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## Incidence of incisional hernia following vertical banded gastroplasty

Received: 6 May 2003 / Accepted: 3 November 2003 / Published online: 22 November 2003  
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**Abstract Background:** Our aim was to determine which patient-related factors influence the incidence of incisional hernia after vertical banded gastroplasty for morbid obesity. **Methods:** We reviewed the medical records of 80 morbidly obese patients operated on between 1986 and 1993. All the operations were performed by only one surgeon, and the midline laparotomy was closed by means of continuous polyglactin 910 suture. Statistical analysis was performed using the Fisher exact test, and significance was assigned for values of  $P < 0.05$ . **Results:** Incidence of incisional hernia in: obese 24%, superobese 51% ( $P = 0.0165$ ), men 40%, women 34% ( $P = 0.7671$ ), age  $< 50$  33%, age  $> 50$  50% ( $P = 0.3137$ ), nondiabetics 31%, diabetics 66% ( $P = 0.0610$ ), no wound infection 34%, wound infection 37% ( $P > 0.9999$ ), no anemia 31%, anemia 50% ( $P = 0.1675$ ), no vomiting 39%, vomiting 32% ( $P = 0.6350$ ). **Conclusion:** The only patient-related factor that significantly influences the incidence of incisional hernia in morbidly obese patients is body mass index.

**Keywords** Incisional hernia · Morbid obesity · Risk factors

### Introduction

Incisional hernia is one of the most common late complications of bariatric surgery and often requires surgical repair. So it is a problem of clinical and eco-

nomic relevance. Suture technique and suture materials, wound infection, and obesity are considered causes of incisional hernia. Because of the high incidence of incisional hernia in morbidly obese patients, they are good models to investigate which factors may affect the incidence of this problem.

Bariatric techniques have been performed in the General Surgery Department of Hospital Clínico of Zaragoza, Spain since 1978. From 1978–2003, more than 350 bariatric procedures were performed. In this study, our purpose was to identify patient-related factors (such as body mass index, age, sex, coexisting chronic illnesses, or postoperative complications) that influence the occurrence of incisional hernia. So we chose for study 80 vertical banded gastroplasties (VBG) that were done by only one surgeon and the abdominal wall was closed in the same way in all cases.

### Methods

The medical records of 80 morbidly obese patients were reviewed. They were operated on between 1986 and 1993 (follow-up longer than 10 years), and the bariatric technique performed was always a vertical banded gastroplasty. There was one postoperative death, so the remaining 79 obese constitute the cohort analyzed. Patients' mean age was 37 years (range 16–58 years), and mean body mass index (BMI) was  $49.5 \text{ kg/m}^2$  (range  $36.9\text{--}70.8 \text{ kg/m}^2$ ).

VBG was performed by only one surgeon. The abdominal incision (midline supraumbilical laparotomy) was closed always by means of continuous polyglactin 910 (Vicryl n°1) suture.

Our purpose was to determine the influence on incisional hernia of BMI, age, sex, chronic illnesses (diabetes mellitus, cardiac and respiratory disease) (Table 1), and postoperative complications, such as abdominal abscess, wound infection, wound dehiscence, pneumonia, obstruction, vomiting, hypoproteinemia, and anemia (Table 2).

Statistical analysis was performed using the Fisher exact test, and statistical significance was assigned for values of  $P < 0.05$ .

### Results

We found by physical examination an incisional hernia in 28 patients (35.44%). The incidence of incisional

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**Table 1** Study groups

Group	Definition	<i>n</i> patients
Age	< 50	69
	> 50	10
Sex	Men	15
	Women	64
BMI	Morbidly obese: BMI	46
	Superobese: BMI > 50	33
Diabetes	Nondiabetics	70
	Diabetics: FPG > 140 mg/dL	9
Chronic lung diseases	No	68
	HOS, OSAS	11
Chronic cardiac diseases	No	74
	Congestive failure, CAD	5

BMI = body mass index; FPG = fasting plasma glucose; HOS = obesity hypoventilation syndrome; OSAS = obstructive sleep apnea syndrome; CAD = coronary artery disease

**Table 2** Postoperative complications

Complication	<i>n</i> patients
Intra-abdominal abscess	2
Wound infection	16
Wound dehiscence	0
Pneumonia	2
Obstruction	0
Vomiting	46
Hypoproteinemia	0
Anemia	18

**Table 3** Incisional hernia incidence

	Incisional hernia incidence	Fisher exact <i>P</i> value
Morbidly obese	11/46 (23.91%)	0.0165
Superobese	17/33 (51.51%)	
Men	6/15 (40%)	0.7671
Women	22/64 (34.37%)	
< 50	23/69 (33.33%)	0.3137
> 50	5/10 (50%)	
Nondiabetics	22/70 (31.42%)	0.0610
Diabetics	6/9 (66.66%)	
No cardiac disease	24/74 (32.43%)	0.0507
Cardiac disease	4/5 (80%)	
No lung disease	23/68 (33.82%)	0.5069
Lung disease	5/11 (45.45%)	
Nonabscess	27/77 (35.06%)	> 0.9999
Abdominal abscess	1/2 (50%)	
No infection	22/63 (34.92%)	> 0.9999
Wound infection	6/16 (37.5%)	
No pneumonia	27/77 (35.06%)	> 0.9999
Pneumonia	1/2 (50%)	
No anemia	19/61 (31.14%)	0.1675
Anemia	9/18 (50%)	
No vomiting	13/33 (39.39%)	0.6350
Vomiting	15/46 (32.60%)	

hernia in each group and Fisher exact test *P* values is given in Table 3. Any case of wound dehiscence, obstruction, or hypoproteinemia was recorded, so we excluded them for the statistical analysis.

We found a greater incidence of incisional hernia in the superobese, male patients, older patients, diabetics,

and the obese suffering from chronic cardiac and lung disease and when there were postoperative complications, such as abdominal abscess, wound infection, pneumonia, and anemia, but Fisher test *P* values were significant only when compared with the incidence in the morbidly obese and superobese.

## Discussion

As many as 19% of laparotomies are complicated by the development of incisional hernias [1]. Incisional hernia has been attributed to the surgical technique and to patient-related factors. In this study, we consider the problem of incisional hernias after bariatric surgery and focus on the patient-related factors.

Some authors [2, 3] think that the surgeon acts as a risk factor for the development of incisional hernias. It is the surgeon who chooses the type of incision and the suture material and who must insert this suture with an adequate suture technique. In this study, we eliminated this variable because all of the laparotomies were closed by the same surgeon.

Which is the ideal suture for abdominal wall closure? Many trials comparing absorbable and nonabsorbable materials or continuous and interrupted sutures have been published [4, 5]. A recent meta-analysis [1] concludes that the ideal suture to reduce incisional hernia rates is a nonabsorbable suture and a continuous technique. Another one [6], which compares slowly absorbing sutures with nonabsorbing, does not find any difference in wound dehiscence but recommends the use of slow-absorbing sutures because the nonabsorbing ones increased wound pain and suture sinus formation [7]. So now we know that abdominal closures with rapidly absorbable sutures result in more incisional hernias than closures with nonabsorbable sutures, and instead of the continuous polyglactin 910 suture, we use a continuous polypropylene suture. In this study, abdominal wall suture technique was the same for all the patients.

One of the major risk factors for the development of incisional hernia is obesity. The reported incidence of incisional hernia in obese patients varies from 5.71 [8] to 65% [9]. The incidence of incisional hernia in our series (35.44%) is higher than in other studies reported (10–18%) [4]. But even though obesity is a major risk factor for incisional hernia, this adverse effect may be diminished by a proper suture technique [10]. And currently, the laparoscopic approach in bariatric surgery significantly reduces the incidence of wound complications. The risk of incisional hernia can be reduced to 0.3% [11].

Even though Brodin [4] affirmed that no comorbidity is associated with development of incisional hernia, and Poole [12] reported that local mechanical factors are more important than systemic diseases in the occurrence of incisional hernias, most of authors think that predisposing factors for developing an incisional hernia are

both local and systemic [13]. Old age is considered a relevant risk factor for developing incisional hernia after bariatric surgery [9], and male gender was found to be a significant risk factor, too [6, 9, 13]. Situations such as chronic pulmonary or cardiac disease, diabetes, wound infection, postoperative respiratory complications, malnutrition [14], or vomiting after gastroplasty [9], which increases intra-abdominal pressure and abdominal muscle tension, are risk factors for incisional hernia. Steroid therapy, pregnancy, constipation, prostatism, or smoking, which have been suggested as predisposing factors for incisional hernia or for recurrence [13, 15], were not considered in our patients. Wound infection is probably the most important risk factor because it interferes with the normal wound healing [13, 15].

One interesting point in our study is the long follow-up. Most incisional hernias appear within 1 year of operation, but an important percentage are diagnosed later [16]. Considering our results, we can only confirm the relationship between body mass index and the incidence of herniation. We found an increased risk of developing an incisional hernia in male patients, patients older than 50 years, patients with anemia, diabetes, or chronic cardiac and lung diseases, and those who suffered infectious wound complications, but differences were not statistically significant. We must be a little cautious with the results of this statistical analysis. Maybe the small number of patients in some groups (diabetics, congestive cardiac failure) can influence the statistical significance of the test.

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