Original Paper

Ventral Hernia Repair and Diabetes Mellitus - A Prospective, Observational and Comparative Study of Outcomes

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ABSTRACT: Diabetes mellitus (DM) and obesity are known to influence postoperative outcomes in surgical patients. This study aimed to analyze the divergence in outcomes between patients with and without DM who underwent ventral hernia repair, while also assessing the additional impact of obesity on postoperative complications, hospitalization, and costs. A prospective, non-interventional, observational study was conducted over five years (2018-2022) at the First Surgical Clinic of Craiova Emergency Clinical Hospital. The study included 216 patients, with 42 (19.44%) having DM, half of whom were also obese. There were no significant differences in age between patients with or without DM. However, diabetes and obesity were more prevalent in female patients. The mean duration of hospitalization was 10.7±8.6 days, with no significant differences observed between patients with or without DM or obesity. Statistical analysis revealed that patients with DM had a higher incidence of seroma formation, wound infection, and hematoma formation compared to patients without DM. However, there were no significant differences in mesh infection, hospitalization days, or costs between the two groups. Similarly, no significant differences were found between obese and non-obese patients in terms of complications, hospitalization days, or costs. In conclusion, this study highlights that DM is associated with an increased risk of specific complications in ventral hernia repair, including seroma formation, wound infection, and hematoma formation. However, the impact of obesity on these outcomes appears to be limited. Individualized preoperative optimization and targeted interventions are necessary to mitigate the risk of complications in patients with DM or obesity.

KEYWORDS: *Ventral hernia repair, diabetes mellitus, obesity, outcomes.*

Introduction

Diabetes mellitus (DM) is considered to be an important factor which influences postoperative outcomes in surgical patients.

DM is considered to impair healing, to be a risk factor for surgical site infections (SSI) and a risk factor for recurrence [1,2].

Moreover, patients with DM have higher in-hospital costs and prolonged length of hospital stay [3].

Some studies nuance the risk of DM, showing that there is a difference between patients with insulin dependent DM and insulin non-dependent DM, and between patients with complicated and non-complicated DM [4].

Consequently, patients with DM necessitate careful optimization before surgery.

Obesity is a prevalent health issue that has reached epidemic proportions worldwide [5].

When it comes to ventral hernia repair, obesity poses several challenges and significantly impacts the postoperative outcomes [6].

Research has consistently shown that obese individuals undergoing ventral hernia repair are at a higher risk of experiencing postoperative complications compared to non-obese individuals.

Additionally, obesity is often associated with underlying metabolic disorders and comorbidities such as diabetes, hypertension, and cardiovascular diseases, further contributing to the increased risk of postoperative complications [7].

The impact of obesity on ventral hernia repair extends beyond the immediate postoperative

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period, leading to longer hospitalization and higher healthcare costs.

Obese patients undergoing hernia repair may require a longer duration of hospital stay for close monitoring and management of complications.

The presence of comorbidities associated with obesity also adds to the complexity of postoperative care, necessitating specialized medical interventions and extended hospitalization [8].

Moreover, the increased risk of complications in obese patients may require additional procedures such as wound debridement or revision surgery, further prolonging the hospital stay and escalating the costs associated with the treatment.

The economic burden of obesity-related ventral hernia repair is substantial, considering the increased healthcare resources required, including extended hospital stays, additional medications, laboratory investigations, and professional services [9].

This study aims to analyze the divergence in outcomes between patients with and without DM, in terms of postoperative outcomes, in patients undergoing ventral hernia repair.

Beside this primary endpoint, secondary objectives were to determine if the association of obesity has an additional impact on postoperative complications, hospitalization and costs.

Material and Method

We performed a prospective, non-interventional, observational study on patients with ventral hernia repair which were treated in the First Surgical Clinic of Craiova Emergency Clinical Hospital.

The study was conducted over a period of 5 years (2018-2022).

Inclusion criteria consisted of patients with ventral hernia, which were repaired in our Department, over 18 years of age, and signed the informed consent.

Data homogeneity

Preoperative workout comprised a full biologic panel (complete blood count, glycemia, blood nitrogen, creatinine, urine, liver enzymes, coagulation panel, ionogram, total proteins, ECG, pulmonary X-ray).

Defects were measured clinically and the size was classified as W1 for 0-5cm, W2 for 5-10cm, W3 for >10cm, according to the EHS classification for incisional hernias [10].

Hernia localization was also classified according to EHS classification, and grouped as supraumbilical (M1, M2), periumbilical (M3), subumbilical (M4, M5) and complex hernias (multiple M).

Preoperative preparation

Skin preparation prior to surgery was systematically performed with an antibacterial scrub and with betadine soap. No skin cover was used.

Thromboprophylaxis was applied only in patients with high risk according to Caprini score for Venous Thromboembolism [11].

Antibiotic prophylaxis was routinely performed with a single dose of second generation cephalosporins at induction, with an additional dose if procedure lasted more than 3 hours.

Techniques used

Repair technique employed was dependent on surgeon preference, experience, patient setting, and local factors.

Most of the patients benefitted from preperitoneal Rives-Stoppa technique using polypropylene light mesh.

Transversus abdominis release (TAR) was performed in cases with a defect size of more than 10cm, and it was performed bilaterally.

The mesh was anchored to the abdominal wall with transfascial sutures with polypropylene 2/0, and the knot buried in the subcutaneous fatty tissue.

After mesh placement in the preperitoneal space, if closure of the anterior aponeurosis of the rectus abdominis muscles was unattainable, a substitution mesh (lightweight microporous polypropylene mesh) was placed, fixed to the margins of the anterior aponeurosis, in an onlay manner.

Drains usage and placement was dictated by surgeon choice.

Panniculectomy was performed if deemed necessary.

Postoperative care

NG tubes were regularly placed after induction of anesthesia.

If patient presented in the acute setting and/or was at high risk of aspiration, NG tubes were placed prior to induction.

Nasogastric tube was removed at the end of the anesthesia.

Postoperative, early mobilization from bed was encouraged, pain control was administered on demand, early removal of urinary catheter in the first or second postoperative day, oral liquid diet was started from the first postoperative day, solid food intake was allowed after passage of

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flatus, closed-circuit drains were monitored and drainage aspect and quantity was followed daily.

Drains were removed progressively, depending on drainage and surgeon choice.

Patients used an elastic abdominal binder to reduce pain when in upright position.

Decision to discharge was taken on restoration to solid food diet, full mobilization, SSI status.

Patients were followed up postoperative at regular intervals at 1, 3, and 6 months postoperatively and on demand.

Statistical Analysis

We examined the impact of diabetes or obesity on hospital complications and costs in hospitalized patients with incisional hernias.

Continuous data was expressed as mean and standard deviation, median (interquartile range) and compared using Mann-Whitney U test or Kruskal-Wallis test.

Categorical data was presented as percentage and compared using Chi-squared or Fisher's Exact test.

The existence of statistical correlations between the different variables using Spearman's coefficients was assessed (weak correlation, |rho|=0,2-0,4; moderate correlation, |rho|=0,4-0,6; strong correlation, |rho|=0,6-0,8; very strong correlation, |rho|=0,8-1).

A two-tailed $p<0.05$ was considered to be statistically significant. Statistical analysis was performed with GraphPad Prism v.9.5.1 for Windows (GraphPad Software, San Diego, California USA, www.graphpad.com).

Results

The population study included 216 patients.

Of them, 42 (19.44%) patients with diabetes mellitus (half of them having both diabetes and obesity).

The mean age of patients was 64.23±13.11 with extremes of 26 and 87 years old.

Pulmonary co-morbidities (COPD, Asthma, pulmonary fibrosis) were present in 16 patients (7.41%), cardiac co-morbidities were present in 106 patients (49.07%) and represented arterial hypertension (88 patients, 40.74%), heart failure (12 patients, 5.56%), ischemic cardiopathy (4 patients, 1.85%), history of acute myocardial infarction (4 patients, 1.85%) and valvular heart disease (5 patients, 2.31%).

Neoplasia was present in 41 patients (18.98%) and cirrhosis in 6 patients (2.78%).

No significant difference of age was found between patients with or without diabetes or obesity (Table 1).

Diabetes and obesity were more prevalent in women patients (p=0.003).

The mean duration of hospitalization was 10.7±8.6 days with extremes of 3 and 93 days.

No significant differences were observed between patients in terms of seroma formation, mesh infection, hospitalization or costs; but significance was met for wound infection (p=0.006), hematoma formation (p=0.05), which are more frequent in obese and diabetic patients (Figure 1, Table 1).

Table 1. Characteristics of the patients.

	No Diabetes or Obesity (n=122)	**Diabetes (n=21)**	**Obesity (n=53)**	**Diabetes and Obesity (n=21)**	**p-value**
Age	64.08±13.49 66 (56-75.25)	58.71±13.85 60 (50.5-68.5)	64.83±12.23 66 (58.5-74)	69.33±10.4 70 (67-76)	0.826[a]
Gender, male, n (%)	37 (30%)	7 (33%)	17 (32%)	5 (24%)	**0.003**[b]
Size					
W1 (Small)	16 (13.1%)	5 (23.8%)	6 (11%)	4 (19%)	0.727[b]
W2 (Medium)	52 (42.6%)	7 (33.3%)	21 (40%)	10 (48%)	
W3 (Big)	54 (44.3%)	9 (42.9%)	26 (49%)	7 (33%)	
Localisation					
M1 or M2 (Supraumbilical)	22 (18%)	3 (14%)	11 (21%)	5 (24%)	0.053[b]
M3 (Periumbilical)	69 (57%)	6 (29%)	31 (59%)	7 (33%)	
M4 (Subumbilical)	2 (2%)	-	-	-	
Multiple M (Complex)	15 (12%)	8 (38%)	9 (17%)	7 (33%)	
Repair					
Anatomic	28 (23%)	6 (29%)	11 (21%)	4 (19%)	0.66[b]
Open Preperitoneal	67 (55%)	13 (62%)	34 (64%)	12 (57%)	
Onlay	12 (10%)	2 (10%)	3 (6%)	5 (24%)	
Open IPOM	7 (6%)	-	3 (6%)	-	

IPOM & Interlay Laparoscopic IPOM Laparoscopic preperitoneal	6 (5%) 1 (1%) -	- - -	1 (2%) - 1 (2%)	- - -	
Seroma, yes, n (%)	20 (17%)	7 (33%)	9 (17%)	8 (38%)	0.074 [b]
Infection wound, yes, n (%)	1 (1%)	3 (14%)	1 (2%)	3 (14%)	**0.006** [b]
Infection mesh, yes, n (%)	2 (2%)	1 (5%)	-	-	0.362 [b]
Hematoma, yes, n (%)	6 (5%)	5 (24%)	2 (4%)	1 (5%)	**0.050** [b]
Viscerolysis, yes, n (%)	69 (57%)	12 (57%)	29 (55%)	13 (62%)	0.956 [b]
Cancer, yes, n (%)	26 (22%)	3 (14%)	10 (19%)	5 (24%)	0.843 [b]
Hospitalization days	10.58±9.05 10 (7-12)	12.62±19.35 8 (5-13)	11.75±9.84 9 (7-12.5)	10.29±5.52 9 (6.5-13.5)	0.987 [a]
Costs, Euro	688.5±602.9 597.5 (455.2-780.4)	786.2±1088.6 538.8 (308.3-825.1)	766.3±557.9 647.7 (451.6-786.1)	676±330.7 607.3 (406.5-815.7)	0.555 [a]
Costs/day, Euro	65.83±10.64 65 (64.8-65.9)	65±19.95 62.1 (55-67.4)	66.1±17.6 58.6 (56.8-67.7)	71.4±27 65.5 (58.2-76.9)	0.276 [a]

a, Kruskal Wallis Test. b, Chi-Square or Fisher's Exact Test

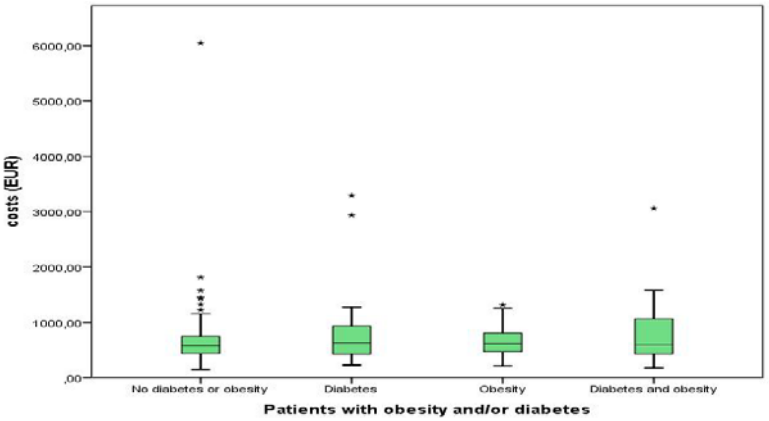

Figure 1. Box plot of hospitalization costs by patients group (diabetes or obesity status).

Among patients with/without obesity/diabetes, we found the costs were the same as in Figure 1.

We compared patients with diabetes with non-diabetic patients and no significant differences were found among the two groups in terms of mesh infection (Table 2).

Statistical differences were found for seroma formation (p=0.01), wound infection (p=0.001) and hematoma formation (p=0.034), in patients with DM compared to patients without DM.

No difference was found regarding hospitalizations days and costs.

Table 2. Demographic and clinical characteristics of patients by diabetes.

	No Diabetes (n=174)	**Diabetes (n=42)**	**p-value**
Age	64.08±13.49 66 (56-75.25)	58.71±13.85 60 (50.5-68.5)	0.398[a]
Gender, male, n (%)	54 (31%)	12 (29%)	0.137 [b]
Obesity, yes, n (%)	53 (30.5%)	21 (50%)	**0.019** [b]
Size			0.881 [b]

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W1 (Small)	22 (13%)	9 (21%)	
W2 (Medium)	73 (42%)	17 (41%)	
W3 (Big)	80 (46%)	16 (38%)	
Localization			**0.002** [b]
M1 or M2 (Supraumbilical)	33 (19%)	8 (19%)	
M3 (Periumbilical)	100 (58%)	13 (31%)	
M4 (Subumbilical)	2 (1%)	-	
Multiple M (Complex)	24 (14%)	15 (36%)	
Repair			0.342 [b]
Anatomic	39 (22.4%)	10 (23%)	
Open Preperitoneal	101 (58%)	25 (60%)	
Onlay	15 (8.6%)	7 (17%)	
Open IPOM	10 (5.7%)	-	
IPOM & Inlay	7 (4%)	-	
Laparoscopic IPOM	1 (0.6%)	-	
Laparoscopic preperitoneal	1 (0.6%)	-	
Complications, yes, n (%)	8 (5%)	1 (5%)	1.00 [b]
Seroma, yes, n (%)	29 (17%)	15 (36%)	**0.01** [b]
Infection wound, yes, n (%)	2 (1%)	6 (14%)	**0.001** [b]
Infection mesh, yes, n (%)	2 (1%)	1 (2%)	0.479 [b]
Hematoma, yes, n (%)	8 (5%)	6 (14%)	**0.034** [b]
Viscerolysis, yes, n (%)	98 (56%)	25 (60%)	0.732 [b]
Cancer, yes, n (%)	36 (21%)	8 (19%)	1.00 [b]
Hospitalization days	10.58±9.05 10 (7-12)	12.62±19.35 8 (5-13)	0.964 [a]
Costs, Euro	688.5±602.9 597.5 (455.2-780.4)	786.2±1088.6 538.8 (308.3-825.1)	0.375 [a]
Costs/day, Euro	65.9±13.1 65 (58.3-66.6)	68.2±23.7 62.3 (56.7-67.4)	0.710 [a]

a, Mann-Whitney U test. b, Chi-Square or Fisher's Exact Test

Among patients without diabetes, we found significant positive correlations between costs and age (rho=0.321, p-value<0.0001), size (rho=0.392, p-value<0.0001), complications (rho=0.181, p-value=0.017), drain (rho=0.342, p-value<0.0001), infection mesh (rho=0.165, p-value=0.029) and cancer (rho=0.163, p-value=0.033).

Among patients with diabetes, no significant positive correlations were found between costs and other variables.

No significant differences for seroma (p-value=0.483), size (p-value=0.881), wound infection (p-value=0.450), hematoma (p-value=0.390), viscerolysis (p-value=1.0) were found among obese patients compared to non-obese patients (Table 3).

As a result, no difference was found on hospitalizations days and costs.

More supraumbilical or complex localization was found for patients with obesity than for patients without obesity (p-value=0.002).

Table 3. Demographic and clinical characteristics of patients by obesity.

	No Obesity (n=142)	**Obesity (n=74)**	**p-value**
Age	63.58±14.17 66 (54-75.25)	65.47±10.8 67 (58.8-72.3)	0.625[a]
Gender, male, n (%)	21 (15%)	12 (29%)	0.037 [b]
Diabetes, yes, n (%)	53 (30.5%)	21 (28%)	0.019 [b]
Size			0.881 [b]

W1 (Small)	24 (17%)	7 (10%)	
W2 (Medium)	56 (39%)	34 (46%)	
W3 (Big)	62 (44%)	33 (45%)	
Localisation			0.002 [b]
M1 or M2 (Supraumbilical)	25 (18%)	16 (22%)	
M3 (Periumbilical)	75 (53%)	38 (51%)	
M4 (Subumbilical)	2 (1%)	-	
Multiple Mx (Complex)	23 (16%)	16 (22%)	
Repair			0.342 [b]
Anatomic	34 (24%)	15 (20%)	
Open Preperitoneal	80 (56%)	46 (62%)	
Onlay	14 (10%)	8 (11%)	
Open IPOM	7 (5%)	3 (4%)	
IPOM & Inlay	6 (4%)	1 (1.4%)	
Laparoscopic IPOM	1 (0.7%)	-	
Laparoscopic preperitoneal	-	1 (1.4%)	
Complications, yes, n (%)	2 (1.4%)	-	1.00 [b]
Seroma, yes, n (%)	27 (19%)	17 (23%)	0.483 [b]
Infection wound, yes, n (%)	4 (3%)	4 (5%)	0.450 [b]
Infection mesh, yes, n (%)	3 (2%)	-	0.553 [b]
Hematoma, yes, n (%)	11 (8%)	3 (4%)	0.390 [b]
Viscerolysis, yes, n (%)	81 (57%)	42 (57%)	1.00 [b]
Cancer, yes, n (%)	29 (20%)	15 (20%)	1.00 [b]
Hospitalization days	10.94±9.81 9 (7-12)	10.1±5.8 9 (6.8-13)	0.989 [a]
Costs, Euro	694.4±613.15 582.9 (419.2-763.4)	694.1±402.3 614 (459.4-847.4)	0.246 [a]
Costs/day, Euro	65.7±12.4 65 (63-66.3)	67.6±20.7 60.2 (57.7-68.1)	0.165 [a]

a, Mann-Whitney U test. b, Chi-Square or Fisher's Exact Test

Among no obese patients, we found significant positive correlations between costs and age (rho=0.331, p-value<0.0001), size (rho=0.339, p-value<0.0001), complications (rho=0.197, p-value=0.019), drain (rho=0.274, p-value=0.001), wound infection (rho=0.214, p-value= 0.011), infection mesh (rho=0.230, p-value=0.006) and cancer (rho=0.187, p-value=0.026).

Among patients with obesity, we found significant positive correlations between costs and size (rho=0.366, p-value=0.001), viscerolysis (rho=0.246, p-value=0.034).

Obesity was more common in females than in males (p=0.037).

No differences were found among the groups of obesity regarding complications, hospitalization days or costs.

Although not statistically significant, patients with grade 3 obesity developed complications (hematoma 20% vs. 7%; seroma 40% vs. 20% and wound infection 7% vs. 3%) more frequently compared to non-obese patients (Table 4).

Table 4. Demographic and clinical characteristics of patients by obesity.

	No Obesity (n=142)	**Obese grade 1 (n=29)**	**Obese grade 2 (n=30)**	**Obese grade 3 (n=15)**	**p-value**
Age	63.54±14.12 66 (54-75)	65.03±11.38 68 (57-71.5)	66.43±10.44 66.5 (57.8-75.3)	64.8±11.5 66 (60-72)	0.941[a]
Gender, male, n (%)	52 (37%)	4 (14%)	7 (23%)	3 (20%)	0.037[b]
Diabetes, yes, n (%)	22 (15.5%)	7 (24%)	8 (27%)	5 (33%)	0.221 [b]

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Size					0.530 [b]
W1 (Small)	24 (17%)	4 (14%)	2 (7%)	5 (33,3%)	
W2 (Medium)	58 (41%)	10 (35%)	16 (53%)	8 (53%)	
W3 (Big)	60 (42%)	15 (52%)	12 (40%)	2 (13%)	
Type					0.267 [b]
M1 or M2 (Supraumbilical)	25 (18%)	6 (21%)	7 (23%)	3 (20%)	
M3 (Periumbilical)	74 (52%)	16 (55%)	19 (63%)	4 (27%)	
M4 (Subumbilical)	2 (1%)	-	-	-	
Multiple Mx (Complex)	23 (16%)	6 (21%)	3 (10%)	14 (93%)	
Repair					0.820 [b]
Anatomic	33 (23%)	7 (24%)	4 (13%)	5 (33%)	
Open Preperitoneal	81 (57%)	17 (59%)	20 (67%)	8 (53%)	
Onlay	14 (10%)	3 (10%)	3 (10%)	2 (13%)	
Open IPOM	7 (5%)	1 (3%)	2 (7%)	-	
IPOM & Inlay	6 (4%)	1 (3%)	-	-	
Laparoscopic IPOM	1 (0.7%)	-	-	-	
Laparoscopic preperitoneal	-	-	1 (3%)	-	
Complications, yes, n (%)	2 (1.4%)	-	-	-	0.640 [b]
Hospitalization days	10.89±9.83 9 (7-12)	9.28±4.07 9 (6-12)	10.17±3.98 9.5 (7-13)	11.9±10.1 10 (7-12)	0.864[a]
Drain, yes, n (%)	84 (59%)	15 (52%)	14 (47%)	8 (53%)	0.597 [b]
Hematoma, yes, n (%)	10 (7%)	-	1 (3%)	3 (20%)	0.056 [b]
Seroma, yes, n (%)	28 (20%)	7 (24%)	3 (10%)	6 (40%)	0.119 [b]
Infection wound, yes, n (%)	4 (3%)	3 (10%)	-	1 (7%)	0.143 [b]
Infection mesh, yes, n (%)	3 (2%)	-	-	-	0.468 [b]
Viscerolysis, yes, n (%)	82 (58%)	18 (62%)	14 (47%)	9 (60%)	0.640 [b]
Costs, Euro	694.8±616.1 582.9 (410.8-763.4)	637.4±261.41 603.9 (475.4-808.2)	681.2±265.9 631.7 (456.3-867.4)	826.1±706.2 659.4 (458.4-808.2)	0.574 [a]
Costs/day, Euro	65.7±12.4 65 (63.2-66.6)	66.5±20.2 60.2 (52.7-67.7)	68.6±23.61 60.2 (58.2-70.6)	67.5±15.9 63.1 (57.9-67.4)	0.412 [a]

[a], Kruskal Wallis Test; [b], Chi-Square Test.

Discussion

The present study aimed to analyze the impact of diabetes mellitus (DM) on postoperative outcomes in patients undergoing ventral hernia repair, as well as to assess the influence of obesity on postoperative complications, hospitalization, and costs.

Our findings provide insights into the relationship between these factors and may shed light on their implications for surgical management.

The prevalence of DM in our study population was 19.44%, with half of the diabetic patients also presenting with obesity.

This aligns with the well-established association between DM and obesity, as both conditions often coexist due to shared underlying metabolic abnormalities and lifestyle factors [12].

The presence of pulmonary and cardiac comorbidities was also observed, further highlighting the complexity of the patient population.

We observed a higher prevalence of DM and obesity among female patients, which is consistent with previous studies reporting a

higher incidence of these conditions in women [13-15].

This may be attributed to hormonal and genetic factors that contribute to the development of DM and obesity in this population.

In terms of postoperative outcomes, the mean duration of hospitalization was 10.7 days, with a wide range of variability.

However, there were no significant differences in hospitalization duration or costs between patients with and without DM or obesity.

This finding suggests that while DM and obesity may impact specific complications, they may not necessarily result in prolonged hospital stays or increased costs overall.

The analysis of postoperative complications revealed that wound infection and hematoma formation were significantly more frequent in obese and diabetic patients.

This finding highlights the importance of careful management and monitoring in this patient population to prevent such complications.

No significant differences were found between obese and non-obese patients in terms of complications, hospitalization duration, or costs. This finding suggests that obesity may not independently influence the studied outcomes in the context of ventral hernia repair.

However, it should be noted that patients with grade 3 obesity tended to develop complications more frequently, although this finding did not reach statistical significance.

Obesity is known to increase the difficulty of the surgical intervention, impair wound healing, and contribute to higher rates of infection and other complications [16].

However, it is important to acknowledge that the surgical techniques employed, such as the preperitoneal Rives-Stoppa technique and transversus abdominis release (TAR), may effectively address some of the challenges posed by obesity, leading to comparable outcomes between obese and non-obese patients.

When comparing patients with DM to those without DM, significant differences were found in seroma formation, wound infection, and hematoma formation.

These complications were more frequent in patients with DM, emphasizing the need for targeted interventions and preventive measures in this subgroup.

However, no differences were found in terms of hospitalization duration or costs, indicating that DM may primarily affect specific complications rather than overall postoperative outcomes.

It suggests that meticulous surgical technique, appropriate patient selection, and comprehensive perioperative protocols, including antibiotic prophylaxis and early mobilization, can potentially mitigate the impact of DM and obesity on postoperative outcomes in ventral hernia repair.

However, it is essential to interpret these results with caution, considering the relatively small sample size of our study.

In a retrospective study Huntington et al. found that in open ventral hernia repair, patients with diabetes mellitus had a higher rate of complications, especially among those who were insulin-dependent, while laparoscopic repair seemed to be unaffected by insulin dependence or complicated DM, suggesting that diabetic patients should be optimized before open VHR and laparoscopic repair may be more suitable for those with insulin-dependent and complicated DM [17].

Qin et al. analyzed 45,759 cases from the NSQIP database and found that insulin-dependent diabetes was the only type of diabetes associated with an elevated risk of overall, surgical and medical complications in open repair, and an increased risk of medical complications in laparoscopic repair.

The findings of our study have important implications for clinical practice and resource allocation.

As we did not observe a significant association between DM or obesity and postoperative complications, hospitalization duration, or costs, the need for specialized interventions or extended hospital stays may be reevaluated.

This suggests that tailored approaches to patient management and resource allocation, focusing on individual patient characteristics, may be more appropriate than generalized assumptions based solely on the presence of DM or obesity.

Postoperative hyperglycemia may be a factor in complex abdominal VHR.

Won et al. investigated patients with large or recurrent hernias of the abdominal wall and discovered that within 48 hours after surgery, 37.9% of patients (for whom glycemic levels were available) had glucose levels over 140mg/dL, with 50.7% requiring insulin [18].

These patients experienced delayed food intake, insulin events, prolonged hospital stays, and increased costs of hospitalization.

Although not all patients with diabetes mellitus developed postoperative hyperglycemia

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or required intensive insulin therapy, 46.4% of those who did develop hyperglycemia were previously unknown to have diabetes mellitus.

Nevertheless, most of these individuals had at least one clinical risk factor for a prediabetic condition.

The retrospective analysis by Al Mansour et al., using the Abdominal Core Health Quality Collaborative database, involving 2167 patients divided into two groups based on HbA1c levels, found no evidence of a relationship between HbA1c levels and operative outcomes in patients undergoing elective repair [19].

Study limitations

While our study provides valuable insights into the outcomes of ventral hernia repair in relation to DM and obesity, several limitations should be acknowledged.

Firstly, the study design was observational, which restricts our ability to establish causal relationships between variables.

Secondly, the sample size was relatively small, potentially limiting the statistical power to detect significant differences.

Additionally, the study was conducted at a single center, which may limit generalizability.

Conclusions

In conclusion, this study demonstrates that DM and obesity are associated with an increased risk of specific complications in patients undergoing ventral hernia repair.

While DM is associated with a higher incidence of seroma formation, wound infection, and hematoma formation, obesity appears to have a limited impact on the studied outcomes.

These findings emphasize the need for individualized preoperative optimization and targeted interventions to mitigate the risk of complications in patients with DM or obesity.

Future research should continue to explore the complex interactions between patient comorbidities and surgical outcomes to inform evidence-based approaches for improving postoperative care in this population.

Acknowledgement

This work was supported by the grant POCU/993/6/13/153178," Performanță în cercetare"-"Research performance" co-financed by the European Social Fund within the Sectorial Operational Program Human Capital 2014-2020.

Conflict of interests

None to declare.

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