

## Surgical Technique

# The Rubens Flap - Breast Reconstruction - Anatomical Dissection on a Cadaver

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### REZUMAT

#### *Lamboul lui Rubens - reconstrucția sânelui - disecție anatomică pe cadavru*

Acoperirea defectelor cutanate și subcutanate a constituit din toate timpurile o provocare în chirurgie. Sânul este unul din părțile importante și definitorii ale frumuseții feminine.

**Materiale și metodă:** Disecția pe un cadavru proaspăt de sex feminin, în vârstă de 64 de ani, în vederea recoltării din regiunea flancului abdominal a lamboului cutaneogrăsos Rubens, suspendat și perfuzat de pediculul sau folosind lupe microchirurgicale. Pentru redarea etapelor recoltării lamboului Rubens s-a folosit un aparat de fotografiat performant.

**Rezultatul:** recoltarea lamboului cutaneogrăsos Rubens, suspendat și perfuzat de pediculul său vascular și închiderea zonei donoare în straturi.

**Concluzii:** avantaje și dezavantaje ale utilizării lamboului Rubens în reconstrucția sânelui amputat.

**Cuvinte cheie:** reconstrucția sânelui, disecție anatomică pe un cadavru proaspăt de sex feminin, transfer liber lambou Rubens

### ABSTRACT

The concealment of cutaneous and subcutaneous defects has always been a challenge in surgery. The breast is one of the most important and defining elements of feminine beauty.

**Material and method:** during the dissection of a fresh female cadaver, age 64, a free Rubens flap was taken from the abdominal flank, using loupe magnification. The preparations for the dissection were photographed with a high definition camera.

**The result:** the harvesting of the Rubens fat pad free flap, suspended and perfused by its vascular pedicle and

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the closure of the donor area in layers.

**Conclusions:** the advantages and disadvantages of using the Rubens flap for the reconstruction of the amputated breast.

**Key words:** breast reconstruction, anatomical dissection of fresh female cadaver, free flap Rubens transfer

## INTRODUCTION

The concealment of cutaneous and subcutaneous defects has always been a challenge in surgery. The breast is one of the most important and defining elements of feminine beauty. Neoplastic pathology has always made it difficult to aesthetically repair the extirpated mammary tissue. Plastic and aesthetic surgery and reconstructive microsurgery, through microsurgical techniques of autologous free flap transfers, try to solve these problems.

## MATERIAL AND METHOD

During the dissection of a fresh female cadaver, age 64, a free Rubens flap was taken from the abdominal flank, using loupe magnification. The preparations for the dissection were photographed with high definition camera.

The result: the harvesting of the Rubens fat pad free flap, suspended and perfused by its vascular pedicle and the closure of the donor area in layers.

**Anatomy:** the deep circumflex iliac artery arises from the external iliac artery (the cranial portion of the inguinal ligament), or the femoral artery (the caudal portion of the inguinal ligament), opposite the deep inferior epigastric artery; it has a diameter of 1.5 – 3 mm and the length of a approximately 7 cm; it is always present and sometimes we can even encounter a double deep circumflex iliac artery.

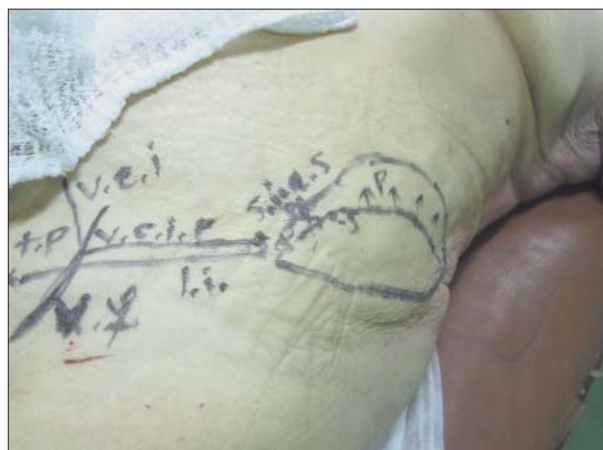
It is accompanied by two veins with a diameter of 3 – 5 mm, that merge as they arise from the external circumflex iliac vein.

After arising from the external iliac artery, the deep circumflex iliac artery travels between the transversalis fascia and the iliac fascia, at approximately 2 cm cranially from the inguinal ligament and parallel to it.

Near the anterior superior iliac spine, it passes along the inner lip of the crest of the ilium bone, between the iliacus muscle and the transversus abdominis muscle, parallel to and at about 2 cm below the edge of the iliac crest.

## Designing the flap

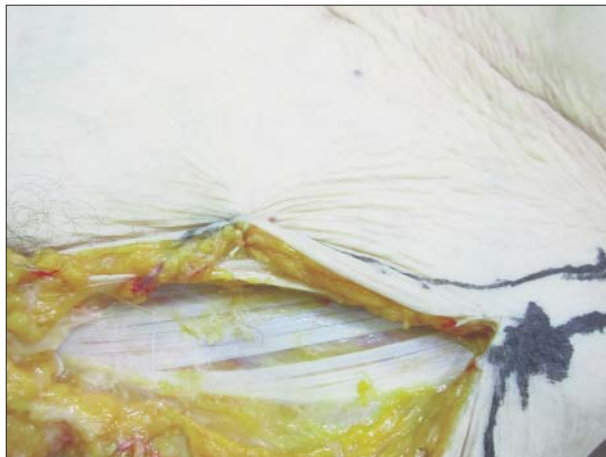
The flap is centered on the iliac crest. The marking of the pubic tubercle – t.p. The anterior superior iliac spine – s.i.a.s. The femoral vessels – v.f. The deep circumflex iliac vessels – v.c.i.p. The inferior iliac vessels – v.e.i. Musculocutaneous perforators – p. (**fig. 1**)



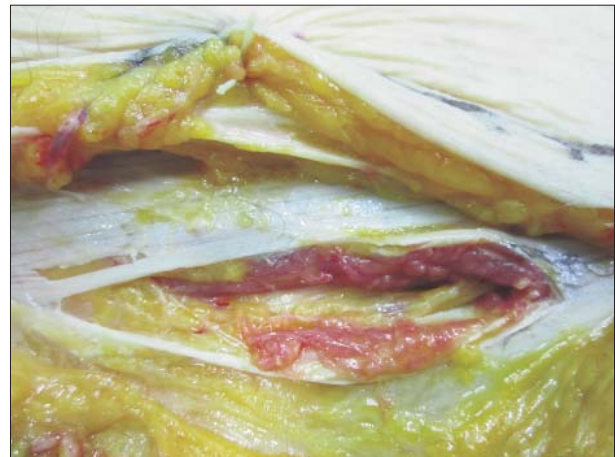
**Figure 1.** From the area of the inguinal ligament (sectioned) arise the deep circumflex iliac artery, that will support the Rubens flap, and the deep inferior epigastric artery (originating in the same area, but on the opposite side)



**Figure.2.** Identifying and dissecting the femoral vessels (the lateral femoral artery and the deep medial femoral vein).



**Figure 3.** The incision of the tegument and the subcutaneous tissue, in order to expose the inguinal ligament (found between the pubic tubercle and the anterior superior iliac spine). The incision is made on the lateral aspect of the femoral artery (whose pulse is identified by palpation) and is extended until the anterior superior iliac spine. The tegument and the subcutaneous tissue are anchored with **????** wires, for an optimal view of the inguinal ligament



**Figure 4.** The incision of the inguinal ligament, to expose the internal oblique muscle (which represents the floor of the inguinal region). The incision of the internal oblique muscle, exposing a thin adipose tissue (that covers the transversalis fascia) which hosts the pedicle (the deep circumflex iliac artery and vein)



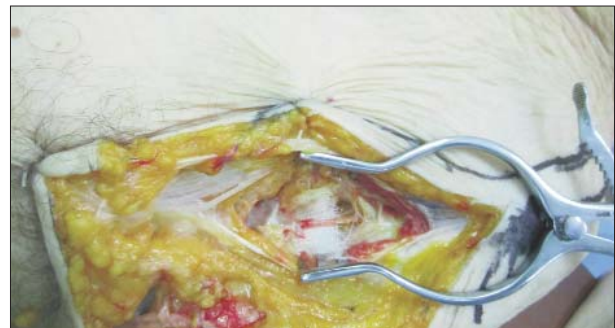
**Figure 5.** The sectioned inguinal ligament and internal oblique muscle and the preperitoneal fat that hosts the vascular pedicle



**Figure 6.** The dissection of the vascular pedicle: the deep circumflex iliac artery and the deep circumflex iliac vein

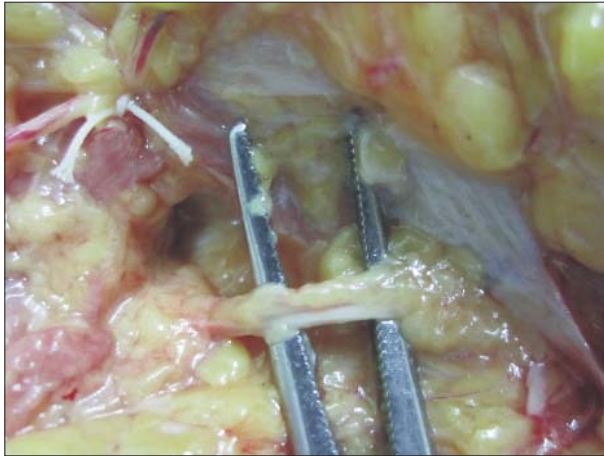


**Figure 7.** The deep circumflex iliac pedicle, found in the space between the transversus muscle and the iliacus muscle



**Figure 8.** The dissected inguinal region: incised skin and subcutaneous tissue (from the pubic tubercle to the anterior superior iliac spine), the longitudinally sectioned inguinal ligament and internal oblique muscle (by the length of its fibers), the thin layer of preperitoneal fat and the deep circumflex iliac artery, separated from the adjacent fat





**Figure 9.** Near the anterior superior iliac spine: the lateral femoral cutaneous nerve, that accompanies the deep circumflex iliac pedicle, passing behind it



**Figure 10.** The dissection of the deep circumflex iliac artery (and the deep circumflex iliac vein that accompanies it) is continued from the thin fat layer that covers them, moving towards the anterior superior iliac spine



**Figure 11.** The deep circumflex iliac artery accompanied by the deep circumflex iliac vein are dissected from their origin in the femoral vessels and towards the area of the anterior superior iliac spine



**Figure 12.** The cutaneous fat-pad flap will be centered on the iliac crest (but mostly on the superior border), where the majority of the musculocutaneous perforators are found

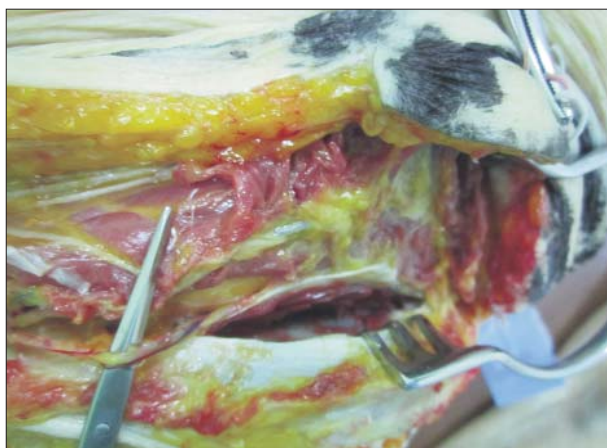


**Figure 13.** The inferior edge of the flap is incised along the premarked line, for a view of the tense vascular pedicle

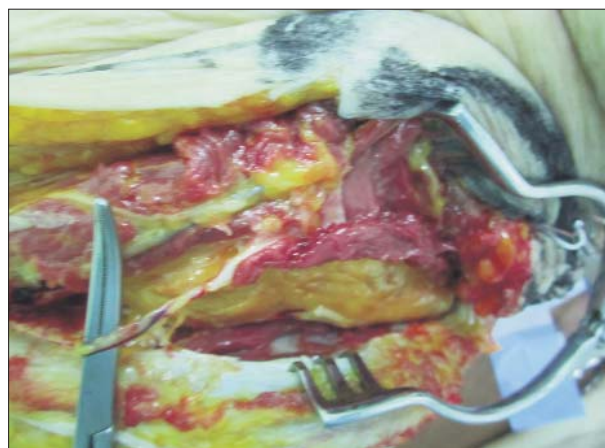


**Figure 14.** We use ??? wires passed through the tegument and the subcutaneous tissue, for a better view of the dissection area





**Figure 15.** We continue the incision of the external and internal oblique muscles and the transversus muscle, tensing up the vascular pedicle for exposing its submuscular trajectory and preventing its accidental injury. In the area of the iliac crest, we continue the dissection subperiosteally, so that the flap can include the osteocutaneous perforators



**Figure 16.** We continue the dissection and lifting of the flap, from the inferior area to the superior area. The flap is lifted with a muscle sheath (including the external oblique muscle, internal oblique muscle and transversus muscle, then the iliacus muscle), that ensure the protection of the vascular pedicle and its musculocutaneous perforators (that will vascularize the subcutaneous tissue and the tegument of the flap). The vascular pedicle is tensed up during the dissection for a better viewing and avoiding its accidental injury



**Figure 17.** We incise the superior edge of the flap (the tegument and the subcutaneous fat tissue). We continue the dissection of the superior area of the flap (keeping the pedicle tense during dissection), until the release of the posterior side of the flap



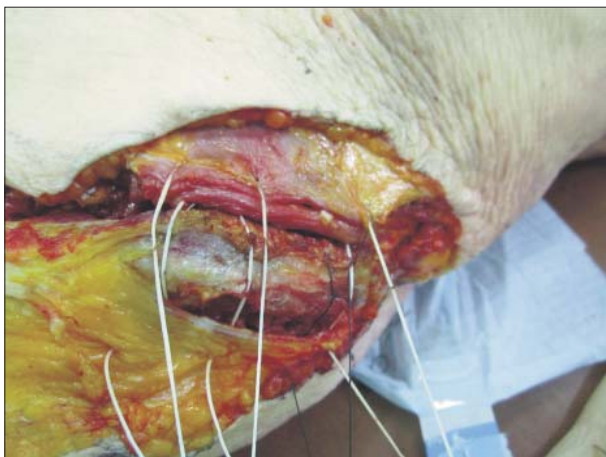
**Figure 18.** The cutaneous fat-pad flap (the deep side) is harvested together with a muscle sheath (containing the subjacent muscles: external and internal oblique muscles, transversus, iliacus) which improves the vascularization of the flap. The harvested flap is left in situ, anchored to the deep circumflex iliac pedicle (1 artery and 2 veins), which provides the perfusion of the flap until the preparation of the receptor vessels. The long vascular pedicle, being of a high caliber, will allow an easy microsurgical anastomosis with the receptor vessels (thoracodorsal or internal mammary)



**Figure 19.** The cutaneous fat-pad flap (the anterior side), suspended and perfused by its vascular pedicle. The muscles of the abdominal wall (external and internal oblique, transversus) left after the harvesting of the muscle sheath that accompanies the pedicle are dissected and prepared for the reconstruction of the abdominal wall



**Figure 20.** The muscles of the abdominal wall left after the harvesting of the flap, from the top down: the external oblique muscle, the internal oblique muscle and the transversus muscle



**Figure 21.** The reconstruction of the abdominal wall is made with solid sutures, with separate wires that bind the three muscle layers, external oblique, internal oblique and transversus, with the tensor fasciae latae muscle and the gluteal muscles. A correct and solid repair of the defect in the donor area decreases the incidence of postoperative hernias



**Figure 22.** The closure of the donor area in layers, resulting in a scar hidden in the concavity of the abdominal flank

## CONCLUSIONS

The advantages of utilizing the Rubens flap in the reconstruction of the amputated breast (2), (4):

1. It's an alternative in the event that the TRAM flap can't be performed (it's been previously performed or the patient has undergone an abdominoplasty), and the medical condition of the patient allows for a long surgical procedure.
2. The pedicle of the flap is long (so as not to require a vein graft) and it is of a sufficiently high caliber to allow a comfortable microvascular anastomosis with the receptor vessels.
3. The scar in the donor area is minuscule, being well hidden; the flap provides a tissue similar to the one transferred through the TRAM flap and can be harvested bilaterally, allowing for the bilateral reconstruction of the breasts, either simultaneously or consecutively.

The disadvantages of utilizing the Rubens flap in the reconstruction of the amputated breast (2), (4), (5):

1. It's more difficult from a technical standpoint and more poorly vascularized than the TRAM flap.

2. The harvesting of a bigger portion of the external and internal oblique muscles and transversus muscle (that incorporate and protect the pedicle) improve the vascularization of the flap, but can weaken the abdominal wall (increasing the incidence of hernias).
3. In the event of the necessity of harvesting an excessive quantity of cutaneous fat tissue, the scar in the donor area can become visible when wearing a bathing suit.

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