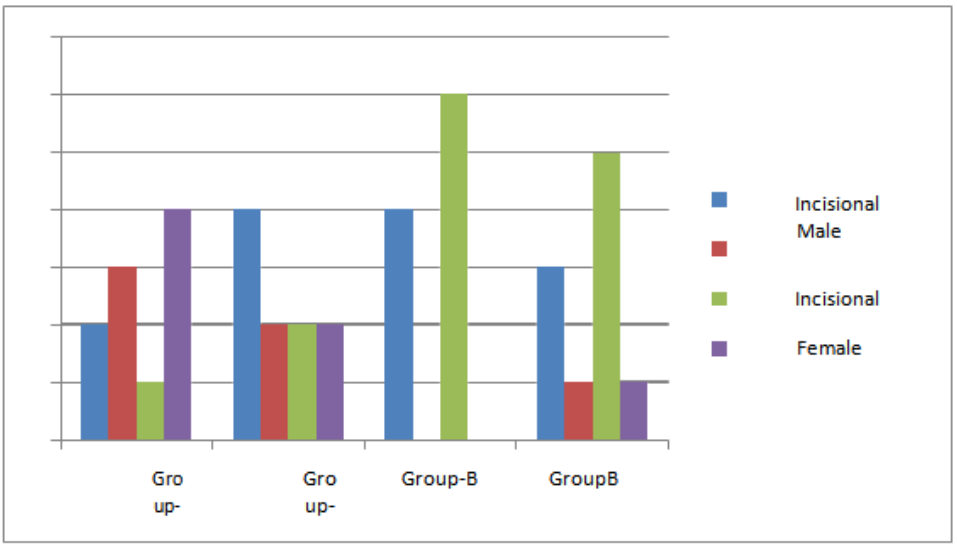


FIGURE 8: Bar chart illustrating Hernia types among males and females

Complications percentage among obese and non-obese individuals

The other complications among obese and normal weight subjects were expressed in percentage in the table below. in group-B the complications were 26% and in group-A it was 14% respectively, revealing no significant results with groups for the complications.

TABLE 3: Complications percentage among the study groups

Groups	Obese (%)	Non-Obese (%)	P-value
Group-A (Vicryl, Prolene)	0	14	0.801
Group-B (Vicryl, Prolene)	26	0	

Complications percentage among non-obese study subjects

The other complications among non-obese subjects were expressed in percentage in the table below in group-A the complications were 20% for Seroma, and 50% for chronic pain with Vicryl respectively.

TABLE 4: Complications percentage among the study groups

Groups	Seroma (%)	Chronic Pain (%)	P-value
Group- A (Vicryl, Prolene)	20	50	0.0494

Complications percentage among obese study subjects

The other complications among obese subjects were expressed in percentage in the table below. in groupB the complications were 40% for Seroma, 50% for Sinus formation and 40% for chronic pain respectively.

TABLE 5: Complications percentage among the studygroups

Groups	Seroma (%)	Sinus Formation (%)	Chronic Pain (%)	P-value
Group-B (Vicryl, Prolene)	40	50	40	0.0449

Complications percentage based on mesh

The complications based on the mesh used in the subjects were expressed in percentage in the table below, in group-A, B respectively.

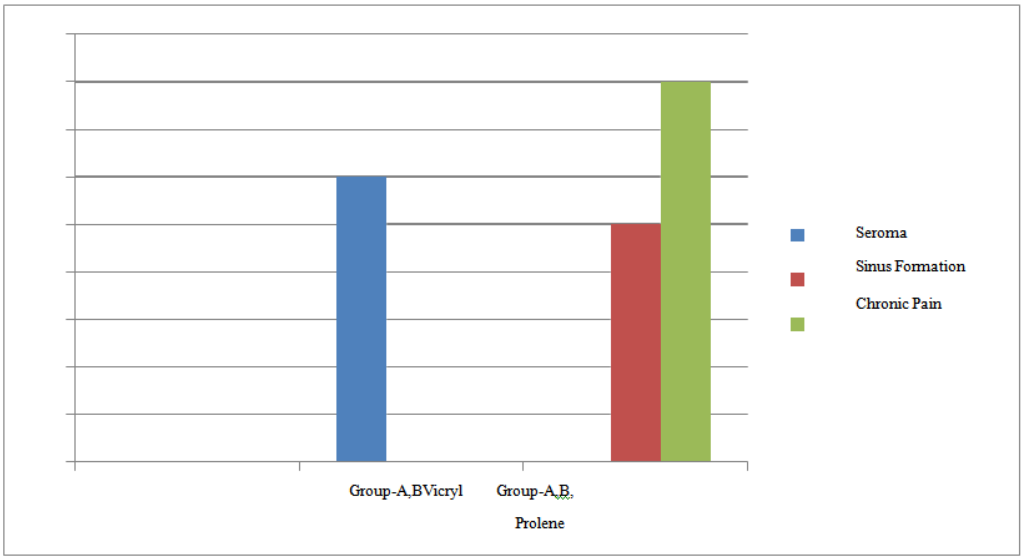


FIGURE 9: Bar chart illustrating complications based on the mesh

V. Discussion

The morbidly obese patients might be susceptible to develop hernias of wall of abdomen with the possible complications of small intestine obstruction

The MO patients have a more chance in developing hernias of wall of the abdominal and complication such as intestinal blockage (6). The recent or modern hernia repair methods have improved the opportunities in treating the victims in a one stage method to decrease the risk of incisional hernias.

The best perceptiveness on applying this for reconstructing the defects of wall of the abdominal and novel synthetic meshes with good mechanical properties are necessary for safe hernia repair, with new bio-compatible materials that provide tissue growth and might be better opposed to various infection than the available conventional meshes, had given a novel outlook for hernia management (7).

This study of included male: female-27:13 respectively, from the collected data it can be inferred that, higher number of males were included in this current study. Among the total study participants, highest numbers were from less than 50 years age. Likewise 20 patients were having normal weight and 20 patients were grouped under over weight, which is nearly 50% for both the groups. When comparing the results with other countries such as United States, overweight / obesity was found to be correlated with higher risk of other clinical issues.

Nearly, 63%, 55% male and female aged above 25 years or older are tend to be obese. Several case-studies have documented and recommended that a losing of weight might help to develop the technical

conditions of the intervention and helps to decrease the possible re-occurrence rate, however it might not change the perioperative complications risk.

The low-grade chronic inflammation were found to be observed in obesity, adipose tissue-derived macrophages and white adipose tissue secrete several cytokines so-called "adipokines," including interleukins and tumor necrosis factor-α (8). The signals which are related to metabolic surplus in overweight subjects are very similar to those present in response with tissue repair and injury, which are caused by main surgical procedures. The morbidly obese subjects experience ineffective energy use since metabolic excess leads to oxidative stress, hypermetabolic inflammatory responses, and also immunosuppression. By compiling all these causes, these obese patients are not prepared to handle with high physiologic stress and might experience new postoperative complications and also other events than normal weight patients (9).

In this current study, we have observed significant differences in complications between Group-A and Group-B; we noticed a trend towards increase in complications associated with obesity in our study. The choice and selection of mesh is important issue in these types of surgical procedures. The usage of bioprosthetic mesh has been previously found to be associated with a less incidence of mesh-related infections, enterocutaneous fistulae and adhesion; low rate of infection, exposure of mesh leading to explantation, wound complications and reconstruction failure, but they have similar hernia recurrence rates when comparing with synthetic mesh and they are more expensive (10).

Our study can be considered with some limitations such as; first the sample-size of this study is relatively small and 40 samples were only analyzed, with two groups such as obese and non-obese subjects. Second the retrospective study design of this study which may have the possibility of selection bias in analysis. In conclusion from this study, more studies on this hernia with obesity are to be warranted and, the effect of preoperative weight loss among bariatric surgery, obese patients, should be further extensively investigated as a preventive measure to reduce the risk of postoperative complications and recurrence of hernia among the patients.

VI. Conclusion

From this study we concluded that obesity plays a major role in Ventral hernia and its complication. It shows vast variation between Obesity and non-obesity patients. Based on this findings, obesity is more prone for complications. Among the two different suture materials, Vicryl and prolene, vicryl shows more complications especially in obese patients than prolene.Complications associated with hernia such as Seroma, Wound Infection, Early Recurrence, Chronic Pain were seen more in obese patient when vicryl material is used. Sinus Formation occurs more in prolene patients with obese than other.

More studies on this hernia with obesity are to be warranted and the effect of preoperative weight loss among bariatric surgery, obese patients, should be further extensively investigated as a preventive measure. In future this study is helpful to reduce the risk of postoperative complications and recurrence of hernia among the patients.

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