

Case Report

Fat Necrosis and Why the Classic Abdominoplasty Should be Avoided in Obese Patients

George Alexander, Mohammed K Ebrahim, Ibrahim Ghoneim
Al-Babtain Center for Plastic Surgery and Burns, Ibn-Sina Hospital, Kuwait

Kuwait Medical Journal 2005, 37 (1): 43-46

ABSTRACT

Major fat necrosis (more than 5 cm) is a complication rarely reported following abdominoplasty though it may be frequently seen in patients with wound dehiscence and cutaneous necrosis. In this paper, the authors report 12 cases of abdominoplasty with post-operative wound dehiscence who needed secondary skin grafting to close the wound. A review of these cases showed that extensive subcutaneous fat necrosis was a prominent feature and all the patients were obese. It appears that obese individuals are prone to develop fat necrosis post-operatively in cases where the classic abdominoplasty is

used. It is important that patients reduce their weight preoperatively and avoid considering abdominoplasty as a form of weight reduction. Fat necrosis, its occurrence and the various factors that could have contributed to major wound dehiscence in these patients are discussed. The authors caution surgeons against the use of the classic abdominoplasty procedure in obese patients and stress minimal undermining and the use of limited dermolipectomy or apronectomy along with judicious liposuction to avoid this complication of fat necrosis.

KEYWORDS: classic abdominoplasty, fat necrosis, obesity

INTRODUCTION

As living standards improve in third world countries and advanced nations better their per capita income, obesity does not lag far behind in following this prosperity trail. It is estimated that in the United States 33% of adults are obese^[1]. The national ambulatory medical care survey (1993) showed that obesity accounted for 8.7% of all patient visits to medical practitioners offices, much greater than visits for diabetes, asthma and osteoporosis^[2]. Though various modes of treatment of obesity exist, like diet, exercises, medications and bariatric surgery, patients often tend to take the easy way out - lipectomies or liposuction. While over the past few decades 'sculpting the abdomen' has evolved through simple dermolipectomy to various forms of abdominoplasty, the use of liposuction and complex endoscopic procedures, complications have continued to manifest in one form or the other. Though complications like hemorrhage, seroma, infection, wound dehiscence and thromboembolism have been observed^[3-7], major fat necrosis (more than 5 cm) is a complication rarely reported after abdominoplasty. We report twelve patients who had wound dehiscence and fat necrosis following classic abdominoplasty and needed secondary skin grafting. All of them were obese.

At the Al-Babtain Center for Plastic Surgery and Burns, Kuwait, 12 patients were seen between January 1993 and December 2000 with major fat necrosis (more than 5 cm) and wound dehiscence following abdominoplasty, all of whom needed skin grafting to close the wound. Eight of these patients had attended our out-patient center prior to their surgery. These patients were refused surgery as they were obese and advised preoperative weight reduction or bariatric surgery. They then had their surgery elsewhere. The rest presented to our center for the first time with this complication. The records of these patients were reviewed and the following factors were studied: age, sex, wound infection, associated clinical problems and ultimate outcome. All data was expressed as Mean \pm SD.

CASE REPORTS

Case 1: A 34-year-old female presented to our department asking for an abdominoplasty. At that time, she weighed 124 kgs and was advised weight reduction prior to surgery. She reported to the outpatient again four months later following an abdominoplasty elsewhere with skin necrosis and wound dehiscence (Fig. 2). She did not have any significant illness nor was she a smoker. Her records indicated that she had undergone a classic abdominoplasty with rectus sheath plication. The

Address correspondence to:

Dr Alexander George MCh (Plastic), Al-Babtain center for Plastic Surgery and Burns, Ibn-sina hospital, P O Box 25427, Safat 13115, Kuwait.
Fax: +(965) 4811784. Email: okalex@mailcity.com

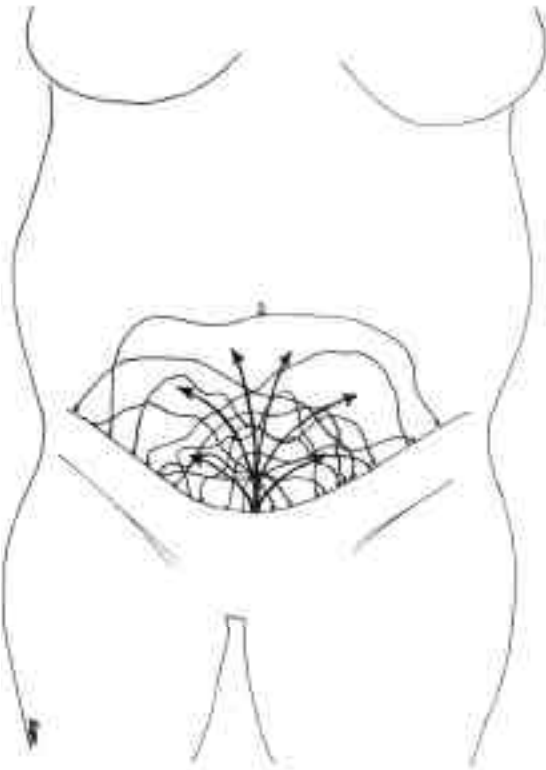


Fig. 1: The extent of fat necrosis in twelve patients is mapped out showing the centrifugal distribution from a central area of the flap above the mons pubis

wound was debrided and a large area of underlying fat necrosis was observed. Closure of the wound needed skin grafting at a later stage.

Case 2: A 42-year-old female patient reported to our outpatient with post-abdominoplasty wound dehiscence and skin necrosis (Fig. 3). She weighed 120 kgs and was diabetic, though well controlled on insulin therapy. She had a concurrent breast reduction with an inverted T closure of the skin flaps. The wound was debrided and a large area of underlying fat necrosis was found. Skin grafting was carried out at a later stage to close the wound.

RESULTS

Table 1 shows the clinical characteristics of patients. All patients were obese females (99 ± 13.8 , range:81-124 kgs), with a mean age of 37.7 ± 6.8 years. The time from abdominoplasty surgery to treatment at Al-Babtain center was 14 ± 4.0 , (range:8-21) days. Six patients had wound infection and one had a positive blood culture with MRSA. Three patients were diabetic and were well controlled by insulin therapy. Four patients were hypertensive on medication and their blood pressure was within the normal range. None of the



Fig. 2: Cutaneous necrosis following classic abdominoplasty in an obese patient



Fig. 3: Wound covered by granulation tissue following skin necrosis in an obese patient who had concurrent breast reduction with a classic abdominoplasty

patients were smokers. Three patients had concurrent breast surgery. Fig. 1 shows the extent of fat necrosis in all patients. All cases were operated upon with debridement at the first stage and skin grafting at the second stage. Two patients underwent two stages of debridement each, prior to skin grafting at a third stage. Hospital stay for all patients was calculated as 19.6 ± 6.0 (range:12-32) days.

DISCUSSION

Postoperative fat necrosis has been reported following reduction mammoplasty, mastectomy and post reconstructive procedures, mesh repair of the abdominal wall and following hypothermic cardiac surgery^[8-11]. The mechanism of fat necrosis still remains poorly understood but a variety of factors are thought to be responsible, namely, direct trauma, infection, poor nutrition, metabolic abnormalities of fat, vascular hypoperfusion and lipolytic enzymatic digestion^[11-15]. It has been shown that excessive fattiness in cattle and sheep predisposes them to fat necrosis^[16,17]. In the rabbit, adipose tissue blood flow declined with increased adiposity of fat deposits and a negative correlation

Table 1

Clinical characteristics of patients (n = 12)

Clinical characteristics

Age ¹ (range)	37.7 ± 6.8 years (28-50)
Male	0
Female	12
Diabetes	3
Septicemia	1
Wound infection	6
Hypertension	4
Obese	12
Concurrent surgery	3
Smoker	0

¹M ± SD

was found between flow and fat cell volume^[18]. In a series of six patients, massive necrosis of skin and fat was reported as a complication of obesity^[19]. The subcutaneous adipose tissue blood flow has been found to have an inverse relationship with the thickness of the subcutaneous layer^[20]. It appears that in obese patients the subcutaneous fat is highly susceptible to ischaemic necrosis as compared to normal subjects. Fat necrosis was found to be twice as common in obese patients as compared to non-obese patients undergoing TRAM flap breast reconstruction^[21]. Obesity at the time of abdominoplasty has a profound influence on the wound complication rate following surgery regardless of any previous weight reduction surgery^[5]. In the classic abdominoplasty, the superficial epigastric artery, superficial external pudental artery, superficial circumflex iliac artery and the musculocutaneous perforators from the deep epigastric arcade are cut with extensive undermining up to the costal margin: the flap that is raised is then supplied by the perforators from the intercostal, subcostal, lumbar and the posterior deep circumflex iliac artery. While the lymphatic drainage to the inguinal region is interrupted and new drainage channels need to be established, the venous drainage must also be reorganized. Although this essentially compromises the blood supply, it must involve a very effective capture of vascular territories since a delay procedure is not routinely undertaken during an abdominoplasty. All the wounds gaped in the central suprapubic area and then extended laterally. In addition, the areas of fat necrosis were centrally oriented with circumferential peripheral extensions (Fig. 1). This occurs as the blood supply following a classic abdominoplasty comes from the lateral side^[22]. The zone of maximum ischaemia is the central area of the flap above the mons pubis - also the most difficult to capture. While in all the cases, the extent

of fat necrosis far exceeded the area of cutaneous necrosis, the extensive well-developed sub-dermal vascular plexus must have effectively maintained a greater area of cutaneous viability.

It appears that the classic abdominoplasty for obese patients is still in vogue in some centers. Liposuction reduces the net amount of subcutaneous fat that needs to be perfused when combined with dermolipectomy, without significantly damaging the vascularity and lymphatic channels. It also reduces the need for the classic abdominoplasty and allows more aesthetic sculpting of the trunk^[23]. All these patients were obese, had classic abdominoplasties with wide undermining and division of perforators - a combination of factors that must have tilted the delicate balance between fat mass and blood flow, contributing to the ischaemic fat necrosis. Areas of fat necrosis may be infected in the presence of wound dehiscence and lead to severe consequences and therefore will need to be radically debrided. One patient had proven septicemia with positive blood cultures for MRSA and improved rapidly following extensive debridement that was undertaken under cover of vancomycin. Patient 2 had a breast reduction procedure, which was done in conjunction with abdominoplasty (Fig. 2). The two infra-mammary incisions in addition to other factors must have significantly compromised the vascularity leading to the fat necrosis. Four patients were diabetic but were well controlled on insulin therapy. All the patients received anticoagulant prophylaxis during their primary surgery and this along with early mobilization probably accounted for the absence of deep vein thrombosis in any of the patients.

It has been reported that discontinuous undermining and maintaining the perforators will avoid vascular hypo-perfusion, but this technique is advocated only for patients with severe abdominal laxity. Le louarn^[24] suggested the technique of partial subfascial abdominoplasty, a combination of liposuction and selective dissection - to ensure vascularisation of skin and fat as well as better preservation of the lymphatic system. Wide undermining, opposite T incisions, concurrent medical problems, smoke exposure and disregard for interacting vascular territories have been observed as significant risk factors by other authors^[22,25]. In some of the cases, granulation tissue covered and masked the extensive fat necrosis present within the flap. Ultrasonography did not show any pockets or fluid collection nor did it give a definite diagnosis of fat necrosis. While in the breast, mammography is an effective tool to differentiate fat necrosis, in the abdomen, the use of magnetic resonance imaging is helpful as fat

necrosis presents a characteristic morphology and signal intensity^[26]. Diagnosis did not pose much of a problem as in all the cases the wounds were open, surgical debridement of the necrotic tissue was undertaken until healthy and bleeding tissue were seen and fat necrosis was confirmed by histopathological examination.

Abdominoplasty continues to be used as a mode of management of obesity by some surgeons. While it may temporarily satisfy the patients' needs, the physician needs to emphasize the other modes of management and reserve surgical excision for deserving candidates following major weight reduction. A variety of procedures, both surgical and non-surgical are now available to help reduce weight and the patient should be counseled in this regard prior to surgery. If major fat necrosis is to be avoided, it is important to avoid the classic abdominoplasty in obese patients, limit the undermining in an 'inverted V' fashion towards the xiphoid, use discontinuous dissection maintaining the vascularity of the flap as well as judiciously combining it with liposuction. The avoidance of such complications is crucial in preventing a psychological breakdown in these patients following a cosmetic deformity resulting from radical debridement and skin grafting. Further, it also leads to loss of hospital resources in terms of bed utilization, dressing materials, antibiotics and operation theater time. In addition, it increases the workload of health care staff and exposes the surgeon to the risk of litigation. Abdominoplasty in the obese patient is a delicate operation and needs to be given its due respect if complications such as major fat necrosis and wound dehiscence are to be avoided.

REFERENCES

- Rosenbaum M, Leibel RL, Hirsch J. Obesity. *N Engl J Med* 1997; 337:396-407.
- Kopelman PG, Finer N. Reply: Is obesity a disease? *Int J Obes Relat Metab Disord* 2001; 25:1405-1406.
- Chaouat M, Levan P, Lalanne B, *et al.* Abdominal dermolipectomies: early postoperative complications and long-term unfavorable results. *Plast Reconstr Surg* 2000; 106:1614-1618.
- Van Uchelen JH, Werker PM, Kon M. Complications of abdominoplasty in 86 patients. *Plast Reconstr Surg* 2001; 107:1869-1873.
- Vastine VL, Morgan RF, Williams GS, *et al.* Wound complications of abdominoplasty in obese patients. *Ann Plast Surg* 1999; 42:34-39.
- Al-Qattan MM. Abdominoplasty in multiparous women with severe musculoaponeurotic laxity. *Br J Plast Surg* 1997; 50:450-455.
- Floros C, Davis PK. Complications and long-term results following abdominoplasty: a retrospective study. *Br J Plast Surg* 1991; 44:190-194.
- Dabbah A, Lehman JA Jr, Parker MG, *et al.* Reduction mammoplasty: an outcome analysis. *Ann Plast Surg* 1995; 35:337-341.
- Leibman AJ, Styblo TM, Bostwick J. Mammography of the post-reconstruction breast. *Plast Reconstr Surg* 1997; 99:698-704.
- Jouini S, Sehili S, Ksontini R, *et al.* Pseudotumoral abdominal cysto-steato-necrosis: an unusual etiology. *Ann Radiol (Paris)* 1996; 39:111-114.
- Silverman AK, Michels EH, Rasmussen JE. Subcutaneous fat necrosis in an infant, occurring after hypothermic cardiac surgery. Case report and analysis of etiologic factors. *J Am Acad Dermatol* 1986; 15:331-336.
- Lee PC, Howard JM. Fat necrosis. *Surg Gynecol Obstet* 1979; 148:785-789.
- Voinchet V, Boissinot P, Mangalon G. Post-traumatic liponecrosis. Apropos of a clinical case. *J Chir (Paris)* 1995; 132:305-308.
- Marshak RH, Lindner AE, Maklansky D, *et al.* Mesenteric fat necrosis simulating a carcinoma of the cecum. *Am J Gastroenterol* 1980; 74:459-463.
- Janigan DT, Morris J, Hirsch D. Acute skin and fat necrosis during sepsis in a patient with chronic renal failure and subcutaneous arterial calcification. *Am J Kidney Dis* 1992; 20:643-646.
- Gregory NG, Christopherson RJ, Lister D. Adipose tissue capillary blood flow in relation to fatness in sheep. *Res Vet Sci* 1986; 40:352-356.
- Katomoto H, Yukawa T, Shimada Y. Lipogenic and lipolytic activities in isolated adipocytes from cattle with fat necrosis. *Res Vet Sci* 1996; 61:214-217.
- Digirolamo M, Esposito J. Adipose tissue blood flow and cellularity in the growing rabbit. *Am J Physiol* 1975; 229:107-112.
- Janigan DT, Prokopetz RD, Chawla S, *et al.* Massive necrosis of fat and skin as a complication of obesity. *CMAJ* 1989; 140: 665-668.
- Nielsen SL, Larsen OA. Relationship of subcutaneous adipose tissue blood flow to thickness of subcutaneous tissue and total body fat. *Scand J Clin Lab Invest* 1973; 31:383-388.
- Jewell RP, Whitney TM. TRAM fat necrosis in a young surgeon's practice: is it experience, technique, or blood flow? *Ann Plast Surg* 1999; 42:424-427.
- Matarasso A. Liposuction as an adjunct to a full abdominoplasty. *Plast Reconstr Surg* 1995; 95:829-836.
- Lockwood T. High-lateral-tension abdominoplasty with superficial fascial system suspension. *Plast Reconstr Surg* 1995; 96:603-615.
- Le Louarn C. Partial subfascial abdominoplasty. *Aesthetic Plast Surg* 1996; 20:123-127.
- Dillerud E. Abdominoplasty combined with suction lipoplasty: a study of complications, revisions, and risk factors in 487 cases. *Ann Plast Surg* 1990; 25:333-338.
- Canteli B, Saez F, de los Rios A, *et al.* Fat necrosis. *Skeletal Radiol* 1996; 25:305-307.