

Abdominoplasty Combined with the Anterior Component Separation Technique for Reconstruction of Midline Large Ventral Hernias: Functional and Aesthetic Outcome Clinical Study

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ABSTRACT

Background: Large midline ventral hernias, diastasis of recti and the associated laxity and abdominal shape deformity, represent aesthetic and functional problems for the patients. So, the surgical treatment of both pathologies at the same time is highly recommended if the patient's general condition permits. This can be achieved by a comprehensive technique incorporating abdominoplasty performed by a transverse lower abdominal incision into any of the hernia repair techniques.

Objective: The aim of this study is to evaluate the functional and aesthetic outcome of the combined abdominoplasty and anterior component separation technique in the management of midline ventral abdominal hernias.

Patients and Methods: This study is a prospective case control study that evaluates both functional and aesthetic outcome of performing abdominoplasty on patients with large midline ventral hernias. This study was conducted between December 2020 to March 2022 at the Plastic Surgery Department, Demerdash University Hospital, Cairo, Egypt. Study consisted of fifteen female patients with different presentations of abdominal wall laxity and ventral hernias. Patients were evaluated regarding their age, BMI, degree of rectus diastasis, Pre-operative radiological findings, post Operative complication and hernia reoccurrence, and patients' satisfaction.

Results and Conclusion: The current study showed that Abdominoplasty can be combined with complex hernia repair by anterior component separation technique within the same setting in high-risk patients safely with an excellent functional outcome and acceptable satisfactory aesthetic results. Although, this can be associated with minimal risk of postoperative surgical site complications such as; skin necrosis and wound infection. Patient characteristics associated with the development of complications following anterior component separation combined with abdominoplasty include obesity, previous abdominal procedures and previous pregnancies.

Key Words: Panniculectomy – Tummy-Tuck – Divarication – Diastasis – Plication.

Disclosure: No conflict of interest.

INTRODUCTION

Large midline ventral hernias, diastasis of recti and the associated laxity and abdominal shape

deformity, represent aesthetic and functional problems for the patients. So, the surgical treatment of both pathologies at the same time is highly recommended if the patient's general condition permits. This can be achieved by a comprehensive technique incorporating abdominoplasty performed by a transverse lower abdominal incision into any of the hernia repair techniques.

The component separation technique was first described by Ramirez et al., in 1990 [1] as a new technique for abdominal wall reconstruction in ventral hernia repair. It was proved to be very effective for reconstructing large or complex midline abdominal wall defects, as it has the advantage of restoring the innervated dynamic abdominal wall integrity without producing undue tension on the repair [2,3].

The recurrence rate after the use of component separation technique was found to be ranged from 0%-30%. This technique shortly after being introduced into the field of hernia repair had been considered as a basic procedure for midline hernia repair. In this method, the external oblique muscle aponeurosis is dissected 1.5-2.0cm lateral to its attachment to the rectus abdominis muscle and parallel to it along its entire length. Further, the tissue under the aponeurosis is dissected laterally till lumbar veins appear. Being, bilateral, it enables to mobilize the rectus muscles medially (5-10cm in the upper abdomen, 10-15cm in the umbilical area, and 3-8cm in the lower abdomen) [4]. According to some others, once the rectus muscles are relocated in situ it will start functioning well postoperatively preventing recurrences and improving the chronic back pain [5]. Kim et al., 2011 [6] considered this technique as a method of choice and a real alternative to prosthetic repair.

Anterior component separation technique has a number of advantages over inlay technique, and is consistent with a concept of an adequate abdominal wall repair in large midline hernias, therefore, it can be recommended for people of workable age, which is the ideal age for abdominoplasty as well.

To our knowledge, there are a few published articles in the literature in which abdominoplasty was combined with hernia repair techniques. In these, the abdominoplasty was performed through the vertical midline incision. This approach succeeded in combining a strong hernia repair with very low recurrence rate, a well-shaped tucked abdomen, yet the patients weren't fully satisfied with the residual midline scar [7]. Therefore, adding the abdominoplasty (low horizontal incision technique) to the equation with the component separation technique as the technique of choice for midline hernia repair, in selected patients with laxity of the abdominal wall, will achieve both a safe procedure and improved aesthetic outcome. In addition, it will raise the awareness of this technique among various specialties and to advocate the plastic surgeons to get more involved in the management of these complex cases.

PATIENTS AND METHODS

This Prospective case control study was conducted on 15 female patients complaining of various types of Abdominal midline defects and Abdominal wall laxity, in the period from December 2020 to March 2022; whereas all cases were followed-up for at least six months post-operatively, at the Plastic Surgery Department, Demerdash University hospital, for correction of abdominal deformity. Their ages varied from 33 years to 43 years (Mean age: 38).

The sample population was managed by the Anterior component separation for the hernia repair, vertical midline plication after the repair and conventional abdominoplasty for treatment of skin and soft tissue redundancy.

Ethical consideration: Consent was obtained from all participants. This study was approved by the Research Ethics Committee of Faculty of Medicine, Ain Shams University.

Inclusion criteria: In this study, adult female (21-60) years, BMI (25-45), complaining of abdominal wall laxity and large midline ventral defects were included.

Large is defined as defects over 4cm in diameter according the European Hernia Society (EHS) and American Hernia Society (AHS) classification for umbilical or paraumbilical and epigastric hernia [29].

Exclusion criteria: Patients' age below 21 years and above 60 years, patients with unrealistic expectations, patients who were expected to have bad compliance for follow-up post-operatively, patients complaining of severe Skin infections, Patients with other types of hernias other than midline ventral hernias, patients with obstructed or strangulated hernia, patients with uncontrolled chronic co-morbidities such as; Cardiac, Diabetic or chronic chest problems were not included.

Surgical intervention: All procedures were done under general anesthesia. Prophylactic antibiotics were given to all the patients at the time of induction of Anesthesia. All patients were operated upon in the supine position. Foley's catheters were inserted to all patients to monitor urine output. Compression stockings were applied to minimize the risk of VTE events. The procedures started by a lower abdominal incision. Skin flaps were raised to the level of infrasternal angle in the midline and the coastal margin laterally. Anterior Abdominal wall was exposed. Hernial content was reduced back into the Abdomen. The size of defect was measured in width which ranged from 6 to 13cm (mean average 9.4cm). The extent of diastasis of recti was also measured at widest point ranged from 9 to 15 (mean average 11.2cm). Anterior Component separation technique was performed as described by Ramirez. The external oblique muscle was divided vertically 2cm lateral to the semilunaris line to allow tissue medialization of the recti to achieve both primary closure of the defect and plication without tension. Primary defect closure was done using (Prolene 1-0) suture and the plication was done by using continuous sutures (PDS Double loop) supported by interrupted sutures (prolene 1-0) from the xiphoid process till the symphysis pubis. The abdominal skin flaps were excised. The umbilicus was dissected and released from its original position and sutured to the new position to be placed approximately just below the midpoint between the Xiphoid and the symphysis pubis according Simon et al., 2010 [28,31-36]. Adequate hemostasis was done. Two suction drains were inserted in all patients. Closure of the deep subcutaneous layer by using vicryl zero, followed by vicryl 2-0, and closure of the skin by running subcuticular (intradermal) suture prolene 3-0.

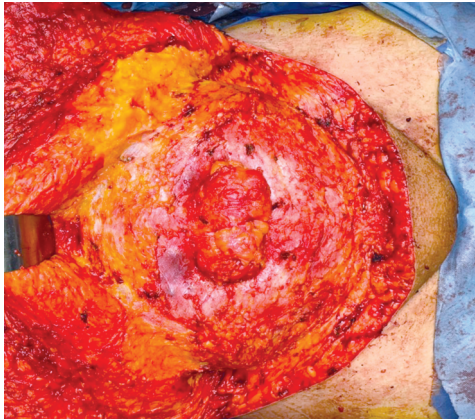


Fig. (1): Showing a large midline defect in one of the participants.

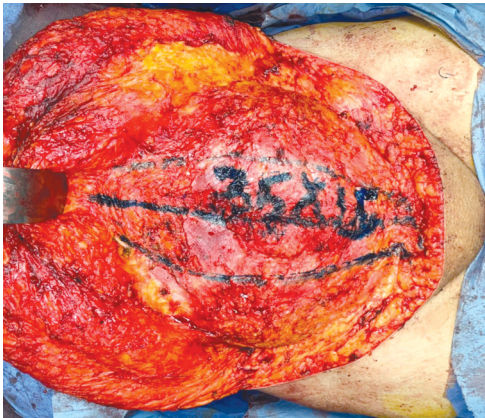


Fig. (2): Extent of recti diastasis measured and noted by methylene blue stain.



Fig. (3): Anterior component separation performed by two vertical incisions dividing the external oblique muscles from the lateral borders of rectus abdominis muscle to allow both medialization of recti at the level of the defect and a tension free plication of the recti.

Post-operative period: Abdominal binder was worn as soon as the operation was over. Patients were instructed to sleep in semi sitting position from 4-6 weeks post operatively and not to walk erect neither stand up straight during the 1st week post-operatively. No anti-coagulants were pre-

scribed and early ambulation was advised post-op to minimize risk of VTE [30]. Oral antibiotics and analgesics were continued on for 1 week postoperative. The urinary catheter was removed in the second day postoperative. The drains were evacuated every 24 hours, the amount and color were recorded. The patients were discharged after removal of the drains (2-4 days post-operative). Follow-up was done at one week, two weeks (subcuticular suture removed), four weeks, 6 weeks, three months and 6 months after discharge [37-40] where postoperative measurement and photos were taken and the patient satisfaction score sheets were completed by all patients. All preoperative data, surgical interventions and post-operative findings were documented and analyzed regarding mean age, BMI, previous pregnancies, pre operative radiological findings, degree of diastasis of recti, pre operative & post-operative umbilical measurements, post-operative complication rate, and patient degree of satisfaction by the CSQ-8 [27].

Statistical analysis: The quantitative data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. The Shapiro test was used to verify the normality of distribution. Quantitative data were described using, range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). Significance of the obtained results was judged at the 5% level. The used test was Wilcoxon signed ranks test for non-normally distributed quantitative variables, to compare between two periods.

RESULTS

This study was conducted on fifteen female patients who were complaining of different types of midline ventral hernias, rectus diastases, and abdominal wall laxity. Patients were managed by Hernia Repair, vertical midline Plication, Anterior component separation and Abdominoplasty. There were multiple variables in all the patients in the study including age, BMI, number of previous pregnancies and presentation of midline hernias, rectus diastasis, post operative complications and patient satisfaction. All were compared as following:

A- Age:

The mean age of patients was ~38 with maximum 43 years and minimum of 33 years as shown in Table (1) and Fig. (1). Mean age of patients: 37.73 with max. (43) and min. (33).

Table (1): Descriptive analysis of the studied cases according to age (N=15).

Age (years)	No.	%
<40	11	73.3
≥40	4	26.7
Min. - Max.	32.0-43.0	
Mean ± SD.	37.73±3.15	
Median (IQR)	38.0 (36.0-39.5)	

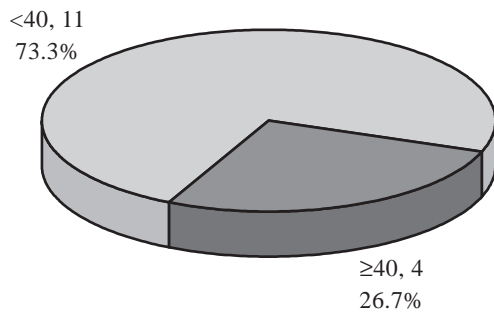


Fig. (4): Showing the percentage of patients above and below the age of 40.

B- BMI:

The mean BMI of the patients was ~34 with maximum 44.0 and minimum of 26.5 as shown in Table (2) and Fig. (2). Considering the BMI of the cases we found that 60% of our cases were below 35 while 40% were above 35.

Table (2): Descriptive analysis of the studied cases according to BMI (N=15).

BMI (kg/m ²)	No.	%
<35	9	60.0
≥35	6	40.0
Min. - Max.	26.50-44.0	
Mean ± SD.	34.09±5.53	
Median (IQR)	33.0 (30.0-37.5)	

IQR: Inter quartile range. SD: Standard deviation.

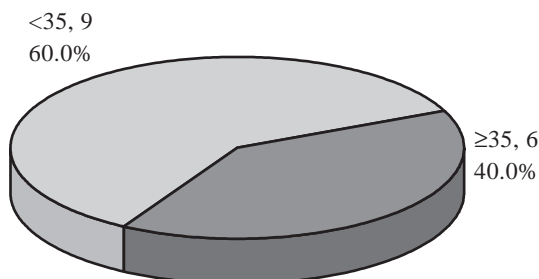


Fig. (5): Descriptive analysis of the studied cases according to BMI.

C- Previous pregnancies:

All patients in the study were multiparous with maximum of five pregnancies and minimum of 3 as shown in Table (3) and Fig. (3).

Table (3): Distribution of the studied cases according to previous pregnancies (N=15).

Previous pregnancies	No.	%
3	13	86.66
4	1	6.66
5	1	6.66

IQR: Inter quartile range. SD: Standard deviation.

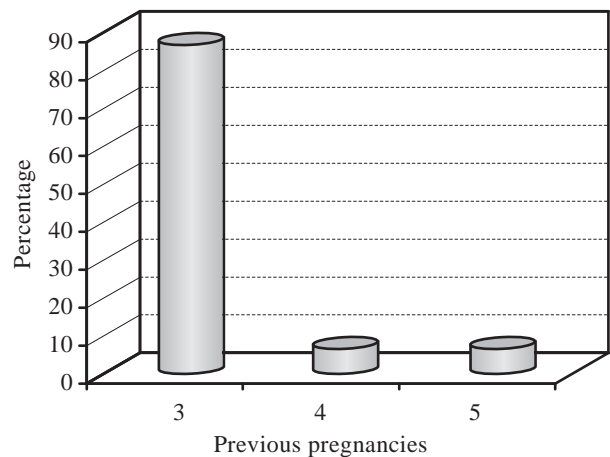


Fig. (6): Showing number of previous pregnancies.

Rectus diastases & hernia defect:

All of our cases complained of rectus diastases and Hernia defect which diagnosed preoperatively clinically or radiologically and later confirmed intra operatively by direct measuring with mean average of 11.20 maximum diastases of 15cm and minimum of 9cm (Table 4). The width of the hernia defect mean average 9.40cm with maximum defect of 13cm and minimum of 6cm. (Table 5).

Table (4): Rectus diastasis.

	Min. - Max.	Mean ± SD	Median (IQR)
Rectus diastasis	9.0cm-15.0cm	11.20±1.86	11.0 (10.0-12.0)

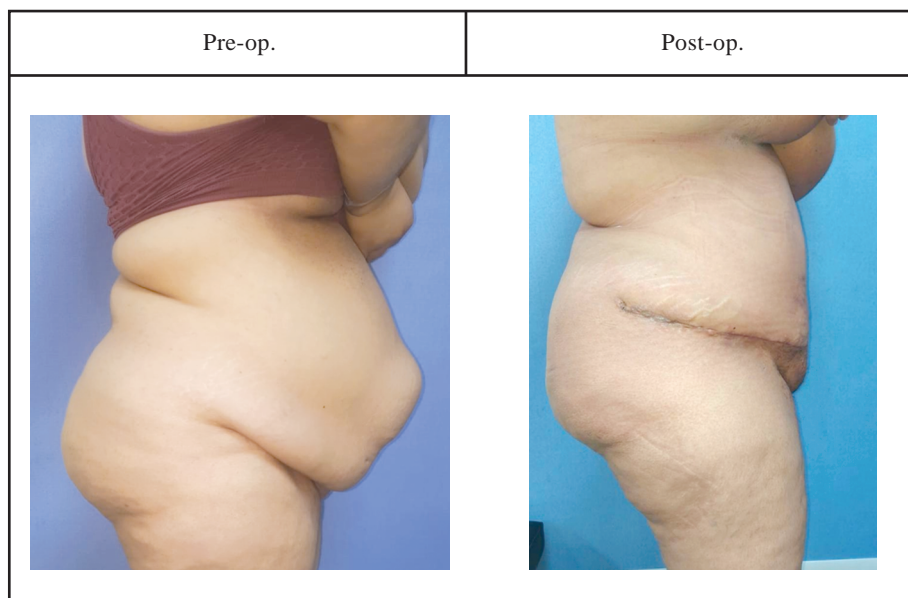
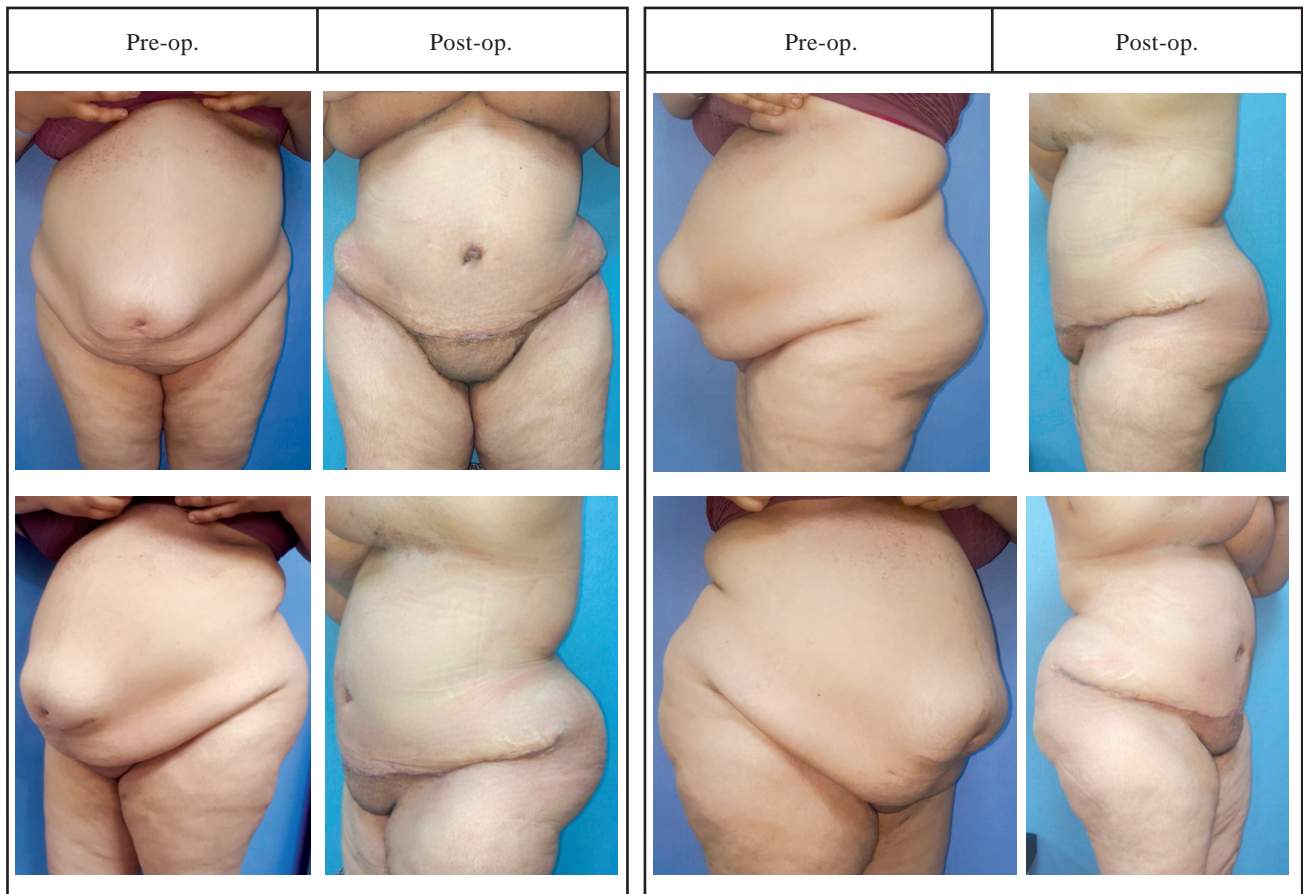
Table (5): Hernia defect.

Defect size (cm)	Total no. = 15
Median (IQR)	10 (6-11)
Mean ± SD	9.4±2.53
Range	6-13

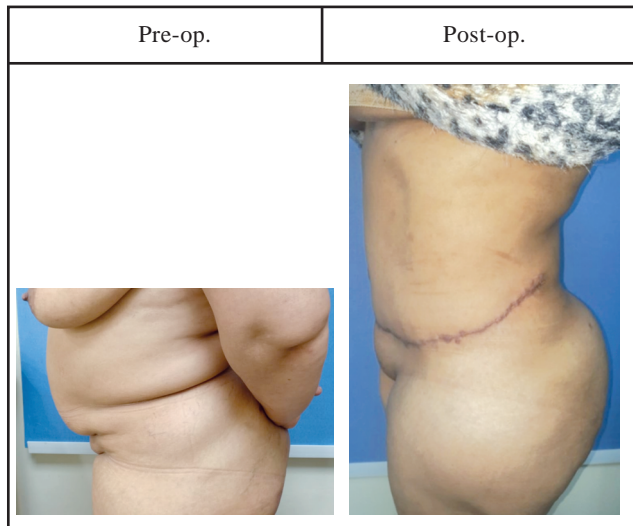
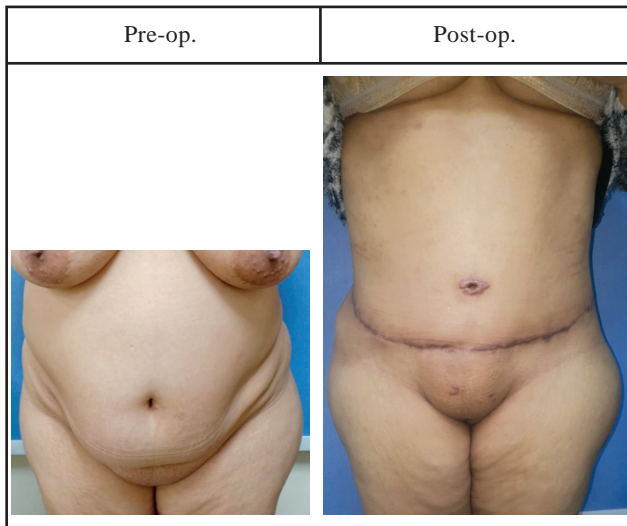
Post-operative complication:

Post-operative complications were reported in 13.33% of the cases (2 out of the 15 studied cases) ranging from wound infection and skin necrosis, each reported in 6.66% respectively. Wound infection at the umbilical wound was reported in one

Cases



Case (1): Female patient, 38 years old, 44 BMI, 3 previous pregnancies all were delivered by C-section, presented by recurrent paraumbilical hernia that was repaired by conventional herniorrhaphy 2 years prior presentation. No recurrence was reported at 6 months after the study. Patient scored 100% satisfaction rate.



Case (2): Female patient, 40 years old, 44 BMI, 5 previous pregnancies all were delivered by C-section, presented by paraumbilical hernia since the 3rd pregnancy which was 10 years ago which had become larger the following two pregnancies. No recurrence was reported at 6 months after the study. The patient scored 75% satisfaction rate.

DISCUSSION

Midline ventral hernias form a commonly encountered problem in the field of plastic and reconstructive surgery. In our study, we share our experience with Abdominoplasty combined with midline large ventral hernia repair by vertical plication and the Anterior Component separation technique. Adding to the existing midline ventral hernia literature, we expect this study may contribute to the progress of the field of Abdominal wall repair, decrease hernia post repair recurrence and complication rates, and improve overall patient outcomes both functionally and aesthetically.

The impact of the patient's age, BMI and comorbidities was affected by the exclusion criteria suggested for a purposive prospective study evaluating Abdominoplasty combined with the anterior component separation technique for hernia repair [16]. Similarly in our study, we defined ages to be above 21 and below 60 and BMI to be lower than 45kg/m². In one study evaluating short-term complications, hernia recurrence, and healthcare utilization by Shubinets et al., [18] the authors reported that in patients who were presented with multiple comorbidities, Abdominoplasty may be done under caution, because these high risk patients are more prone to early postoperative complications. However, the authors also stated the importance of an optimal repair in these cases, considering their high risk of occurrence. We were also faced by similar challenges of having patients presented

with comorbidities such as; obesity and ventral hernia who also displayed great concern about the appearance of their abdomen after repair.

Many benefits of Abdominoplasty for patients with morbid obesity have been recognized in the literature, including better visualization of the hernia defect after exposing the abdominal wall—enabling performance of the component separation and allowing obliteration of the dead space [19]. This study adds to the existing literature by reporting the results we obtained with performing conventional Abdominoplasty concurrently with the hernia repair on a sample with more comorbidities than in previous studies such as the high grades of obesity that we included. Such information is viable considering the recent controversy of combining Abdominoplasty in patients with substantial comorbidities. The results are also essential for improving preoperative planning and patient risk assessment considering the high frequency of obesity in this patient population.

Medical comorbidities are extremely common in the midline ventral hernia population, with obesity being the most prevalent [15]. Also in our study, almost half of our cases were at least class II and III obesity, while more than half were overweight and class I obesity. The rates of postoperative wound complication, the need for reoperation, and recurrence of hernia have been proven to increase significantly with increasing BMI [20,21]. Several recent studies have indicated that improvements in abdominal wall repair have led to decreasing the recurrence rates to as low as 6% to 11% in the obese population [12,15]. In a 2017 comparative study by Giordano et al., [16] has proven no significant difference in hernia recurrence rates with the different obesity classes which we found to be consistent with our study, recurrence rate, was reported at 0% despite high BMI of the majority of our cases. Similarly, we pay the attribute of such results to the implication of the recti plication and the anterior component separation technique.

While some studies have demonstrated that hernia recurrence rates, wound complications and reoperation rates remain significantly higher in patients with excess BMI. We, on the contrary, found that post-operative complication rates were very minimal. Wound complications such as infection and skin necrosis were reported in only 13% of patients with BMI in excess of 30kg/m². These findings are similar to wound complication rates found in some other studies [15,22,23].

However, improvements in the avoidance of wound complications yet need to be advanced to

reach 0% complication rate. Elements contributing to wound complications in the obese population include chronic inflammatory state, reduced oxygen tension of excessive subcutaneous fat, and the presence of medical comorbidities such as diabetes mellitus, hypertension and obesity [16]. The implementation of epigastric artery perforator sparing fasciocutaneous flaps during dissection has improved blood supply to the skin and subcutaneous tissues in the postoperative period, enhanced wound healing and reduced skin necrosis. Recent studies have shown a significant reduction in skin necrosis with utilization of these techniques [12,13]. We, as well, have had a low incidence of skin necrosis; 6%, by applying the same technique.

The decision to perform Abdominoplasty concurrently with midline ventral hernia repair has been a cause of dispute among researchers. In a prior study by Shubinets et al., [18], has shown a considerably lower rates of hernia recurrence over 2 years post repair but reported a higher rate of early complications and greater healthcare expenditures. Consistently, another study reported similar results in regards to wound complications and hernia recurrence rates at long-term follow-up but even higher wound morbidity [16]. On the contrary, Hughes et al., [24] and Reid et al., [25] both reported a reduction in both the incidence of wound complications and hernia recurrence rates, which we also have found to be consistent with our results.

In our study, 15 patients underwent concurrent Abdominoplasty and vertical plication of recti at the same setting of the Hernia Repair by Anterior component separation. Only two of these patients experienced wound complication early post-operatively in comparison to 13 patients with no complications at all.

Prior studies have demonstrated that the number of previous hernia repair is an independent risk factor for recurrence, complication rates, and reoperation rates [26]. A study by Smolevitz et al., [17] assessing the impact of concomitant abdominoplasty demonstrated that, despite having no statistically significant differences in baseline characteristics such as average age, gender and operative time, all patients with recurrences had previous hernia repairs. In our study, it is interesting to note that, when stratified number of pregnancies, we found that hernia reported at least after three pregnancies. Thus, according to our study population, we would like to suggest that one of the major causes of midline ventral hernia and abdominal wall laxity in our study population was at least 3 pregnancies.

The addition of Abdominoplasty to the hernia repair has likely contributed the most to wound complication which was also reported with previous studies [17,24] which the authors attribute to the grade of obesity [15,19,26]. Although we have had similar incidents, yet in our study we added abdominoplasty to the hernia repair but the overall percentage of complications were not as high as reported in prior studies.

Limitations:

While our study does provide an extensive review of patients who underwent Abdominoplasty concurrently with co-morbidities such as; large midline hernias and high grades of obesity, there are instinctive limitations that may have been a withdraw to our review such as a limited follow-up of only six months and the number of patients of only 15 cases.

Conclusion:

Abdominoplasty combined with large hernia repair by anterior component separation can be performed concurrently within the same setting in high-risk patients safely with an excellent functional outcome and an acceptable satisfactory aesthetic result. Although, this can be associated with minimal risk of post-operative surgical site complications such as; wound infection and skin necrosis. Patient characteristics associated with the development of complications following anterior component separation combined with abdominoplasty include obesity, previous abdominal procedures and multiple previous pregnancies.

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