Objective. We aim to determine if different techniques of abdominal wall closure can reduce ventral hernia incidence in obese patients undergoing bariatric surgery.

Method. We reviewed data of 150 patients divided in three groups: in group PDS, suture with monofilament polidioxanone (PDS) alone was used in abdominal wall closure; in group PRO-0, PDS suture plus Prolene-0 as reinforcement were used; and in group PRO-2, PDS suture plus Prolene-2 as reinforcement were used. Incidence of ventral hernia was analyzed for a 22 months follow-up compared with age, sex, body mass index (BMI), co-morbidities, time of hernia incidence in post-operative period and post-operative complications.

Results. There were seven ventral hernias in group PDS (14%), three in PRO-0 (6%) and one in PRO-2 (2%). Mean age of PDS was 35.7 ± 1.3 years (19–53), PRO-0 was 36.7 ± 1.3 years (17–59) and PRO-2 was 37.4 ± 1.6 years (18–67) (p = 0.84). Percentage of females in each group was similar, 82% in PDS, 90% in PRO-0 and 80% in PRO-2 (p = 0.35). Mean BMI in PDS was 42.1 ± 0.6 kg/m² (35.5–59.7), PRO-0 was 42 ± 0.7 kg/m² (36.2–60.6) and PRO-2 was 41.7 ± 0.6 kg/m² (35.8–54.3) (p = 0.57). Mean time of ventral hernia occurrence in PDS was 9.7 ± 1.5 months (5–15), in PRO-0 was 9 ± 1.7 months (6–12) and PRO-2 was 9 months (p = 0.97).

Conclusions. Time of hernia occurrence in post-surgery was similar in the three groups. Using Prolene-2 as reinforcement was useful to reduce the incidence of ventral hernia during 22 months follow-up in patients undergoing bariatric surgery.

Key words. Ventral hernia; suture; bariatric surgery; obesity; gastric baypass

RESUMO

**O QUE PODE SER FEITO PARA REDUZIR A INCIDÊNCIA DE HÉRNIA INCISIONAL PÓS-BYPASS GÁSTRICO EM Y DE ROUX?**

**Objetivo.** Determinar se as diferentes técnicas de fechamento da parede abdominal podem reduzir a incidência de hérnia incisional em pacientes submetidos à cirurgia bariátrica.

**Método.** Foram analisados dados de 150 pacientes, divididos em três grupos: no grupo PDS, apenas o fio cirúrgico polidioxanone (PDS) foi utilizado no fechamento da parede abdominal, no grupo PRO-0, além de PDS, utilizou-se prolene-0 como reforço, e no grupo PRO-2, além de PDS, utilizou-se prolene-2 como reforço. A incidência de hérnia incisional foi observada por 22 meses, analisando-se a idade, sexo, índice de massa corporal (IMC), co-morbididades, tempo de aparecimento da hérnia no pós-operatório e as complicações pós-cirúrgicas.

**Resultados.** Ocorreram sete hérnias incisionais no grupo PDS (14%), três no PRO-0 (6%) e uma no PRO-2 (2%). A média de idade do PDS foi 35.7 ± 1.3 anos (19–53), PRO-0 foi 36.7 ± 1.3 anos (17–59) e PRO-2 foi 37.4 ± 1.6 anos (18–67) (p = 0.84). Percentual de mulheres em cada grupo foi semelhante, 82% no PDS, 90% no PRO-0 e 80% no PRO-2 (p = 0.35). O IMC médio do PDS foi 42.1 ± 0.6 kg/m² (35.5–59.7), do PRO-0, 42 ± 0.7 kg/m² (36.2–60.6) e do PRO-2 foi 41.7 ± 0.6 kg/m² (35.8–54.3) (p = 0.57). O tempo médio de aparecimento de hérnia incisional do PDS foi 9.7 ± 1.5 meses (5–15), em PRO-0 foi 9 ± 1.7 meses (6–12) e PRO-2 foi de 9 meses (p = 0.97).

**Conclusões.** Tempo de ocorrência de hérnia no pós-operatório foi semelhante nos três grupos. Prolene-2 como reforço foi útil para reduzir a incidência de hérnia incisional durante 22 meses de seguimento em pacientes submetidos à cirurgia bariátrica.

**Palavras-chave.** Hérnia incisional; sutura; cirurgia bariátrica; obesidade; derivação gástrica.
INTRODUCTION

Obesity is considered a negative determinant of life quality and longevity, with prevalence of more than 30% among adults in USA during 2003-2004. Obesity increases the risk of developing diverse pathological conditions related to cardiovascular, endocrine, and digestive systems. Some cancer types, like colon, endometrial, and post-menopause breast cancer have been associated with increased body weight.

Weight loss surgery has grown worldwide during the last decade resulting in safer procedures and should be considered for patients with body mass index (BMI) > 40 kg/m² or BMI > 35 kg/m² with serious co-morbidities. Roux-en-Y gastric bypass is the most common surgical procedure for morbid obesity in the United States and is considered gold standard technique. This procedure is well tolerated by the patient, leads to excess weight loss around 70% in the first 12 months, and has acceptable short and long term morbidity.

In the minimally invasive surgery era, when procedures such as natural orifice translumenal endoscopic surgery (NOTES), single-incision laparoscopic surgery (SILS), laparoendoscopic single-site (LESS) prevail and considering the fact that more patients have their bariatric surgery performed laparoscopically, open surgery may seem outdated. However it is still used for some reoperations for surgical complications, super obese patients, obese non-bariatric surgery (like oncologic and gynecologic), revisional bariatric surgery and conversions from laparoscopic to open surgery.

Ventral hernia is a frequent complication in patients undergoing open bariatric surgery. Many risk factors increase its occurrence, such as surgical site infection, older age, male sex, type of incision and obesity. Ventral hernia occurs in about 3% to 5% of abdominal surgical procedures. Among 6% to 15% of these hernias can become incarcerated and 2% can become strangulated requiring surgical emergency intervention. In obese patients after open bariatric surgery, ventral hernia can reach an incidence from 9.5% to 50%.

The purpose of this study is to determine if different techniques of abdominal wall closure can reduce ventral hernia incidence in obese patients undergoing bariatric surgery.

METHOD

We reviewed medical records of 150 patients who underwent bariatric surgery from February 2006 through October 2007 in a bariatric surgery clinic. All patients were operated by the same surgeon and the technique used was open Roux-en-Y gastric bypass through upper vertical midline incision. During this period, there was an alteration in abdominal wall closure technique used by the surgeon. During the first six months, 50 patients were operated and only monofilamentar polidioxanone (PDS) number 2 was used in continuous abdominal closure. This group of patients was named PDS. From August 2006 through January 2007, PDS continuous abdominal closure was reinforced with interrupted sutures of Prolene-0 in 50 patients. This group of patients was named PRO-0. From February 2007 through October 2007, PDS continuous abdominal closure was reinforced with interrupted sutures of Prolene-2 in 50 patients. This group was named PRO-2.

Ventral hernia incidence was observed in the first 22 months of follow-up for all patients and correlated with age, sex, BMI, comorbidities, post-operative complications and time of hernia occurrence.

Diagnosis of obstructive sleep apnea syndrome was performed according to clinical analysis and results of polysomnography. Diagnosis of chronic obstructive pulmonary was made according to the clinical and spirometrical exams.

The research was approved by Research Ethics Committee of the University of Brasilia’s Medical School. Statistical analysis was performed by GraphPad Instat 3.0. P-value was considered significant if ≤ 0.05. Statistical tests used were Qui-square, ANOVA test and Pearson correlation analysis.

RESULTS

Ventral hernia incidence was 14% (7 cases) in group PDS, 6% (3 cases) in group PRO-0 and 2% (1 case) in group PRO-2 (p = 0.02). Percentages of women in all groups were similar: 82% in PDS, 90% in PRO-0 and 80% in PRO-2 (p = 0.35). Mean age in PDS was 35.7 ± 1.3 years (19–53), in PRO-0 was 36.7 ± 1.3 years (17–59) and in PRO-2 was 37.4 ± 1.6 years (18–67) (p = 0.84). Mean BMI in PDS was 42.1 ± 0.6 kg/m² (35.5–59.7), in PRO-0 was 42.0 ± 0.7 kg/m² (36.2–60.6) and in PRO-2 was 41.7 ± 0.6 kg/m² (35.8–54.3) (p = 0.57). Obstructive sleep apnea syndrome was present in 40.6% (61) of all patients, corresponding to 34% (17) of group PDS, 44% (22) of group PRO-0 and 44% (22) of group PRO-2 (p = 0.36). Chronic obstructive pulmonary disease was present in 9.3% (14) of all patients.
Table. Ventral hernia incidence, women percentage, mean age, mean body mass index, comorbidities, mean ventral hernia time occurrence for groups PDS, PRO-0 and PRO-2

<table>
<thead>
<tr>
<th></th>
<th>Group PDS n = 50</th>
<th>Group PRO-0 n = 50</th>
<th>Group PRO-2 n = 50</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventral hernia – n (%)</td>
<td>7 (14)</td>
<td>3 (6)</td>
<td>1 (2)</td>
<td>0.02*</td>
</tr>
<tr>
<td>Women – n (%)</td>
<td>41 (82)</td>
<td>45 (90)</td>
<td>80</td>
<td>0.35</td>
</tr>
<tr>
<td>Age (years; mean ± SD)</td>
<td>35.7 ± 1.3</td>
<td>36.7 ± 1.3</td>
<td>37.4 ± 1.6</td>
<td>0.84</td>
</tr>
<tr>
<td>Body mass index (kg/m²; mean ± SD)</td>
<td>42.1 ± 0.6</td>
<td>42.0 ± 0.7</td>
<td>41.7 ± 0.6</td>
<td>0.57</td>
</tr>
<tr>
<td>Obstructive sleep apnea syndrome – n (%)</td>
<td>17 (34)</td>
<td>22 (44)</td>
<td>22 (44)</td>
<td>0.36</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease – n (%)</td>
<td>5 (10)</td>
<td>4 (8)</td>
<td>5 (10)</td>
<td>0.36</td>
</tr>
<tr>
<td>Hypertension – n (%)</td>
<td>30 (60)</td>
<td>26 (52)</td>
<td>33 (66)</td>
<td>&gt; 0.99</td>
</tr>
<tr>
<td>Diabetes mellitus – n (%)</td>
<td>5 (10)</td>
<td>8 (16)</td>
<td>9 (18)</td>
<td>&gt; 0.99</td>
</tr>
<tr>
<td>Dyslipidemia – n (%)</td>
<td>37 (74)</td>
<td>34 (68)</td>
<td>34 (68)</td>
<td>0.36</td>
</tr>
<tr>
<td>Ventral hernia time occurrence (months; mean ± SD)</td>
<td>9.7 ± 1.5</td>
<td>9.0 ± 1.7</td>
<td>9.0</td>
<td>0.97</td>
</tr>
</tbody>
</table>

* Significant difference among groups. †SD – standard derivation

corresponding to 10% (5) of group PDS, 8% (4) of group PRO-0 and 10% (5) of group PRO-2 (p = 0.36). Hypertension was present in 59.3% (89) of all patients, corresponding to 60% (30) of group PDS, 52% (26) of group PRO-0 and 66% (33) of group PRO-2 (p > 0.99). Type 2 diabetes mellitus was present in 14.6% (22) of all patients, corresponding to 10% (5) of group PDS, 16% (8) of group PRO-0 and 18% (9) of group PRO-2 (p > 0.99). Dyslipidemia was present in 70% (105) of all patients, corresponding to 74% (37) of group PDS, 68% (34) of group PRO-0 and 68% (34) of group PRO-2 (p = 0.36). Mean time of ventral hernia occurrence in group PDS was 9.7 ± 1.5 months (5–15), in PRO-0 was 9.0 ± 1.7 months (6–12) and in PRO-2 was 9 months (p = 0.97). All results are shown in Table.

None of the patients had major postoperative complications such as wound infections, respiratory failure, pneumonia, major bleeding, fistula and deep venous thrombosis.

**DISCUSSION**

Bariatric open procedures have a higher incidence of ventral hernia than laparoscopic surgery.16 Many are the risk factors that contribute for hernia incidence: sex, age, obesity degree, type of incision and use of corticoids.16-20

All three groups were homogeneous and comparable regarding sex, age, BMI and comorbidities. Number of women in all three groups were similar: 41 women in group PDS, 45 in group PRO-0 and 40 in group PRO-2. All patients were submitted to the same Roux-en-Y gastric bypass technique and by the same surgical team.

Abdominal wall tension in surgical incision increases with abdominal radius, therefore tension should be elevated in individuals with higher obesity degree.15 All three groups are comparable concerning BMI and comorbidities, so risk factors associated with these variables are similar between groups. Age is also a factor that can influence development of ventral hernia.15 In this study, there was no statistical difference in age between the three groups considered.

Hernia diagnosis was based on physical examination (eg. bulge on operator incision). Ventral hernia diagnostic workup by imaging exams, such as computed tomography and ultrasonography, are rarely needed.

In our study, hernia incidence time ranged from 5 to 15 months, with a mean time of 9 months, without statistical significant difference between the groups.

We used reinforcement sutures with Prolene-0 and Prolene-2 to help the incision closure to resist
rupture, which would be caused by the wall tension created by elevated intra-abdominal pressure, a characteristic of obesity. These techniques showed reduced hernia incidence in groups PRO-0 and PRO-2 when compared with group PDS alone.

Surgery incision closure with polidioxanone number 2 reinforced with Prolene-2 proved efficient in reducing ventral hernia incidence in obese patients submitted to bariatric surgery, when compared to the other 2 techniques mentioned.

Other studies have also proposed techniques to reduce complications in patients undergoing abdominal operations. In a prospective randomized trial of wound closure technique, Brolin found that a continuous fascial suture technique was more cost effective, less time consuming and was associated with fewer late wound complications, including the occurrence of incisional hernia. Other prospective, randomized study of the midline fascial closure technique in bariatric operations concluded that continuous fascial closure improves wound healing and reduces major acute wound complications.

There are several techniques that decrease ventral hernia development which were studied by Capella et al., such as incision size and incision position. Our study verified the decrease in ventral hernia incidence based on incision closure by different suture lines.

Limitations of this study are the small number of patients in each group, patients are not allocated to the respective group by randomization, since this is a retrospective study. Evaluation of the end point, occurrence of ventral hernia, was made by physical examination and imaging techniques (computed tomography, ultrasound) were not routinely used. These limitations do not impair the conclusions, for statistical significance was achieved.

We conclude that using reinforcement sutures has been proven useful in reducing ventral hernia incidence in weight loss laparotomy. Using Prolene-2 line with greater traction resistance was even more efficient in diminishing hernia occurrence. This data can be applied in non-bariatric surgeries done in obese patients. Ventral hernia incidence of 2% in morbid obese is acceptable and it is comparable to the incidence in individuals without obesity. We believe that the patient should be careful with abusive abdominal effort until the ninth month, mean time for ventral hernia occurrence.

DISCLOSURE

No potential conflict of interest relevant to this article was reported.

REFERENCES


PARATOHORMÔNIO E CÂNCER COLORETAL

Controle conduzido em 1.214 portadores de câncer colorectal pareado com 1.214 controles. Foram medidas as concentrações sanguíneas de paratohormônio (PTH) e de 25-hidroxi vitamina D. Foram colhidas também detalhadas informações sobre a dieta e estilo de vida. Em análise multivariada, constatou-se que as concentrações no soro de PTH igual ou maior que 65 ng/mL, comparada com concentrações médias de 30 a 65 ng/mL, foram associadas com maior risco de câncer colorectal. Os homens estariam em maior risco que as mulheres.