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Massive panniculectomy results in improved functional outcome

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Panniculus morbidus; Massive panniculectomy; Obesity; Functional capacity

Abstract

BACKGROUND: Panniculus morbidus is a large abdominal apron found in morbidly obese patients. This condition creates a vicious cycle of weight gain and functional incapacity. Our study assessed the functional improvement in patients undergoing massive panniculectomy.

METHODS: A retrospective review of panniculectomies performed from 1994 to 2012 was conducted. Twenty-seven patients with resections >20 lbs were selected. Data on demographics, operative details, complications, and pre- and postoperative functional capacity (using the Steinbrocker Functional Classification) were collected.

RESULTS: The preoperative mean body mass index was 58 kg/m², with a mean resection weight of 33 lbs. The overall complication rate was 74%. A statistically significant improvement in functional capacity (preop mean 3.7 vs postop mean 2.0; \(P < .0001\)) was identified.

CONCLUSIONS: Panniculus morbidus is a functionally debilitating condition and massive panniculectomy is often the only treatment available. Our data suggest that massive panniculectomy is a viable option for patients functionally incapacitated by panniculus morbidus.

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Obesity is a prominent health concern in the United States and most westernized countries. According to the statistics obtained from the Centers for Disease Control, nearly 36% of US citizens are obese, and the prevalence of severe obesity is >6% (body mass index, BMI > 35 kg/m²). Obesity is associated with significant mental and physical comorbidities, including many of the leading causes of preventable death. In 2008, the medical costs associated with obesity in the United States were estimated at $147 billion.¹

Panniculus morbidus, also known as abdominal elephantiasis, is a rare end stage complication of abdominal obesity.² This condition is characterized by excess abdominal skin and subcutaneous tissue. The panniculus is often concentrated in the dependent portion of the abdominal wall and frequently contains an element of lymphedema. Panniculus morbidus can become so severe that the mass nearly reaches the floor in the upright position.³

The panniculus becomes a distinct pathologic entity affecting health, hygiene, and functional capacity. Toileting and personal hygienic issues often arise leading to disruptions in a patient’s psychosocial well-being.⁴ The skin and the soft tissue develop intertrigo, cellulitis, and chronic
skin ulcerations. The most frequent detrimental complication of panniculus morbidus is functional debilitation. Patients enter a cycle of functional decline and weight gain which in extreme cases can render the patient bed bound.

Unfortunately, patients with panniculus morbidus are typically past consideration for bariatric surgery. Studies have shown that weight loss surgery in the significantly obese patients have poorer outcomes and have increased complications when compared with patients with lower BMI. Patients with panniculus morbidus are left with the option to live with the large abdominal apron and associated functional incapacity or undergo massive panniculectomy.

Massive panniculectomy is a technically challenging procedure that aims at treating the complications associated with panniculus morbidus. It is aimed at improving the patient’s health and mobility in preparation for a weight loss program and/or bariatric surgery. Unfortunately, massive panniculectomy is troubled by a number of complications ranging from simple seroma formation to wound infection to death. Reported complication rates range from 15% to 80%. Remarkably, the literature suggests that most patients are satisfied with the end results. However, there is a paucity of data regarding functional improvement after panniculectomy in this population. Our study was designed to assess the functional improvement in patients with panniculus morbidus undergoing massive panniculectomy.

**Methods**

This study was approved by the University of Illinois College of Medicine at Peoria institutional review board. The authors conducted a retrospective chart review of all patients undergoing a massive panniculectomy by a group of 3 bariatric surgeons from 1994 to 2012. A massive panniculectomy is defined as a resection weight \( \geq 20 \) lbs.

Massive panniculectomies were performed by a group of 3 bariatric surgeons. Minor variations in surgical techniques occurred among the 3 surgeons. In general, the excessively large panniculus was elevated using steinman pins and a traction bar to fashion a self-contained “lift” (Fig. 1). A circumferential, elliptical incision was carried deep to the fascia with electrocautery or more recently the “Ligasure” device. The panniculus was dissected off the fascia and a combination of thermal energy and suture ligation was used to control the vasculature. Two to four 19 French Blake drains were placed in the wound. The wound was closed in layers of interrupted vicryl stitches. The skin was approximated using interrupted, vertical mattress prolene stitches. Perioperative venous thromboembolism prophylaxis was the same as for the bariatric surgery population and consisted of Enoxaparin 40 mg preoperatively and 40 mg twice daily postoperatively. Those patients with a BMI > 50 kg/m\(^2\) were sent home with 10 days of twice daily enoxaparin therapy.

Pre- and postoperative inpatient and clinical notes were reviewed. Data on demographics, weight, BMI, comorbidities, concomitant procedures, estimated blood loss, weight of the resected panniculus, postoperative complications, length of follow up, and pre- and postoperative functional capacity were collected. Major complications were defined as deep venous thrombosis/pulmonary embolism (DVT/PE), any conditions warranting return to the operating room, or death. Minor complications were defined as seroma, hematoma, cellulitis, minor wound infections managed nonoperatively, and respiratory insufficiency requiring noninvasive management. Functional status was interpreted from pre- and postoperative clinical notes. The subjective section often contained significant information regarding the patient’s mobility and home functional status that was used to assess patient function. Functional capacity scores were assigned using a modification of the Steinbrocker Functional Classification. This system was chosen because of its simplistic nature and ease of use. A paired Student t test was used to statistically analyze the difference between pre- and postoperative functional capacity. A P value of <.05 was considered statistically significant.

**Results**

Twenty-seven patients underwent a massive panniculectomy during the study period (a total of 257 panniculectomy...
patients identified). The study population consisted of 20 women (74%) and 7 men (26%), with a mean age of 55 years (range, 33 to 70 years). Preoperative average patient weight was 371 lbs (range, 222 to 531 lbs), with a mean BMI of 58 kg/m² (range, 39 to 72 kg/m²). The most commonly encountered comorbidities included hypertension, Type II diabetes, heart disease, and chronic obstructive pulmonary disease. Twenty patients (74%) presented preoperatively with significant comorbidities (Table 1).

The mean specimen weight was 33 lbs (range, 20 to 62 lbs) and the mean estimated blood loss was 519 mL (100 to 1,200 mL). Concomitant procedures were performed in 16 of 27 patients (59%) and most commonly included a ventral hernia repair (75% of concomitant procedures). Mean follow-up duration was 38 months (range, 1 to 180 months).

The overall complication rate was 74% (20 of 27 patients). The most common complications were related to wound healing and included seroma, hematoma, cellulitis, skin necrosis, and wound infection. Major complications occurred in 37% of the patients (10 of 27 patients) and included 3 deaths. Two deaths were attributed to postoperative sepsis and 1 death was attributed to a stroke. Nine patients (33%) had to be returned to the operating room. No patients developed a DVT or PE. Minor complications occurred in 37% of the patients (10 of 27 patients).

Pre- and postoperative functional capacity scores1–4 were assigned to patients on the basis of a modified Steinbrocker Functional Classification system (1, full functional capacity; 2, minor disability; 3, major disability; 4, incapacitated) based on pre- and postoperative physician notes/assessments.1 The three patients who died in the immediate postoperative period were not included in the statistical analysis of functional class. The mean preoperative functional classification score was 2.0 and the mean postoperative functional classification score was 2.0. A statistically significant difference (P < .0001) was noted between the pre- and postoperative functional classification scores with a mean score difference of 1.7 (confidence interval, 1.4 to 1.9).

Table 1 Comorbidities

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>No. of patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease/failure</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Type II diabetes</td>
<td>11</td>
<td>41</td>
</tr>
<tr>
<td>Hypertension</td>
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<td>48</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Idiopathic thrombocytopenic purpura</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Comments

Obesity has reached epidemic proportions in the United States over the last two decades. More than 36% of our adult population is categorized as obese and 6% are characterized as severely obese. In 2008, the healthcare costs associated with obesity were estimated at $147 billion.1 The obese patient population presents with a myriad of comorbidities including diabetes, hyperlipidemia, hypertension, and obstructive sleep apnea. As the search for an obesity cure has continued, surgical intervention has moved to the forefront of obesity treatment. More than 100,000 bariatric procedures are performed each year.5 The literature suggests a significant decrease in obesity-related mortality and obesity-associated comorbidities as a result of bariatric surgery.5

Unfortunately, a subset of obese patients exist who have become so obese that their size precludes them from bariatric surgery. This population often suffers from panniculus morbidus, a distinct pathologic entity affecting all aspects of a patient’s daily life. These patients struggle from hygienic issues, intertrigo, cellulitis, and chronic skin ulcerations.4

Obesity has reached epidemic proportions in the United States over the last two decades. More than 36% of our adult population is categorized as obese and 6% are characterized as severely obese. In 2008, the healthcare costs associated with obesity were estimated at $147 billion.1 The obese patient population presents with a myriad of comorbidities including diabetes, hyperlipidemia, hypertension, and obstructive sleep apnea. As the search for an obesity cure has continued, surgical intervention has moved to the forefront of obesity treatment. More than 100,000 bariatric procedures are performed each year.5 The literature suggests a significant decrease in obesity-related mortality and obesity-associated comorbidities as a result of bariatric surgery.5

Unlike many previously published reports, our study used strict definitions for both major and minor complications with the literature results as their definitions remain vague. Analyzing our patient population reveals a number of characteristics that are shown to increase the risk for complications. Our study cohort’s mean BMI was 55 kg/m² and the mean resection weight was 33 lbs. In addition, 12 patients (44%) underwent concomitant ventral hernia repair, putting them at increased risk for minor wound complications.
Three patients in our study population died in the immediate postoperative period (11%). Two patients succumbed to sepsis as a result of significant wound infections and 1 died of a massive stroke. This is higher than the reported death rate. We partially attribute our high death rate to the overall demographics of our patient population. All 3 patients were suffering from significant comorbidities including diabetes and congestive heart failure. Two of these patients had BMI’s >70 kg/m² and 2 patients were >65 years of age. Although we did identify similarities between the 3 patients who died in our study, we are unable to draw any significant conclusions regarding patient selection as our patient population is too small.

Although our complication rate was at the upper end of the reported values, we saw a marked improvement in the functional capacity of our study cohort. Most massive panniculectomies are performed for a combination of wound issues and functional incapacity. Patients often report high satisfaction rates following the procedure. However, most issues and functional incapacity. Patients often report high satisfaction rates following the procedure. However, most studies do not address the direct functional benefit gained from undergoing resection of panniculus morbidus. To our knowledge, this study is one of the first to assess functional status and to support the use of massive panniculectomy in the setting of functional incapacity because of panniculus morbidus.

The design of our study leads to a number of drawbacks. This study is a retrospective chart review and inherently makes data interpretation more difficult. Ideally, a prospective, matched case–control study design would be used. In addition, our patient cohort of 27 patients makes our study too underpowered to propose any definitive conclusions. Finally, the subjective nature of assigning functional classes to patients on the basis of retrospective data leads itself to user error.

Conclusions

Panniculus morbidus is a distinct pathologic entity affecting health, hygiene, and functional capacity. Resection of panniculus morbidus is associated with high overall complication rate, but an acceptable major complication rate. We have shown that massive panniculectomy results in significantly improved functional status and is a viable treatment option in this patient population.

Discussion

Nicholas J. Zyromski (Indianapolis, IN): Although the Steinbrocker Functional Scale is relatively blunt, I think this will be a real contribution to the literature. I have 2 questions. The first is an 11% mortality for elective operation is high. Could enlighten us in terms of who are you going to operate on, and not operate on for this procedure? Second, can you tell us what you did to prevent venous thrombo-embolic events? Do you screen these people post-operatively or perioperatively?

Evans: The 11% death rate is high for an elective procedure. With the small study we had, it’s tough to make any definitive conclusions on which patients to operate on and which not to. Looking at the 3 deaths, 2 had BMI greater than 70. Two of them were elderly, you know, 65, and I think one of them was actually 75, and they did have heart disease in two of those, as well. Unfortunately, that’s the patient group that needs this procedure the most. In regards to the DVT and PE, we treated these patients like we treat our bariatric patients. So the patients received 40 milligrams of Lovenox and Oxypurine preoperatively and the postoperative stage, they received BID dosing of that same 40 milligrams. Patients with BMI greater than 50 went home with 10 days of Lovenox BID.

James Madura (Phoenix, AZ): A very difficult problem. You showed two very different patients in those pictures. The first one was a gentleman which had a huge pannus with a lot of lymphedema. And the second one, in my opinion, looked like someone who was postgastric bypass with a very bag flaccid pannus. How many of those patients that you presented have had significant weight loss due to weight loss surgery? So I am wondering if you have a weight loss criteria or strategy before taking these patients to the operating room.

Evans: As far as the pictures, actually the second one, he had not undergone any bariatric surgery. As far as if we have the data of who had gastric bypass, who had weight loss surgery beforehand, we don’t have. I can tell you that four of our patients that were in our study cohort did undergo gastric bypass at the same time as the massive panniculectomy.