35 Complications of Unipedicled TRAM Flap Reconstruction: Treatment and Prevention (and Their Influence on the Choice of the Reconstruction)

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35.1 Introduction

After a description of the technique in 1982 [1], Carl Hartrampf was the pioneer and promoter of unipedicled transverse rectus abdominis myocutaneous (TRAM) flap breast reconstruction. The principles of pedicled TRAM flap (unipedicled or bipedicled) reconstruction with preparation of the flap by ligation of the inferior epigastric vessels (delayed TRAM flap) and strengthening of the vascularization by microanastomoses of the inferior epigastric vessels (supercharged TRAM flap) and the principles of free TRAM flap reconstruction by microanastomoses of the deep inferior epigastric vessels were quickly proposed [2, 3].

Subsequently new techniques of reconstruction with TRAM flap microanastomoses were developed in order to preserve the abdominal fascia. The deep inferior epigastric perforator (DIEP) flap reconstruction leaves the right rectus abdominis muscle totally in place the [4]. The superficial inferior epigastric artery (SIEA) reconstruction avoids a fascial incision [5]. These techniques give excellent results in referral centers for surgeons trained in microsurgery.

TRAM flap reconstruction is a technique of choice because it allows reconstructing a breast without a prosthesis, with a natural look, and which is easily improvable by lipomodeling and is very stable over time regardless of changes in the weight of the patient [6]. Specific complications are mainly necrosis of the flap and the weakening of the abdominal wall, which can cause a hernia or bulge. There are also less specific complications such as infection, which must be taken into account when choosing the technique (whether or not to use mesh at the wall).

The TRAM technique is used routinely by many surgeons all over the world. The choice of the technique (unipedicled, bipedicled, or microanastomoses) depends largely on individual experience, but proportionally few surgeons are experienced in microsurgery. Each TRAM technique has advantages and disadvantages, with a risk of partial or total necrosis, and a risk of more or less important parietal complications. The risk of complications is dominated by parietal complications for pedicled TRAM flap reconstruction and the total loss of the TRAM flap for microanastomoses [7, 8].

Since being trained in the technique of unipedicled TRAM flap reconstruction by Madeleine Lejour in Brussels in 1989, I have acquired a personal experience of more than 500 such reconstructions. The beginning was marked by an important rate of partial necrosis of 8 % during the first 60 TRAM flap reconstructions without this being clearly explainable by a technical problem or a specific risk factor related to the patient. Then we became more selective with patients and improved the technology to make it more reliable. A study of 192 consecutive unipedicled TRAM flap reconstructions done between 2003 and 2009 was used to analyze these complications and their preventive measures. The use of delayed TRAM flap reconstruction has reduced very significantly the rate of partial necrosis to 3 %. Similarly, the rate of parietal complications of about 10 % at the beginning of the study was reduced to 4.6 % owing to the technical reconstruction of the wall adapted to each patient.

35.2 Complications of Unipedicled TRAM Flap Reconstruction and their Treatment

35.2.1 Necrosis

Necrosis is linked to a lack of blood supply to part of the flap, resulting more in peripheral venous congestion followed by thrombosis than arterial ischemia. In fact, at the time of the decision to retain more or less area of the surface level of the flap, it is quite simple to evaluate the arterial supply to the flap, deepithelializing the surrounding area to be observed. On the other hand, it is more difficult to assess the quality of venous return in the periphery of the flap. It may

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C. Urban and M. Rietjens (eds.), *Oncoplastic and Reconstructive Breast Surgery*,
DOI: 10.1007/978-88-470-2652-0_35,

seem to be of poor quality at the beginning, with a rather important stasis at the time of the lifting of the flap in the epigastric region, which then improves spontaneously after having the patient sit in order to close the abdominoplasty. Two mechanical reasons could explain this:

1. The slope of the venous return obtained by having the patient sit
2. The relaxing of anti-reflux valves in the veins, once they are dilated by the initial venous stasis that they caused.

After the surgery and in the early postoperative hours, the capillary refill is the best indirect evidence of vascularization of the flap. If it is less than 2 s in the peripheral zone, the least well vascularized, we can expect a favorable outcome. If it is more than 2 s, the flap should be monitored very carefully. If it is more than 3 s, necrosis is a concern.

Some propose putting a temporary drain in place during the operation, intubating one of the epigastric inferior veins with an angiocatheter to drain the flap when the degree of venous congestion is very high [9].

35.2.1.1 Important Flap Loss (Greater Than 25 % of the Flap)

The total loss of the flap is exceptional in cases of unipedicled TRAM flap reconstruction. It may be related to a problem of notification as it has only happened once in our experience This was a 65-year-old woman who had had two Pfannenstiel incisions (one for a hysterectomy and one for a prolapse), which were much more traumatic for perforating vessels than a Pfannenstiel incision made for a caesarean section. As the patient showed abdominal excess compatible with TRAM flap reconstruction and moreover was very adamant about having the operation, TRAM flap reconstruction was chosen, knowing that there was a risk associated with her age and surgical history. The appearance of the flap after surgery was satisfactory. The results were marked by progressive thrombosis of the flap causing extensive necrosis of more than 50 %, as well as a pulmonary embolism occurring on the fifteenth postoperative day which required the removal of the flap on postoperative day 21 (Fig. 35.1). The patient reported spontaneous thrombosis related to a factor V Leiden anomaly in her daughter. Additional tests showed the existence in her case of a factor V Leiden anomaly, which is known to be a risk factor for necrosis of the TRAM flap [10].

Apart from high-risk situations (smoking, obese, or diabetic patients), which are for some only relative contraindications to unipedicled TRAM flap reconstruction, significant necrosis of the flap can occur owing to a technical error during the intraoperative harvesting injuring the superior epigastric vessels as in following case. This was an obese patient of 52 years of age for whom unipedicled TRAM flap reconstruction was chosen despite a BMI of 31 to correct a faulty immediate reconstruction with an expander (infection). The operation was marked by a spontaneous and

Fig. 35.1 Total flap loss

complete tear of one of the two pedicles of the upper division epigastric vessels before it entered the posterior face of the right rectus abdominis muscle. This occurred as a result of traction on the pedicle (which was attached to the rib cage) by the particularly heavy flap of this patient while it was being shifted upward. Microsurgical repair of the injured pedicle (artery and vein) was performed to save the flap, but partially failed. Further surgery was done 48 h later to resect about 25 % of skin tissue developing necrosis (Fig. 35.2a), with good progress after 1 month (Fig. 35.2b) but fat melting was recorded later (Fig. 35.2c). In these situations of significant loss of surface and volume of the flap, the secondary correction requires the use of a prosthesis or another flap. A proposal for recovery with an autologous latissimus dorsi flap associated with lipofilling was made to the patient.

35.2.1.2 Moderate Flap Loss (Between 5 and 25 % of the Flap)

This complication occurs more frequently, from 3 to 15 % in published series [11, 12]. Early treatment is performed to save as much as of the flap as possible and a later treatment is proposed to correct the sequelae of this necrosis.

Often related to venous congestion (which will be the cause of necrosis), an established necrosis requires us to perform further surgery on the second postoperative day when the limits of the cutaneous vein thrombosis are well marked and before thrombosis spreads to a larger portion of the flap. It is generally found in patients whose blood supply to the flap was overestimated intraoperatively, especially in its periphery and the side opposite the pedicle muscle. In this case the removal of thrombosed tissue requires a complete remodeling of the flap, which is easy to perform on the second postoperative day before scar tissue fibrosis occurs as is shown in the case in Fig. 35.3.

It is better to intervene early rather than let necrosis evolve naturally, for several reasons:

- Early intervention saves more volume of the flap (before the necrosis spreads).
- Spontaneous evolution of the necrosis can last several months with important localized health treatment, which can lower the patient's morale.
- In some cases there is a risk of infection of necrotic tissue that may extend to the whole flap.
- The final result with a retractile fibrosis and a defect located on the edge of the flap is more difficult to correct

Fig. 35.2 **a** Resection of thrombosed tissues after 48 h. **b** Result after 1 month. **c** Result after 1 year and fat melting

Fig. 35.3 **a**, **b** Images showing the thrombosed tissues after 48 h. **c** Removal of thrombosed tissues and complete remodeling of the flap. **d** Result 9 months later

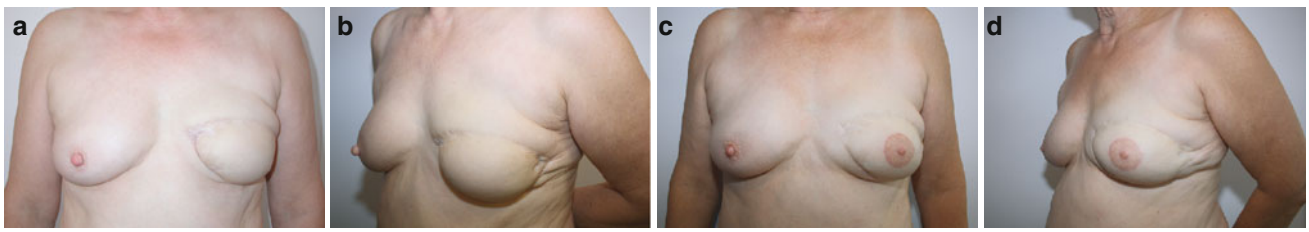

Fig. 35.4 **a** Frontal view and **b** oblique view 1 year after necrosis of both extremities of the flap. **c** Frontal view and **d** oblique view after two lipofillings (140 and 120 cm^3) and nipple–areola reconstruction

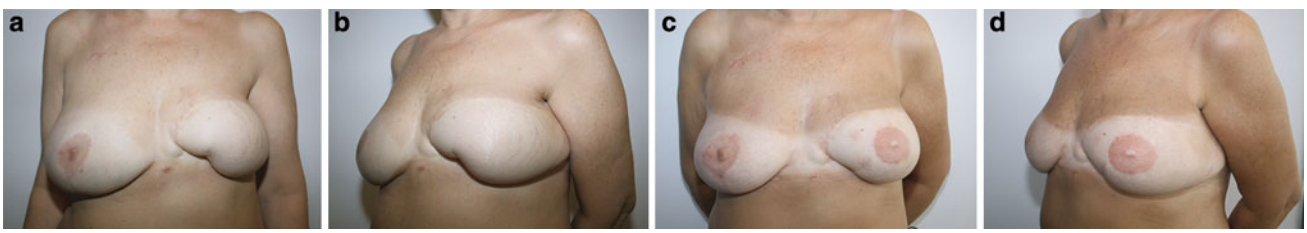

Fig. 35.5 **a** Frontal view and **b** oblique view 7 years after necrosis of the inferointernal region of the flap. **c** Frontal view and **d** oblique view after remodeling of the flap, two lipofillings (110 and 160 cm^3), nipple–areola reconstruction, and reduction of the contralateral breast (170 g)

than one treated after an early intervention leaving the residual flap smoother.

The necessary correction in the long run may call for a prosthesis or another flap to make up the volume. If the patient has suitable donor areas, a correction of the flap can be done more simply by skin remodeling associated with lipofilling and symmetrization of the contralateral breast and without (Fig. 35.4) or with (Fig. 35.5) remodeling of the flap.

35.2.1.3 Minimal Skin Necrosis (Less Than 5 % of the Flap)

This does not require early new surgery. Its boundaries are difficult to assess in the first few days after surgery and can be treated by allowing the lesion to evolve spontaneously as postoperative care is then simple and can be done by the patient herself without too much trouble. It leaves a zone of residual underlying fat necrosis. It is often associated with a

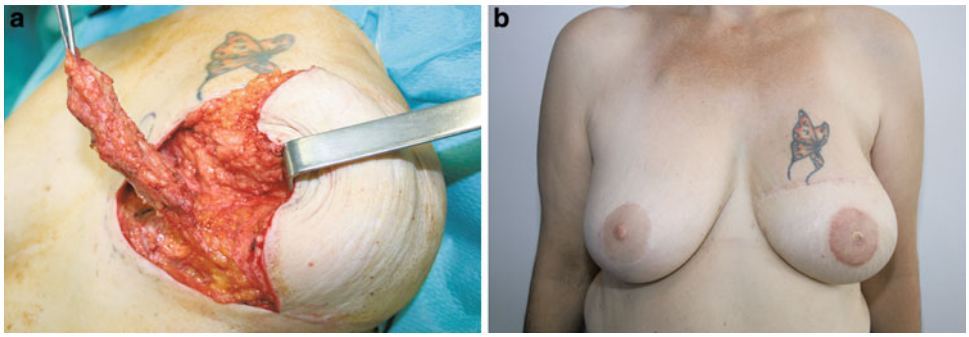

Fig. 35.6 **a** Removal of internal fat necrosis (10 × 2 × 1.5 cm), remodeling of the flap, and areola reconstruction 8 months after transverse rectus abdominis myocutaneous (TRAM) flap reconstruction. **b** Result 8 months later

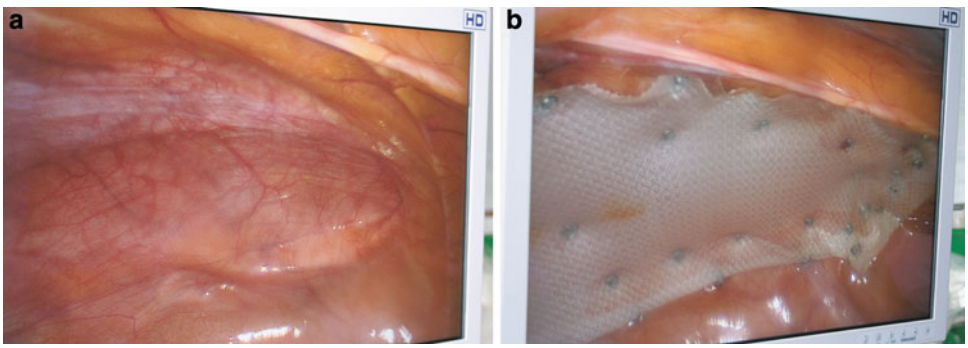

Fig. 35.7 **a** Laparoscopic view showing abdominal infraumbilical hernia 2 years after unipedicled TRAM flap reconstruction without preaponeurotic mesh. **b** Repair using intraperitoneal mesh

small skin necrosis of the abdominal scar, reflecting a general vascular status of the patient that is not optimal.

35.2.2 Fat Necrosis

Fat necrosis is associated with skin necrosis but can also occur without evidence of skin necrosis. Its frequency ranges from 4 to 35 % depending on the series [7, 13, 14]. It is troublesome if it is large and the cause of a large induration perceived by the patient. It can, as in the case shown in Fig. 35.6, be corrected by an excision followed by remodeling of the flap done in conjunction with the areolar reconstruction.

If the fat necrosis cannot be resected without distorting the reconstruction, or if it is minimal, it can be left in place with reassurance given to the patient. A simple lipofilling can potentially improve the consistency of the flap or remove a superficial skin retraction.

35.2.3 The Parietal Complications

35.2.3.1 Mechanical

All types of complications can occur following a relaxation of the fascial suture in 4–29 % of cases depending on the series [15–17].

The most troublesome are the abdominal hernias, which can be localized in the epigastric region (transition zone of the flap) or below the umbilical region (area of weakness below the arcuate line). They should be treated as if they are symptomatic. The placement of a mesh by laparoscopy is the most elegant treatment (Fig. 35.7).

The commonest complication is weakness of the fascia in the infraumbilical region (laxity or bulge), which can be corrected later, if the patient wishes, by a complete detachment of the wall followed by plication of the fascia (for re-tension) and the establishment of a reinforcing preaponeurotic mesh.

35.2.3.2 Infections

Infections of the flap are rare outside necrosis cases.

Acute and significant postoperative infections of the abdominal wall require removal of the prefascia mesh, followed by monitored wound healing and later cosmetic correction away from the abdominal scar (Fig. 35.8).

Infections of the abdominal wall in relation to a dehiscence abdominal scar after a deficit of blood supply to the lips are handled by local treatment without removal of the parietal prosthesis.

Some infections such as those occurring away from a hematoma or seroma of the abdominal wall can cause a chronic skin fistula problem. If the prosthesis located deep in the sheath of the right rectus abdominis muscle is affected

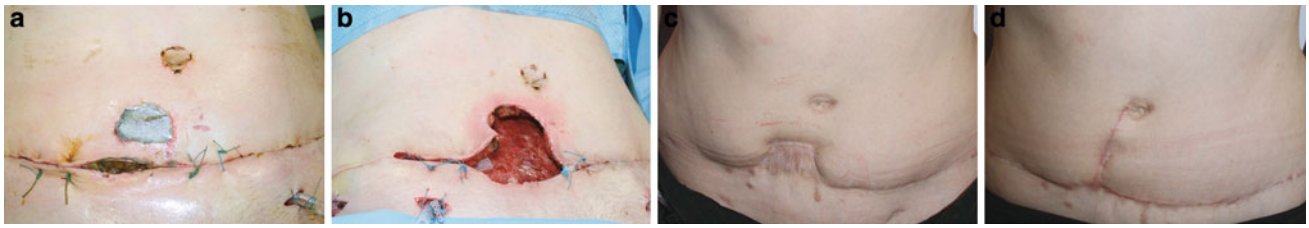

Fig. 35.8 **a** Drainage of acute infection with anaerobic germs of the abdominal infraumbilical skin 8 days after TRAM flap reconstruction. **b** Removal of the infected tissues and the prefascia mesh 15 days after TRAM flap reconstruction. **c** Result 6 months later, after important localized health treatment. **d** Result 1 year later after correction of the scarring sequelae

by germs, superficial debridement of the wound, even combined with appropriate antibiotic therapy, is inadequate. The final treatment of the infection requires removal of the underlying contaminated prosthesis, which can weaken the wall, with a risk of secondary eventration. The use of a dermal matrix prosthesis can be of great help to obtain proper healing and a solid wall in a septic environment.

35.3 Our Series

We performed 192 unipedicled TRAM flap reconstructions in our unit between October 2003 and October 2009. I participated as a principal surgeon (in most cases) or as an assistant. The analysis was done from medical records (hospitalization and outpatient) and also from questionnaires sent to patients (77 % responded). In our experience, unipedicled TRAM flap reconstruction is the preferred secondary breast reconstruction technique when the morphology of the patient permits. In some cases it is done by default, even if the morphology of the patient is not ideal (with a flap of moderate size) owing to the impossibility of making a prosthesis for breast reconstruction and weighing the pros and cons with respect to the use of a latissimus dorsi flap. The patient is then warned of the risk of postoperative prolonged tension of the abdominal wall.

When possible, we use the unipedicled TRAM flap by a taking a sample of the contralateral right rectus abdominis muscle. Preparation by ligation of inferior epigastric vessels is routinely performed at least 3 months before the completion of the TRAM flap reconstruction.

We do not often use TRAM flap reconstruction for immediate reconstruction (3 % of cases), given the risk of additional treatment in cases of invasive cancer. We also systematically insist on a 3-month period after preparation, and it is difficult to delay a mastectomy for cancer, even in situ, for that period of time. Our immediate TRAM flap reconstruction involves prophylactic mastectomy.

In this series, the rate of specific complications was low. As shown in Table 35.1, there were six cases of flap necrosis (3 %), of which three cases were necroses greater than 5 % requiring further surgery: one for an intraoperative problem already described (Fig. 35.2) and two related to the overevaluation of the intraoperative vascularization of the flap, treated by removal of areas of necrosis at 48 h, with subsequent correction of asymmetry.

Table 35.1 Cases of necrosis observed (among 192 cases)

Flap loss > 25 %	1 case
Flap loss of 5–25 %	2 cases
Flap loss < 5 %	3 cases
Fat necrosis < 10 %	17 cases

Table 35.2 Cases of mechanical complications observed

Abdominal hernia	3 cases
Abdominal laxity	6 cases

As shown in Table 35.2, there were nine cases of mechanical complications of the wall (4.5 %), of which six cases were bulges and three cases were abdominal hernia requiring further surgery by laparoscopy(1.5 %).

Five infections of the abdominal wall, of which two of the more important required removal of the preaponeurotic mesh, had to be treated

The loss of hemoglobin was on an average 2.5 g per 100 ml (between the preoperative samples and those obtained on the third postoperative day). Four patients had to be transfused, a rate of 2 %.

This low rate of complications is explained by three factors:

1. The careful selection of patients
2. The vascular preparation of the TRAM flap
3. The careful refection of the abdominal wall.

35.3.1 Selection of Patients

Apart from the classic contraindications for TRAM flap reconstruction, three factors should be discussed on the basis of the risk of complications related to them.

35.3.1.1 Age

The average patient age was 48 years. In younger patients, the pedicled TRAM flap reconstruction is ruled out when the patient desires to become pregnant later [18]. For older patients, the theoretical upper age limit is set at 60 years but can be overturned on a case-by-case basis depending on the general condition of each patient. Our oldest patient (73 years old) had perfectly simple follow-ups.

35.3.1.2 Tobacco

We found early in our experience, and as reported throughout the literature [19], that tobacco intoxication was a major risk factor for complications owing to a decrease in the arterial supply leading to necrosis of the flap and also more complications in terms of scar abdominoplasty. These necroses can then cause infections. Because of this we operate, and this is our strict condition, only on nonsmokers or patients who stopped smoking at least 6 months before the TRAM flap reconstruction. In most cases this formal condition allows patients who want a TRAM flap reconstruction to be even more aware of the harmfulness of tobacco. Most quit smoking and are also grateful for doing so in the long run. If the patient will not stop smoking, we offer another method of reconstruction safer than a latissimus dorsi flap.

35.3.1.3 Obesity

Obesity is also a complicating factor in the type of flap necrosis, mechanical complications in the abdominal wall, and infection [20].

Obesity is in itself is a risk factor for vascular complications. Too great a thickness of the flap results in a lower skin vascularization with an increased risk of necrosis after surgery. It is also often associated with metabolic risk of poor vascularization (high cholesterol level, diabetes, etc.), promoting arthritis, thus further increasing the risk of necrosis. Obesity also increases the mechanical complications favoring an abdominal hernia or laxity.

For these different reasons, we do not perform TRAM flap interventions in patients with a BMI higher than 30. By properly explaining these risks, and also with the help of a dietician, we can in most cases help these patients to lose weight to get to a BMI under 30. In our series, the average BMI was 24, with a range from 20 to 31.

35.3.2 Vascular Preparation (Delayed TRAM Flap Reconstruction)

Early in our experience, we observed, as have others [21], unexplained flap necrosis occurring without any risk factor. Following the first publications on delayed TRAM flap reconstruction [22, 23], and researching a method to make the results less random, we gradually began a vascular preparation in our patients. Faced with the obvious clinical improvement of the vascularization of the flap, this preparation has become routine and was performed in the same way in all patients in the series studied.

The procedure is done bilaterally with the patient under general anesthesia. The goal is to improve the blood supply of the future flap, in particular in segments III and IV opposed to the pedicle muscle as in the classification of Ninkovic [24], segment II being adjacent to outer segment I, which remains the part of flap best vascularized, in front of the preserved pedicle muscle. The technique is the same on both sides. After an incision in the lateropubian fold, leaving a very discreet scar, the superficial inferior epigastric vessels which vascularize some of segments II and IV of the flap are reached at their origin and are cut between ligatures. These vessels are inconstant (especially the artery), but they are easily found, when they exist, at the bottom or at the external part of the incision. We then open the aponeurosis of the external abdominal oblique muscle in the direction of its fibers at the external inguinal ring. The internal inguinal ring is reached and the deep inferior epigastric vessels, found after a short incision in the fascia transversalis, are linked (the vein is always present lower and below the artery).

A minimum period of 3 months is required before doing the TRAM flap reconstruction. At first it was 15 days as in the published series, but after having established from a clinical standpoint that the longer the delay, the better the vascularization of the flap, we opted for a minimum period of 3 months.

This intervention occurred at the same time as a total mastectomy in 19 % of cases and a contralateral reduction plasty in 15 % of cases, thus avoiding an additional procedure.

35.3.3 Wall Repair

This has to be meticulous. The fascia of the rectus abdominis muscle is preserved as much as possible to reduce side wall tension, which explains much of the postoperative pain. We leave a strip of 5 mm in the region above the umbilicus in the middle of the right rectus abdominis muscle, which is removed in its entirety. In the infraumbilical region, the quality of perforating vessels is evaluated during the initial dissection of the flap, which is done down to the centerline on the opposite side to the removed muscle. If these perforating vessels are numerous and consistent, especially the perforating vessels of the periumbilical and central region, the perforating vessels of the outermost side of the sample can be linked, thus preserving more fascia. Otherwise these vessels must be maintained, resulting in a higher secondary tension of the fascia in the subumbilical fascia.

A flexible polyester mesh, Parietex, is always anchored in the sheath of the rectus abdominis muscle to improve the wall tension in a longitudinal direction (to facilitate subsequent movements of flexion of the torso). The fascia of the rectus abdominis muscle is then sutured with slowly absorbable thread. Plication of the contralateral wall is performed to improve symmetry of the wall and bring the umbilicus in a more central position. Depending on the strength of the fascial suture (variable from one patient to another depending on the quality of tissue and the size of the sample taken from the fascial flap), a second mesh can be put in place in the prefascia to reduce the risk of hernia and later bulge. In our series, this was necessary in 59 % of cases, and among those the mesh was placed over the entire surface of the wall in 78 % of cases, only in the epigastric region in 19 % of cases, and only in the infraumbilical region in 3 % of cases.

35.4 Discussion

35.4.1 Delayed TRAM Flap Reconstruction

The effectiveness of the preparation is a matter of discussion. It is criticized because it involves a supplemental intervention and can cause local complications, making reconstruction more complicated later. For some it is remarkably effective to obtain a quality of vascularization of the flap similar to that of a free TRAM flap [25].

In our series, preparation has reduced our rate of partial necrosis of 8 % before using this technique to 3 %. There is an excellent sign of the indirect contribution of the preparation, during surgery, i.e., the existence of an inferior epigastric pedicle pulsatility with the flow from the superior epigastric vessels, after section of the inferior epigastric pedicle.

But it is very difficult to demonstrate the value of preparation because the performance criteria are mainly clinical. Also, when one is sure, one does not want to penalize the patient for whom the preparation is not done because of the framework of a randomized study. When a classic pedicled TRAM flap reconstruction is performed, there is very good blood supply to segment I, quite good blood supply to segment II, and adequate blood supply to segment III of the flap. After preparation, the blood supply of vascular segments I and II is very good, that of segment III is quite good, and that of segment IV is inconstant [26]. In our series the entire TRAM flap including segment IV of the TRAM flap has been or could have been (without that being necessary) kept partially or completely in about 20 % of cases, which is particularly interesting, mainly in flaps of moderate volume. When the volume of the TRAM flap is not sufficient, complementary lipofilling can be proposed [27].

The advantage of the method we use is its simplicity for any surgeon, and there is minimal scarring, compared with a direct inguinal incision. It also permits us to use the same incision for the superficial and deep inferior epigastric vessels. The remote location of the incision made, relative to the incision made at the future lower flap, avoids local complications, which are the cause of fibrous scars in the future flap and also increase the risk of postoperative wall infection. This is also why we have not opted for an associated skin delay like others have [28].

One disadvantage of delayed TRAM flap reconstruction is that it requires an additional intervention. This can be avoided by making the preparations at the same time as the mastectomy or at the same time as contralateral plastic breast surgery is performed. Given the delay of 3 months that we respect between preparation and reconstruction, it is not feasible in the case of immediate TRAM flap reconstruction except for a preventive mastectomy.

Some practice delayed TRAM flap reconstruction by a laparoscopic approach [29]. After trying this method, we have not adopted it, because research of inferior epigastric vessels has sometimes been difficult, with a bleeding risk, which may be responsible for specific complications and because this technique does not allow ligation of superficial inferior epigastric vessels. Moreover, the incision used in our method is very discreet, thus reducing the relative contribution of laparoscopy.

35.4.2 Abdominal Wall

The TRAM flap, whatever the technique, can improve the aesthetic appearance of the abdomen. In our series, 75 % of patients were satisfied with the cosmetic result of the abdominoplasty with an improvement compared with their previous situation. The consequences of a unipedicled TRAM flap at the abdominal wall are both mechanical and functional.

The risk of mechanical complication in our series was small compared with the risk reported in te literature. This low rate of parietal complications can be partly explained by the relatively short time period studied, and especially by the introduction of a mesh when the fascia closure is fragile. This is easily found during surgery where there is significant tension of the suture and where the sutures tend to tear the tissue. The disadvantage of this preaponeurotic mesh is the risk of compromising the treatment of a potential postoperative wall infection. In borderline cases, in front of a major abdominal skin tension with subsequent risk of dehiscence, or if poor vascularization of the skin of the abdomen is found, this risk must be taken into account by avoiding, if possible, putting in a preaponeurotic mesh.

Compared with the bipedicled TRAM flap, where use of preaponeurotic mesh is mandatory, the parietal consequences are much lower with the unipedicled TRAM flap [16]. The risk of eventration and functional consequences (going back to normal activity and residual discomfort) are much lower. The quality of the blood supply to the bipedicled TRAM flap, however, is better, which makes this technique more reliable for some, especially in borderline cases (patients who are moderate smokers, or obese patients, or reconstruction of a large volume). Because of the rigorous selection of patients and the preparation, the lack of blood supply was detrimental in our series in only three cases (1.5 %) of partial necrosis of more than 5 %, making performing a bipedicled TRAM flap reconstruction unnecessary outside bilateral reconstructions.

Compared with the free TRAM flap reconstruction, preparation seems to result in the same level of vascularization. The risk of parietal complications is essentially the same after a unipedicled TRAM flap reconstruction [2]. The delayed TRAM flap reconstruction is a technique that is much simpler than microsurgery, and can be performed by all surgeons. It is preferable considering the duration of the intervention and the risk of total failure with the free TRAM flap.

With DIEP and SIEA flaps, without taking the muscle, the risk of complete necrosis is higher than with the unipedicled TRAM flap, ranging from 1 to 5 % depending on the experience of the surgeons and the centers where they work. Although for DIEP flap reconstruction the risk of partial necrosis seems to be the same as that after delayed TRAM flap reconstruction, the risk of fat necrosis is higher in some series [12, 13]. In contrast, the functional consequences are clearly less important in the abdominal wall [5].

In our series the functional aspect has been studied through answers to the questionnaire:

- Resuming a professional life (if not physical work) occurred on average 2 months after the unipedicled TRAM flap reconstruction.
- Sports activities were resumed after 5 months for 70 % of patients who exercised before surgery; most of the other 30 % had no athletic activity.
- Only two patients, i.e., 1 %, later regretted having unipedicled TRAM flap reconstruction because of their inability to resume the active sports activities they had previously practiced.
- For 40 % of patients there were, however, some physical activities that were no longer feasible after the procedure.
- Residual discomfort was significant for 16 % of patients.

However, 95 % of patients were satisfied or very satisfied with the reconstruction, thus putting the residual functional discomfort in perspective.

35.5 Conclusion

If an adequate treatment is to be implemented before any complication of unipedicled TRAM flap reconstruction, the best treatment is prevention.

Delayed TRAM flap reconstruction brings a lot of security to unipedicled TRAM flap reconstruction. It is feasible in the case of secondary reconstruction. If immediate reconstruction is possible (for us then there are no preoperative or intraoperative criteria in favor of postoperative radiotherapy), we offer the patient who wants a TRAM flap the immediate insertion of an expander prosthesis at the same time as mastectomy and preparation of the TRAM flap. The unipedicled TRAM flap can then be implemented in the form of a flap deepithelialized a few months later.

Although careful closure of the abdominal wall minimizes the risk of parietal complications after a pedicled TRAM flap reconstruction, the DIEP and SIEA flaps need to be offered preferentially to patients needing the integrity of the abdominal wall: as in young women who can become pregnant later, very athletic women, and those who must carry heavy loads in their professional activities. In this situation, it is best to refer the patient to a center experienced in using this technique regularly rather than one that uses it occasionally.

In summary, unipedicled TRAM flap reconstruction, after a rigorous selection of patients, routine vascular preparation , and reconstruction of the wall proper is a technique within the reach of many oncoplastic surgeons, and is very reliable and suitable for most patients seeking breast reconstruction by means of a TRAM flap.

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