The History of The Fleur-de-lis Technique: a Review of The Literature and Case Report

Article · January 2014

2 authors:

Anindya Lahiri
Sandwell and West Birmingham Hospitals NHS Trust
36 PUBLICATIONS **416** CITATIONS
SEE PROFILE

Gordon Arthur George McKenzie
Hull York Medical School
21 PUBLICATIONS **422** CITATIONS
SEE PROFILE

The History of The Fleur-de-lis Technique: a Review of The Literature and Case Report

Gordon A.G McKenzie BSc (Hons)

College of Medical and Dental Sciences, Univeristy of Birmingham, Edgbaston, Birmingham, B152TT

Anindya Lahiri (FRCS Plast)

Sandwell and West Birmingham Hospitals NHS Trust, Lyndon, West Bromwich, West Midlands, B71 4HJ

KEYWORDS

Fleur-de-lis; history; abdominoplasty; reconstruction

ABSTRACT

From time-honoured pioneers to the modern day plastic surgeon, the fleur-de-lis technique has certainly found its place in the history of plastic surgery, alongside its wider symbolic references. In this historical article with a review of the literature we document the history of the fleur-de-lis technique, which is fascinating both from the perspective of plastic surgery advancement, and the many pioneering surgeons who utilized this technique. The fleur-de-lis incision has been innovatively used in lip, breast, thoracic wall and lower back defect reconstruction, and increasingly today in abdominoplasty. The fleur-delis technique has encouraged innovation in a specialty renowned for solving the most challenging surgical problems. We show readers that knowledge of this technique can be used across the plastic surgery subspecialties with successful results, and is one technique to keep in mind when ingenuity is required. In this respect, we report the use of the fleur-de-lis technique to excise a 1.4kg lipomatous mass from the left buttock and posterior thigh of a 28-year-old female.

INTRODUCTION

The fleur-de-lis (lys) approach is named after its resemblance to the symbol of the “flower of the lily”, which was first used in French heraldry, although it has many historical relations including religion and art.[1] In the field of plastic surgery, fleur-de-lis describes an inverted-T incision where horizontal and vertical incisions resemble the stylized lily

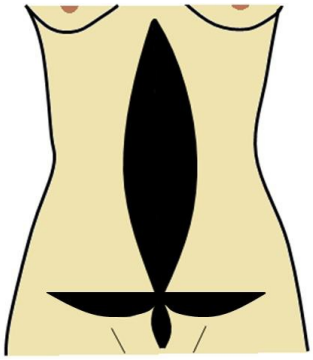

Figure 1: The fleur-de-lis pattern is created when horizontal and vertical incisions resemble the stylized lily, seen here after partial closure of a fleur-de-lis abdominoplasty.

Over the years, the fleur-de-lis technique has been used in lip, breast, thoracic wall and lower back defect reconstruction and abdominoplasty.[2-28] In this historical article with a review of the literature and a case report we document the history of the fleur-de-lis technique, which is fascinating both from the perspective of plastic surgery advancement, and the many pioneering surgeons who utilized this technique.

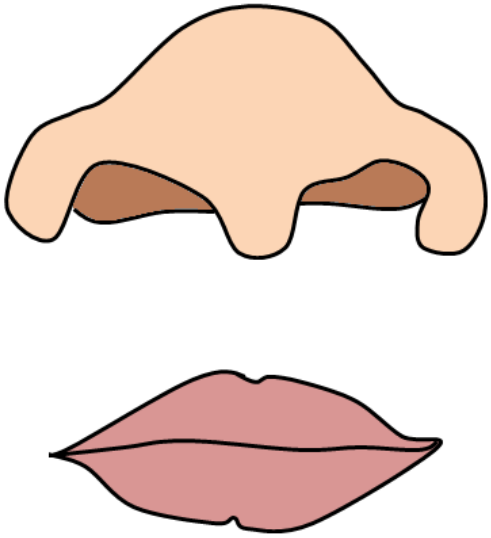

Figure 2: Brown and McDowell modified Vilray Blair's trefoil flap into a fleur-de-lis.

LIP RECONSTRUCTION

In 1941, James Barrett Brown (1899-1971), a pioneer of the use of large split-thickness skin grafts, and Frank McDowell (1911–1992), an editor of Plastic and Reconstructive Surgery, modified Vilray Blair's trefoil flap into a fleur-de-lis (Figure 2), which was used for secondary cleft lip correction.

However, this approach invariably left an unsatisfactory third lip scar in the midline.[2] In 1964, the pioneering and honoured plastic surgeon D. Ralph Millard (1919-2011) published a case report describing a fleur-de-lis lip flap for a 29-year-old female with an atrophic lip scar of the left philtrum column and the lateral 1cm of skin.[3] The history revealed treatment in infancy with radon seeds for an upper lip haemangioma. To correct for the relative thinness of the vermilion of the upper lip compared to the voluminous lower lip, Millard made a vertical excision of the upper lip scar, and a lower lip fleur-de-lis with preservation of the small coronary vessel pedicle (Figure 3).

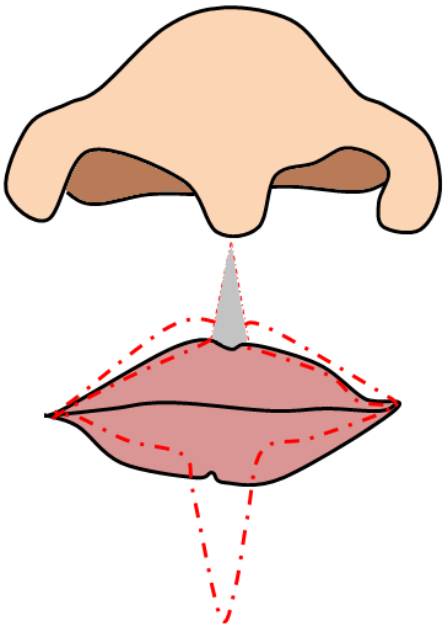

Figure 3: Millard's fleur-de-lis lip flap. Vertical excision of the upper lip scar (highlighted in grey), and a lower lip fleur-de-lis.

By turning the fleur-de-lis flap 180 degrees and inserting the lateral extensions into horizontal relaxing incisions of the upper lip, Millard recounts in Cleft Craft that the procedure was so successful the patient remarried![2]

Subsequent use of the fleur-de-lis lip flap appears with a case report in 1979 describing the reconstruction of the mid-face of a 23-year-old female who had suffered gangrenous destruction in infancy.[4] Daniel Marchac – a profound contributor to European plastic surgery, craniofacial surgery and surgical education[5] – used the fleur-de-lis lip flap to reconstruct the lip and nasal vestibule after Le Fort II advancement for skeleton contouring and a scalping forehead flap for nasal reconstruction. Later, Tsai et al.[6] reported results with the fleur-de-lis flap in four cases of secondary deformity post-surgical correction of cleft lip and palate. They found the results superior to use of an Abbe flap per se, where the upper lip vermilion exhibits severe thinness.

The fleur-de-lis resection was used in the rare condition Melkersson-Rosenthal syndrome by Cederna et al.[7] in 1998. They successfully treated massive lower lip swelling in a 49-year old male by reducing lower lip bulk with a fleur-de-lis labial resection and a transmodiolar labial suspension suture.

ABDOMINOPLASTY

In a 1985 case series, A. Lee Dellon[8] – a pioneer in peripheral nerve surgery – describes an extension of Regnault's modified-W Castanares technique. The pattern he developed when the abdominal wall and mons pubis were partially closed resembled the fleur-de-lis (Figure 1) – a term that Dellon popularized. However, this modification is attributed to Regnault himself in some literature [9,10] and, somewhat surprisingly, fleur-de-lis abdominoplasty is not even mentioned in a 2006 review of the history of body contouring surgery of which Regnault was a pioneer.[11] A similar procedure had been described by Castanares and Goethel in 1967, and the desire for a vertical component to address central abdominal and lateral flank tissue excess was expressed as early as 1916.[12,13] This was no doubt a significant and still used modification, yet this step is little recognised in the literature.

George Ramsey-Stewart[9] described a radical extension of the fleur-de-lis abdominoplasty in 1993. He observed good aesthetic and functional outcomes with low morbidity (six complications) in 45 patients with abdominal and trunk skin redundancy following massive weight loss post-bariatric surgery. He extended the horizontal fleur-de-lis incision via the flank to the back bilaterally (Figure 4), which involved all three vascular zones as described by Huger.

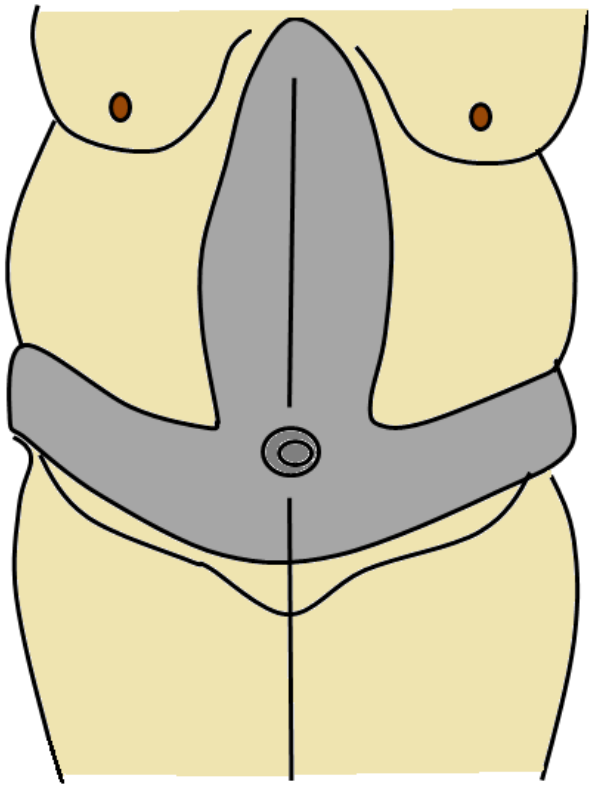

Figure 4: Bilateral extension of the horizontal fleur-de-lis incision through the flank and into the back.

Duff et al.[14] retrospectively reviewed 68 patients who had undergone fleur-de-lis abdominoplasty as described by Dellon. They found that 82% of patients expressed a satisfactory outcome after one operation, despite a complications rate of 62% that was significantly related to higher body mass and body mass index. The authors' concluded that this procedure is desirable for the patient who has lost weight prior to surgery and

favours the body contouring outcome over the scarring outcome. These results were further supported by a case series of 10 patients undergoing fleur-de-lis abdominoplasty for massive weight loss, which emphasised the importance of careful patient selection.[15]

In 2007, Moya and Sharma[16] described a further modification of the fleur-de-lis abdominoplasty in a case series of 16 patients. They utilised extended high lateral incisions in an effort to improve the waistline-to-hip contour, by avoiding undermining and the associated serious postoperative complication such as tissue necrosis.

If the patient requesting an abdominoplasty has a long transverse supra-umbilical or subcostal scar from previous gastrointestinal bypass surgery, this can compromise the blood supply from the superior epigastric arteries.[17] In this regard, Rieger et al.17 described a modified fleur-de-lis abdominoplasty to transform an old transverse scar into a vertical scar, thus encouraging an individualized approach. However, a retrospective study[18] of 92 patients followed after three different operative techniques of abdominal panniculectomy, including 25 fleur-de-lis panniculectomies, found no significant differences between complication rates and patient satisfaction. Moreover, a study[19] of 491 patients – 31% fleur-de-lis; 69% traditional horizontal excision – showed that there were similar rates of complications, although the fleur-de-lis group showed a higher rate of wound infection on multivariate analysis.

Lower complication rates were found in a recent retrospective review[20] of 130 (77% fleur-de-lis, 23% traditional) panniculectomy patients. Together these studies suggest that the fleur-de-lis abdominoplasty is a safe option,offering superior contouring outcomes, which must be balanced with scarring and increased operating time.

A further technical modification to the fleur-de-lis abdominoplasty was suggested by Eisenhardt et al.[21] in 2013 by perioperatively mobilising tissue, aided by a “plumb-line” of suture from the xiphoid process to the mons pubis, to enable symmetrical skin resection.It appears that the fleur-de-lis abdominoplasty continues to be refined.

BREAST RECONSTRUCTION

The standard transverse rectus abdominis myocutaneous (TRAM) flap was modified

by Marshall and Ross[22] in 1994 to include a supra-umbilical vertical component of well vascularised tissue, creating a fleur-de-lis TRAM flap (Figure 5).

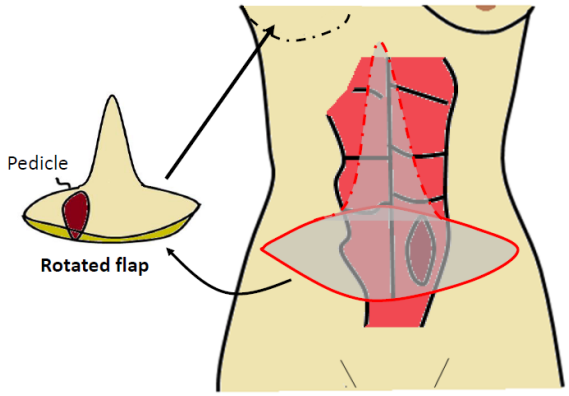

Figure 5: The fleur-de-lis transverse rectus abdominis myocutaneous (TRAM) flap. The standard pedicled TRAM flap is modified with a supra-umbilical extension.

This had several advantages: increased tissue volume, improved vascular supply, decreased operative time, better exposure for dissection and quicker recovery. Furthermore, by approximation of the vertical and horizontal skin flaps to form a cone, excellent breast projection can be gained and the vertical abdominal scar is cosmetically acceptable.

Aitken and Mustoe[23] encouraged a renaissance in the use of the fleur-de-lis technique for breast reconstruction by describing a modified fleur-de-lis pattern to the standard latissimus flap (Figure 6), using "wet" tumescent liposuction and harvesting large amounts of subcutaneous fat.

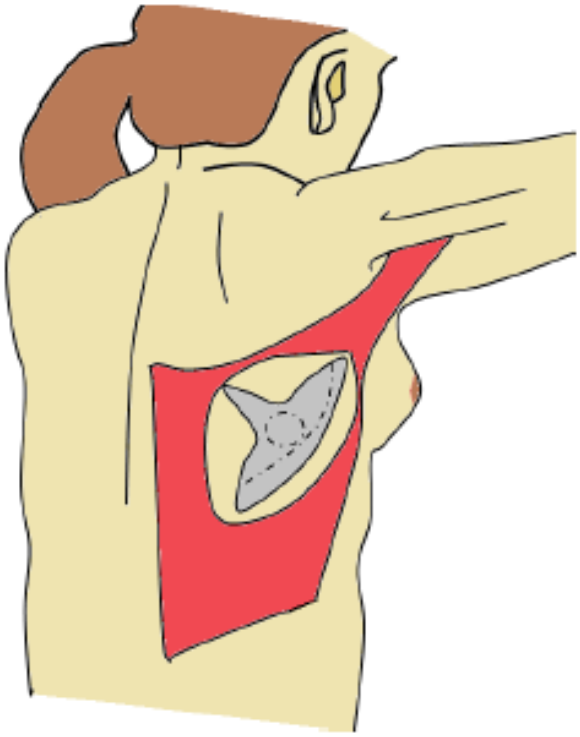

Figure 6: The modified fleur-de-lis latissimus flap.

They undertook a retrospective cohort study of 48 patients [25] (using modified fleur-de-lis) and found that improved breast volume and projection in the inferior pole, and better donor-site outcomes were observed with the fleur-de-lis pattern. Moreover, complications and aesthetic outcomes were found to be comparable to TRAM flap results with the advantage of technical simplicity.

Germanò et al.[24] described reconstruction of the nipple-areolar complex by sculpting three elliptic dermocutaneous flaps to form the fleur-de-lis (Figure 7).

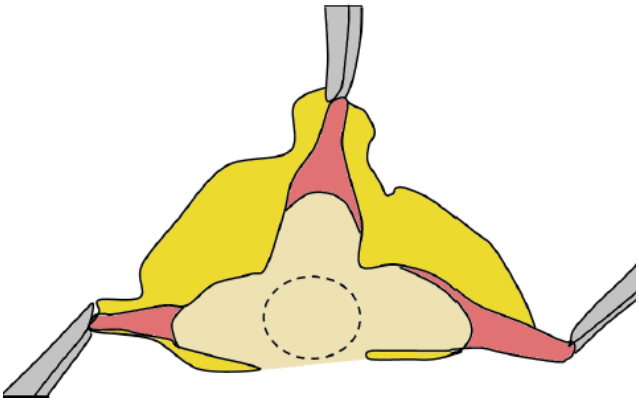

Figure 7: Reconstruction of the nipple-areolar complex by sculpting three elliptic dermocutaneous flaps to form the fleur-de-lis. Triangular dermo-adipose flaps are incised at the distal end of the flaps.

Triangular dermo-adipose flaps were incised at the distal end of the flaps, leaving the skin intact. The flaps were then raised and the lateral flaps wrapped around forming the new base of the nipple and the central flap was sutured anteriorly to form a roof. They evaluated 50 patients with a mean follow-up period of 3.8 years and found that vertical projection of the nipple did not exhibit significant loss.

McKane et al.[25] described the modification of the transverse upper gracilis myocutaneous free flap with a proximal thigh fleur-de-lis skin paddle design to increase volume in 17 consecutive patients (31 flaps). They observed flap success and proportionate breast reconstruction in all patients, with an acceptable complication rate including donor-site dehiscence (≈19%) and cellulitis (≈13%).

Following the PIP implant scandal, a 47-year-old female patient with massive weight loss and previous mastectomy for breast cancer demanded a non-implant based reconstructive approach. Salim et al.[26] improvised and created a fleur-de-lis deep inferior epigastric artery perforator (DIEP) flap by incorporating epigastric tissue. This introduced a “5th zone” of vascular territory, which is reliant on perfusion from the inferior epigastric artery. Moreover, the fleur-de-lis DIEP flap offered enhanced abdominal contouring and an autologous solution to breast reconstruction after massive weight loss.

OTHER USES

Anthony and Foster[27] proposed a fleur-de-lis modification of the rectus abdominis myocutaneous pedicled flap to avoid the need for a free flap, and reported their

success in three patients requiring thoracic wound reconstruction.

Recently, Ciudad et al.[28] drew inspiration from a 1991 proposal in Hartrampf's Breast Reconstruction with Living Tissue to create a novel extended fleur-de-lis latissimus dorsi flap with perfusion maintained via a thoracodorsal vascular pedicle. They successfully closed a 20 x 15cm defect of the flank in a 69-year-old man after sarcoma resection.

We also report recent use of the fleur-de-lis technique in a 28-year-old female. The patient presented with a history of gradual painless overgrowth of tissues in the left buttock and thigh since childhood. She had no other relevant medical history. On examination she had a large, soft, mobile subdermal mass extending from the left buttock down the posterolateral aspect of the thigh to the left knee (Figure 8).

Figure 8: Large lipomatous lesion of the left buttock and posterolateral thigh in a 28-year-old female.

Magnetic resonance imaging indicated the mass was a lipomatous tumour. The patient consented to undergo surgical excision of the mass and she was marked with a fleur-de-lis incision (Figure 9).

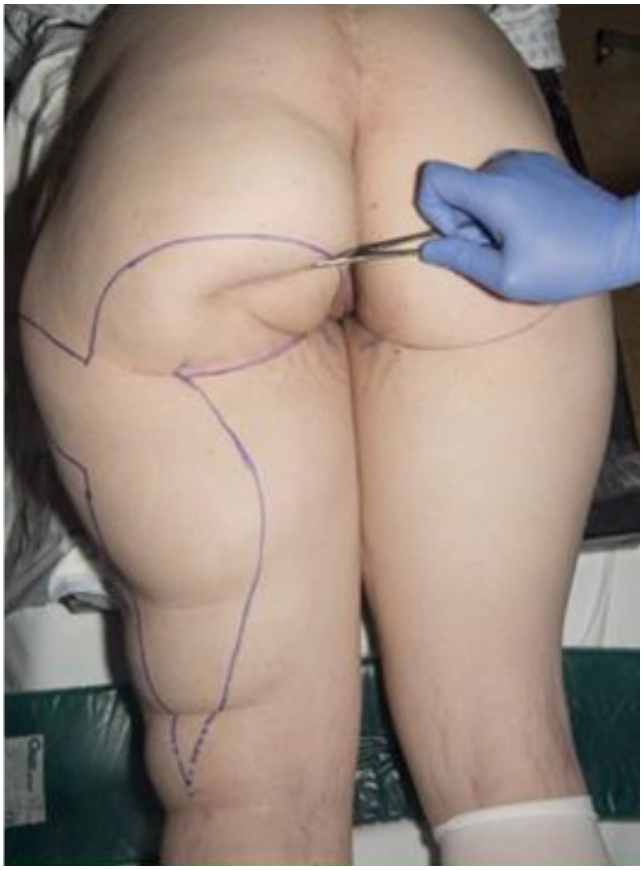

Figure 9: The patient marked with a fleur-de-lis incision.

Figure 10: The patient one-week post-operatively showing good healing and aesthetic results.

A 1.4kg lipomatous mass was successfully excised and sent for histopathological analysis. At one week post-operatively, there were no post-operative complications, the wound had healed well (Figure 10), and the patient was very happy with the outcome. Histopathological analysis confirmed the tumour to be lipomatous with no evidence of malignant disease.

CONCLUSION AND FURTHER PERSPECTIVE

From time-honoured pioneers to the modern day plastic surgeon, the fleur-de-lis technique has certainly found its place in the history of plastic surgery, alongside its wider symbolic references. The fleur-de-lis pattern has encouraged innovation in a specialty renowned for solving the most challenging surgical problems. The principal idea behind the fleur-de-lis technique is to minimize scarring and maximize the amount of tissue transferred or

removed, thereby offering the optimum cosmetic outcome: it continues to be used imaginatively. In line with the obesity epidemic, there is rising demand for abdominoplasty in the setting of massive weight loss; therefore, the fleur-de-lis abdominoplasty is experiencing increased popularity. However, reconstructive usage may be in decline or the fleur-de-lis is seldom utilized only in idiosyncratic cases. We show readers that knowledge of this technique can be used across the plastic surgery subspecialties with successful results, and is one technique to keep in mind when ingenuity is required.

REFERENCES

1. Pastoureau M. Heraldry: Its origins and meaning. Garvie F, trans. United Kingdom: Thames and Hudson;1997:98.

2. Millard DR., Jr. Bilateral and Rare Deformities. In Cleft Craft: The evolution of its
surgery. Vol. 2. Boston: Lippincott Williams and Wilkins, 1977: 419-24

3. Millard DR., Jr. A lip fleur-de-lis flap. Plast Reconstr Surg. 1964;34:34-6.

4. Marchac D. Case report: Reconstruction of the mid-face in an adult, after gangrenous destruction in infancy. Plast Reconstr Surg. 1979;63:726-31.

5. Jones BM. Daniel Marchac. BMJ 2013;346:f60

6. Tsai HC, Leu TR,
Chian SS, et al. Fleur-de-lis flap. Zhonghua Yi Xue Za Zhi (Taipei). 1990;45:45-52.

7. Cederna PS, Fiala TGS, Smith DJ Jr, Newman MH. Melkersson-Rosenthal syndrome: reduction cheiloplasty utilizing a transmodiolar labial suspension suture. Aesthetic Plast Surg. 1998;22:102-5.

8. Dellon AL. Fleur-de-lis abdominoplasty. Aesthetic Plast Surg. 1985;9:27-32.

9. Guyuron B, Eriksson E, Persing JA. Plastic Surgery: Indications and Practice. In: Chung KC, Disa JJ, Gosain AK, Kinney B, Rubin JP, eds. Aesthetic Surgery. Vol. 2, 1st ed. China: Saunders; 2008:1609-1626

10. Ramsey-Stewart G. Radical "Fleur-de-Lis" Abdominal after Bariatric Surgery. Obes Surg. 1993;3:410-14.

11. O'Toole JP, Song A, Rubin JP. Semin Plast Surg. 2006;20(1): 5–8.

12. Foged J. Operative treatment of abdominal obesity, especially pendulous abdomen. Br J Plast Surg. 1948;1:274-83

13. Castanares S, Goethel JA. Abdominal lipectomy: a modification in technique. Plast Reconstr Surg 1967;40:378-83.

14. Duff CG, Aslam S, Griffiths RW. Fleur-de-Lys abdominoplasty - a consecutive case series. Br J Plast Surg. 2003;56:557-66.

15. Wallach SG. Abdominal contour surgery for the massive weight loss patient: the fleur-delis approach. Aesthet Surg J. 2005;25:454-65.

16. Moya AP, Sharma D. A modified technique combining vertical and high lateral incisions for abdominal-to-hip contouring following massive weight loss in persistently obese patients. J Plast Reconstr Aesthet Surg. 2009;62:56-64.

17. Rieger UM, Erba P, Kalbermatten DF, Schaefer DJ, Pierer G, Haug M. An individualized approach to abdominoplasty in the presence of bilateral subcostal scars after open gastric bypass. Obes Surg. 2008;18:863-69.

18. Cooper JM, Paige KT, Beshlian KM, Downey DL, Thirlby RC. Abdominal panniculectomies: high patient satisfaction despite significant complication rates. Ann Plast Surg. 2008;61:188-96.

19. Friedman T, O'Brien Coon D, Michaels J, et al. Fleur-de-Lis abdominoplasty: a safe alternative to traditional abdominoplasty for the massive weight loss patient. Plast Reconstr Surg. 2010;125:1525-35.

20. O'Brien JA, Broderick GB, Hurwitz ZM, et al. Fleur-de-lis panniculectomy after bariatric surgery: our experience. Ann Plast Surg. 2012;68:74-8.

21. Eisenhardt SU, Goerke SM, Bannasch H, Stark GB, Torio-Padron N. Technical facilitation of the fleur-de-lis abdominoplasty for symmetrical resection patterns in massive weight loss patients. Plast Reconstr Surg. 2012;129:590e-3e.

22. Marshall DR, Ross DA. A Fleur de Lys modification of the TRAM flap for breast reconstruction. Br J Plast Surg. 1994;47:521-6.

23. Aitken ME, Mustoe TA. Why change a good thing? Revisiting the fleur-de-lis reconstruction of the breast. Plast Reconstr Surg. 2002;109:525-38

24. Germanò D, De Biasio F, Piedimonte A, Parodi PC. Nipple reconstruction using the fleur-de-lis flap technique. Aesthetic Plast Surg. 2006;30:399-402.

25. McKane BW, Korn PT. The fleur-de-lis upper gracilis flap for breast reconstruction: flap design and outcome. Ann Plast Surg. 2012;69(4):383-6.

26. Salim F, Adlard R, Pickford MA. The Fleur-de-lis DIEP-Introducing a 5th zone for DIEP reconstruction. J Plast Reconstr Aesthet Surg. 2013 (Epub ahead of print)

27. Anthony JP, Foster RD. The reconstruction of complex thoracic wounds: a fleur-de-lys modification of the rectus abdominis myocutaneous flap. Plast Reconstr Surg. 2001;107(5):1229-33.

28. Ciudad P, Singhal D, Sapountzis S, Chilgar RM, Nicoli F, Chen HC. The extended fleur-de-lis latissimus dorsi flap: A novel flap and approach for coverage of lower back defects. J Plast Reconstr Aesthet Surg. 2013 (Epub ahead of print).