

ORIGINAL PAPER

THE SUPERIOR GLUTEAL FLAP – BREAST RECONSTRUCTION – ANATOMIC DISSECTION ON A CADAVER

Nicoleta Ferariu¹, S. Corțan², Anca Colcigeanu¹, I. Lascăr^{1,3}, Adriana Elena Nica^{3,4}, Ioana Teona Sebe^{1,3}

¹The Emergency Clinical Hospital Bucharest, Romania

²The City Hospital Baraolt, Covasna, Romania

³The University of Medicine and Pharmacy “Carol Davila”, Bucharest, Romania

⁴University Emergency Hospital Bucharest, Romania

Corresponding author: Ioana Teona Sebe

Phone no. 0040744330967

E-mail: sebeioanateona@yahoo.com

Abstract

The reconstruction of the breast after an oncological mastectomy is a challenge for the plastic surgeons. During the dissection of one fresh, female cadaver, age 63, a free superior gluteal flap was taken from the gluteal region, using loupe magnification. The dissection preparations were photographed with a high definition camera. The harvesting of the superior gluteal musculocutaneous fat-pad flap and the closure of the donor area in layers advantages and disadvantages of using the superior gluteal flap in the reconstruction of the amputated breast.

Keywords: *breast reconstruction, anatomical dissection on a fresh cadaver, free microsurgical transfer of the superior gluteal flap*

Introduction

The reconstruction of the breast after a mastectomy is a challenge for the plastic surgeons.

Materials and method

During the dissection of one fresh, female cadaver, age 63, a free superior gluteal flap was taken from the gluteal region, using loupe magnification. The dissection preparations were photographed with a high definition camera.

Results

Delimitating and harvesting the superior gluteal flap:

The superior gluteal flap is constructed from the lateral portion of the sacrum until approximately 5 cm from the anterior superior iliac spine [1-3] (Figure 1).

The posterior superior iliac spine, the greater trochanteric, the external contour of the sacrum and the superior gluteal vascular pedicle are marked [4-7] (Figure 1).

We trace a line that connects the posterior superior iliac spine with the greater trochanteric, which will represent the axis of the flap; the vessels of the pedicle are found along this line, at the meeting point of the two middle thirds with the superior third [1,2,3,8] (Figure 1).

The flap will be delimited taking into account the laxity of the gluteal tissue, without exaggerating its width and accentuating the deformity of the donor area [6,7,9,10] (Figure 1).



Figure 1 - The flap is centered on the axis connecting the greater trochanteric with the posterior superior iliac spine

The superior gluteal pedicle is situated along this line, at the meeting point of the two inferior thirds with the superior third [6,7,10,12,13] (Figure 1).



Figure 2 - The superior edge of the previously marked cutaneous island is incised

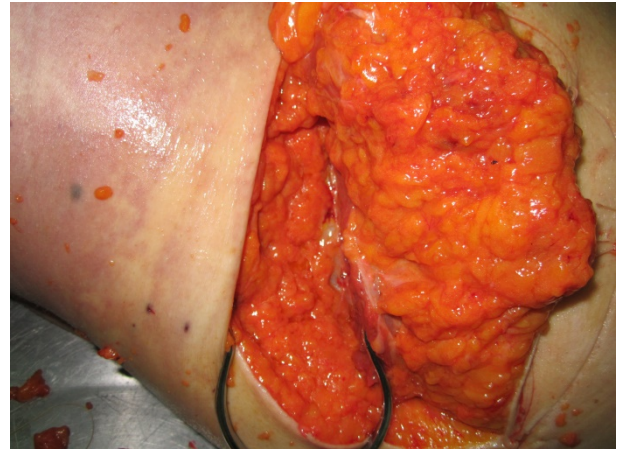


Figure 3 - The dissection is continued in profundity until the fascia of the gluteus medius muscle is visible

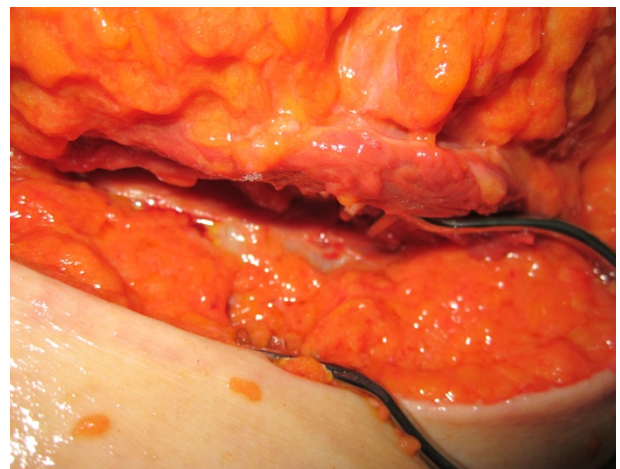


Figure 4 - The superior lateral edge of the gluteus maximus muscle is identified



Figure 5 - Anchoring wires which enter the tegument and the subcutaneous fat tissue are used to obtain a good view of the dissection area and the fascia of the gluteus medius muscle and the superior lateral edge of the gluteus maximus muscle respectively. The superior lateral edge of the gluteus maximus muscle is dissected along its entire length, highlighting it [1-4,14,15] (Figure 5).



Figure 6 - The dissection is continued in the plane situated between the fascia of the gluteus maximus muscle and the fascia of the gluteus medius

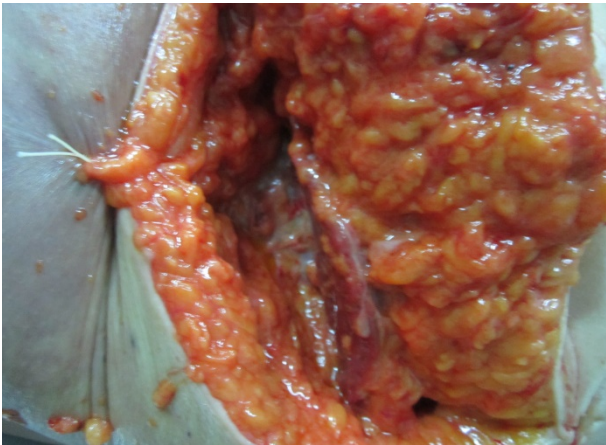


Figure 7 - The lateral portion of the superior gluteal muscle is dissected and gradually lifted

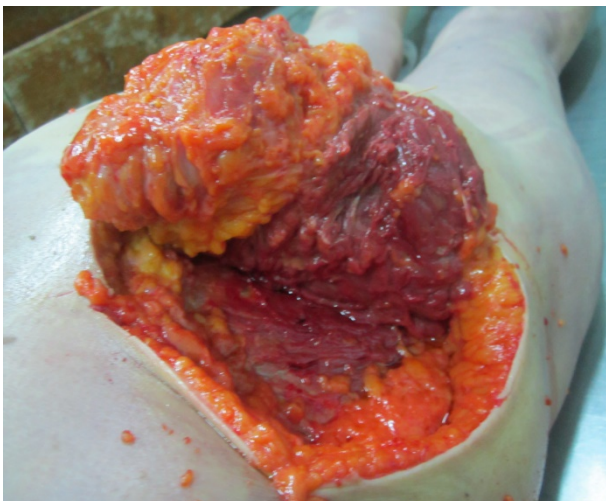


Figure 8 - The superior lateral part of the gluteus maximus muscle is lifted along with the superjacent cutaneous fat tissue



Figure 9 - The posterior side of the superior lateral portion of the gluteus maximus muscle is observed in the forefront, from the lateral edge of the sacrum until the area of the greater trochanteric [2,8,9,10]



Figure 10 - The superior edge of the gluteus maximus muscle is sectioned (in the area where it originates on the sacrum bone) in order to identify the vascular pedicle

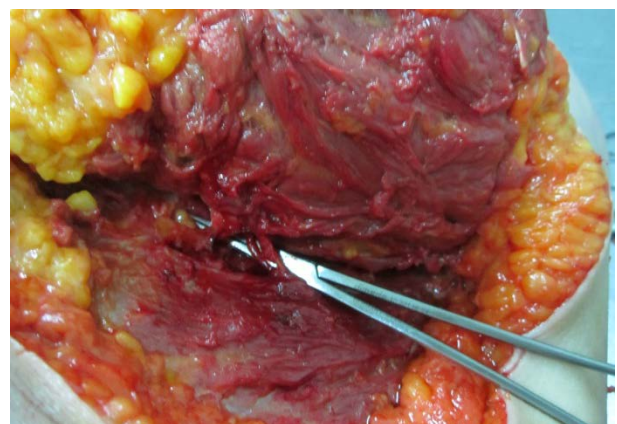


Figure 11 - The identification of the superficial superior gluteal vascular pedicle (the artery and the vein), situated on the deep surface of the gluteus maximus muscle at approximately 5 cm from the lateral edge of the sacrum [1-4]

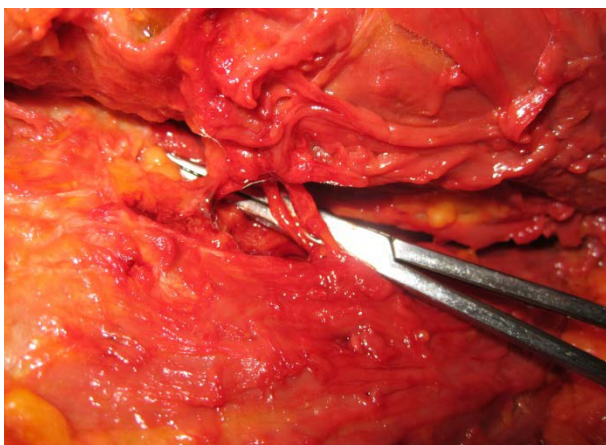


Figure 12 - The forefront view of the superficial superior gluteal vascular pedicle (found at the tip of the forceps) and of the deep superior gluteal artery, along with the superior gluteal nerve. The superior gluteal vascular pedicle is situated between the gluteus medius muscle and the piriformis muscle [3,8,9,13]

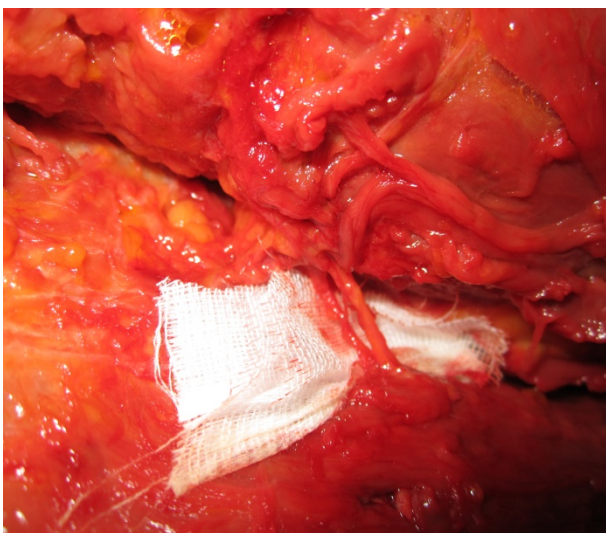


Figure 13 - The forefront view of the deep superior gluteal artery and of the superior gluteal nerve. The deep superior gluteal artery will be ligated and sectioned upon lifting and transferring the superior gluteal flap. The dissection must be performed with great care in order to preserve the superior gluteal nerve [3,5,9,14]

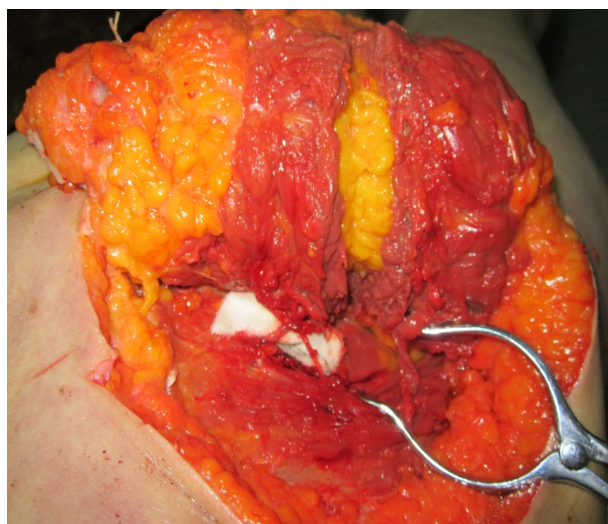


Figure 14 - An overview of the posterior side of the superior gluteal flap. The gluteus maximus muscle is sectioned under the spot where the vascular pedicle penetrates its posterior side. The superior part of the muscle that protects the vascular pedicle and its musculocutaneous perforators (which vascularize the superjacent cutaneous fat-pad flap), will be included in the flap.

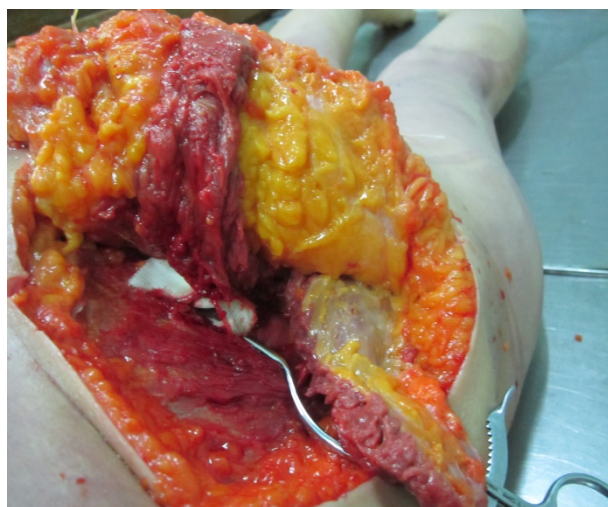


Figure 15 - The inferior part of the gluteus maximus (under the point of entry of the superior gluteal vascular pedicle) will be dissected suprafascially from the superjacent adipose tissue and will remain in situ. Thus, its function is partially preserved, while also minimising the diformity of the gluteal donor area



Figure 16 - The posterior side of the superior gluteal cutaneous fat-pad flap, harvested with a portion of the gluteus maximus muscle, which protects its vascular pedicle



Figure 17 - The superior gluteal flap is harvested along with its vascular pedicle, which will be prepared on the microsurgical table, before the free transfer in the area of the defect resulting from the mastectomy, where it will be microsurgically anastomosed with the receptor vessels



Figure 18 - The superior gluteal vascular pedicle (the artery and the vein), which is short (approximately 2,5 cm), even though it has been dissected until close to its origin, can be noticed in the forefront. The vascular pedicle requires its augmentation with a vein graft, to facilitate the microsurgical anastomose with the receptor vessels [1,2,3,5]



Figure 19 - The defect of the donor area resulting from the harvesting of the superior gluteal flap. The preserved gluteus maximus muscle is fixated at its adjacent structures, using stitches with separate absorbable wires



Figure 20 - The coating of the subcutaneous tissue with separate absorbable sutures, with a hidden knot. The intradermical suture with a continuous non-absorbable wire. The minimal deformity of the donor area, masked by clothing, can be observed

Conclusions

The advantages of using the superior gluteal flap to reconstruct the amputated breast [1,4,14-22]:

1. It was a very popular flap for the reconstruction of the breast, because it provides a generous quantity of autologous tissue for the reconstruction, while the post-surgery scar is well hidden.

2. It is an alternative in the event of the impossibility of executing the TRAM flap, or in the case of an abdominoplasty or a previously performed TRAM flap.

3. It is an alternative in the event that the abdominal tissue is insufficient or unavailable, and the patient wishes the reconstruction using autologous tissue, which has the advantage of not weakening the abdominal wall.

4. Usually, most patients have enough tissue available in the gluteal area for the reconstruction; this flap may be used for the unilateral or bilateral reconstruction of the breasts, either simultaneously or consecutively.

5. Today, it is less used, because of the existence of other, simpler alternatives: the flap based on the extended great dorsal muscle, the inferior gluteal flap, the Rubens flap.

The disadvantages of using the superior gluteal flap for the reconstruction of the amputated breast [1,4,14-22]:

1. The main disadvantage is the technical difficulty; because the pedicle (especially the veins) is fragile and difficult to dissect, while its short length, of 2-3 cm, makes the microvascular anastomosis difficult, even for experienced microsurgeons, requiring microvascular anastomosis with the internal mammary vessels, more fragile and with a more variable anatomy (especially the internal mammary veins). Usually, a vein graft is used to facilitate the microvascular anastomosis, or the superior gluteal flap is lifted on a musculocutaneous perforator (which supplements the length of the pedicle).

2. The second big disadvantage is the deformity of the gluteal contour (of the donor area), which, although not significant, is visible especially when the patient wears trousers, more so in the case of an unilateral use of the flap; this asymmetry can be surgically corrected

by intervening on the other buttock, but by doing this the contralateral superior gluteal flap will be unavailable for a potential ulterior reconstruction.

References

- [1] Guerra A B, Metzinger S E, Bidros R S, Gill P S, Dupin C L, Allen R J. Breast reconstruction with gluteal artery perforator (GAP) flaps: a critical analysis of 142 cases. *Ann Plast Surg.* 2004;52:118–125. [PubMed]
- [2] Allen RJ, Guerra AB, Erhard HA et al (2006) Superior gluteal artery perforator flap. In: Blondeel PN, Morris SF, Hallock GG, Neligan PC (eds) *Perforator flaps—anatomy, technique and clinical applications*, ch 26. St. Louis, Quality Medical Publishing, pp 485–497.
- [3] Rozen WM, Ting JW, Grinsell D et al (2011) Superior and inferior gluteal artery perforators: in vivo anatomical study and planning for breast reconstruction. *J Plast Reconstr Aesthet Surg* 64(2):217–225
- [4] Rad AN, Flores JI, Prucz RB, Stapleton SM, Rosson GD, Clinical experience with the lateral septocutaneous superior gluteal artery perforator flap for autologous breast reconstruction, *MICROSURGERY*, ISSN 0738-1085, 2010, Volume 30, Issue 5, pp. 339 – 347.
- [5] Avashia YJ, Desrosiers AE; Flores JI, A second superior gluteal artery perforator flap with previous liposuction to the same breast after resection of initial SGAP breast reconstruction due to cancer recurrence, *MICROSURGERY*, ISSN 0738-1085, 09/2012, Volume 32, Issue 6, pp. 482 – 484.
- [6] K.D Wolff, F. Holzle - "Raising of Microvascular Flaps", pag.137-173.
- [7] A.Fitoussi, M.G.Berry, B.Couturaud, R.J.Salmon, "Oncoplastic and Reconstructive Surgery for Breast Cancer", Springer, 2009.
- [8] Boyd JB, Gelfand M, Da Lio A, Shaw W, Watson JP, Comparison of superior gluteal artery musculocutaneous and superior gluteal artery perforator flaps for microvascular breast reconstruction. *Plast Reconstr Surg.* 2009 Jun;123(6):1641-7.
- [9] Jones C; Lidder S, Jevani A, The use of bilateral free superior gluteal artery perforator flaps for immediate unilateral breast reconstruction, *Scottish medical journal*, ISSN 0036-9330, 08/2014, Volume 59, Issue 3, p. E28.
- [10] Fade Geraldine, Gobel Fabienne, Pele Eric, Chaput Benoit, Garrido, Ignacio, Pinsolle Vt et al., Anatomical basis of the lateral superior gluteal

artery perforator (LSGAP) flap and role in bilateral breast reconstruction

Journal of plastic, reconstructive & aesthetic surgery: JPRAS, ISSN 1748-6815, 06/2013, Volume 66, Issue 6, pp. 756 – 762.

[11] Iconografie-archiva personala (Avizul Comisiei de Etica UMF Targu Mures).

[12] David L. Brown, Gregory H. Borschol - "Michigan Manual of Plastic Surgery", cap. 34.

[13] Anthi Georgantopoulou; Stavroula Papadodima, Dimitrios Vlachodimitropoulos, Nikolaos Goutas, Chara Spiliopoulou, Othon Papadopoulos, The Microvascular Anatomy of Superior and Inferior Gluteal Artery Perforator (SGAP and IGAP) Flaps: A Fresh Cadaveric Study and Clinical Implications

Aesthetic Plastic Surgery, ISSN 0364-216X, 12/2014, Volume 38, Issue 6, p. 1156.

[14] Chaput B, Fade G, Sinna R, Gangloff D, Chavoïn J P, Garrido I,

"Body-lift"-like pattern for the simultaneous bilateral superior gluteal artery perforator flap in breast reconstruction

Aesthetic plastic surgery, ISSN 0364-216X, 02/2013, Volume 37, Issue 1, pp. 52 – 5.

[15] Stephen S. Kroll, "Breast Reconstruction with Autologous Tissue", pag. 202-210.

[16] American Cancer Society, "Atlas of Clinical Oncology", pag. 196-197.

[17] Michael H. Torosian, "Breast cancer", pag. 127.

[18] Ronald F. Martin, „Surgical clinics of North America, pag. 184-185.

[19] Maurice Y. Nahabedian, "Oncoplastic Surgery of the Breast", 2009.

[20] Scott L. Spear, "Surgery of the Breast", Lippincott, 2011.

[21] Dennis C. Hammond, "Atlas of Aesthetic Breast Surgery", Elsevier-Saunders, 2009

[22] Florian Fitzal, Peter Schrenk, "Oncoplastic Breast Surgery", Springer, 2010.