Many studies have shown the benefits of totally autologous reconstruction in breast cancer. Latisimus dorsi flap is a good option for immediate and delayed breast reconstruction. The continuous use of the latissimus dorsi flap in breast reconstruction is due to the fact that this flap is easy to harvest because of its reliability. However, this technique is limited by the tissue volume provided by the flap, unlike deep inferior epigastric perforator (DIEP) flap, for example.

The most common associated technique for volume restitution with latissimus dorsi flap is the use of this flap in combination with breast implants, with all its possible disadvantages, including rupture, extrusion, and capsular contracture. Furthermore, the use of breast implants presents a risk of infection, radiotherapy complications, and chronic wound drainage, and recent studies have shown an association between breast implants and anaplastic large cell lymphoma.

To improve breast volume while reducing complications, fat grafting is now very often used in addition to latissimus dorsi flap. To the best of our knowledge, fat grafting has always been performed as a second-line surgery, at least a few months after the flap procedure. We aimed to report our experience with an associated breast reconstruction technique combining musculocutaneous latissimus dorsi flap with intraperitoneal lipofilling for totally autologous breast reconstruction.

**Background:** Latissimus dorsi flap is one of the best options for immediate and delayed breast reconstruction. However, this technique is limited by the tissue volume provided by the flap. To improve breast volume while reducing complications, fat grafting is now very often used in addition to latissimus dorsi flap. To the best of our knowledge, fat grafting was always performed as a second-line surgery, at least a few months after the flap procedure. We aimed to report our experience with an associated breast reconstruction technique combining musculocutaneous latissimus dorsi flap with intraperitoneal lipofilling for totally autologous breast reconstruction.

**Methods:** Between September 2014 and January 2015, 20 patients underwent this technique for unilateral autologous breast reconstruction (14 delayed and 6 immediate breast reconstructions). A mean harvested fat volume of 278 ml (range: 190–350 ml) and a mean injected fat volume of 228 ml (range: 170–280 ml) were used.

**Results:** None of the patients experienced complications, such as flap necrosis, breast skin necrosis, hematomas, or infection. One of the patients developed a seroma, which was treated with 3 drainage punctures. Only 2 patients underwent delayed fat grafting procedure.

**Conclusion:** Totally autologous breast reconstruction combining latissimus dorsi flap and intraperitoneal fat grafting in the same procedure is a new technique allowing increased breast volume in a single surgery.
sults. The muscle is indeed a suitable recipient tissue for fat grafting because of its good blood supply and host tissue volume.

The aim of this study was to report our experience with an associated breast reconstruction technique combining musculocutaneous latissimus dorsi flap with intrapectoral lipofilling in totally autologous breast reconstruction.

**PATIENTS AND METHODS**

This study included patients who underwent immediate or delayed breast reconstruction combining autologous latissimus dorsi pedicled flap and fat graft of major pectoralis muscle, between September 2014 and January 2015.

All of the reconstructed cases underwent unilateral breast reconstruction with small-to-moderate volume and presented contraindications to DIEP flap surgery, such as previous abdominal surgeries, no pendulous abdomen, or clinical history of deep vein thrombophlebitis.

All the surgeries were performed by the same surgeon using the same surgical technique. Patients were followed by another surgeon of our team to evaluate outcomes and complications.

All patient information and data were recorded and computerized following the ethical recommendations of our clinical investigation unit. Informed consent was obtained from all patients.

**Surgical Procedure**

Preoperative drawings were designed with the patient in a standing position and the dorsal transfer skin paddle located in the bra area to hide the future scar with the amount of skin available, tested using a pinch test.22

This technique may be used for immediate or delayed breast reconstruction. In case of delayed reconstruction, it was preferable to begin the surgery with the patient lying in a lateral position with the arm in abduction to open the axillary space. First operative time consisted of fat tissue harvest. For this procedure, infiltration of the homolateral hip of the patient was not necessary for the flap rotation.

A musculocutaneous flap was harvested, with horizontal scar. With the patient placed in the lateral position already described, the latissimus dorsi muscle was dissected from its insertions in the iliac crest and cranially to the scapular bone. A close dissection of the thoracodorsal vessels was not necessary for the flap rotation.

Then, the flap was passed under an axillary tunnel to the breast region, and the dorsal area was closed in 3 layers, with 2 drains for the dorsal area. Once finished, the patient was turned to a half-seated position for breast modeling. At this time of the procedure, intrapectoral fat grafting was performed with a 1.5-mm cannula in a “far to near” fatty deposit (Fig. 1). Some fat was also introduced into the serratus anterior muscle (Fig. 2).

Then, the latissimus dorsi flap was modeled and placed. The distal part of the muscle flap was folded on itself to increase the volume and projection of the reconstructed breast. The breast skin was reconstructed with the dorsal skin paddle. Closure was performed in 2 planes, and 2 drains were inserted.

**RESULTS**

Between September 2014 and January 2015, 20 patients underwent this technique for unilateral autologous breast reconstruction (14 delayed and 6 immediate breast reconstructions). Patient mean age was 55.2 years (range: 38–72 y), and the mean body mass index was 25.89 kg/m² (range: 20.2–51.4 kg/m²).

For the 6 patients who underwent immediate breast reconstruction, the median weight of the removed breast was 386 g (range: 265–542 g).

Donor-site areas for fat harvest were the hip for 14 patients (delayed breast reconstruction) and the abdomen for 6 patients (immediate breast reconstruction), with a mean harvested fat volume of 278 ml (range: 190–350 ml) and a mean injected fat volume of 228 ml (range: 170–280 ml).

The mean surgery duration was 2.45 hours (range: 1.90–3.60 h). Drains were removed when the output was less than 30 ml per day. Patients were discharged to home 5 to 11 days (mean: 6.8 d) after surgery.

None of the patients experienced complications, such as flap necrosis, breast skin necrosis, hematomas, or infection. One of the patients experienced a seroma, which was treated with 3 drainage punctures.

The mean follow-up was 12.8 months (range: 10–15 mo). During the follow-up, all the patients were seen by a surgeon of our team (not by the operative surgeon) at 6 months to evaluate aesthetic outcomes, breast volume, and the possible need for further fat grafting. Only 2 patients underwent a delayed fat grafting procedure, 7 and 8 months after the surgery. They were treated with subcutaneous fat grafting of 90 cm³ and 110 cm³ in the upper and medial part of the breast, to correct the final volume.
Preoperative and postoperative pictures were taken for all patients (Figs. 3–7).

**DISCUSSION**

Latissimus dorsi flap is one of the most reliable and popular methods for breast reconstruction. However, one of the technique limitations is the volume provided by the flap. To avoid this problem, for many years, the flap has routinely been augmented at the time of its harvest by an implant. During the last years, many articles have shown the disadvantages related to the presence of implants, in the short (infection, extrusion, and contracture) and long term, with poor aesthetic outcomes. 14–17

Introduced by Hokin in 1983 and subsequently popularized by Delay, 23 the extended latissimus dorsi myocutaneous flap, where the harvest involves the whole muscle,
the lumbar fascia, and the largest possible skin paddle, avoids the need for implant in most of breast volumes. Nevertheless, the increase in flap volume correlates with donor-site morbidity, including wound dehiscence, seroma, and skin necrosis, which often lead to a contour and aesthetic defect on the dorsal donor area.

To resolve these issues, autologous fat transfer has recently become recognized as a very useful tool in autologous breast reconstruction. However, this technique generally requires a second surgery, 3 or 6 months after the flap harvest in most cases, when the fat is introduced in the subcutaneous tissue. The limitations of this technique are the resorption rate of the fat, of about 30% to 40%, and the need for an additional procedure under general anesthesia.24–29

In 2014, Santanelli et al have described their totally autologous latissimus dorsi flap for immediate breast reconstruction, using fat graft directly into the latissimus dorsi muscle during its harvest. The muscle is a suitable recipient tissue for fat transfer with a good blood supply and a reasonable volume of host tissue to inject into.21

In this report, we present our experience of intrapelvic fat grafting in latissimus dorsi breast reconstruction during the harvest time, for immediate and delayed breast reconstruction.

We believe that this technique is indicated for breast reconstruction with small-to-moderate volume and in case of contraindications to DIEP flap surgery, such as previous abdominal surgeries, no pendulous abdomen, or clinical history of deep vein thrombophlebitis.

With this kind of procedure based on an open surgery, it is possible to visualize where the fat tissue is injected, its location after injection, and the immediate result of the fat graft in the major pectoralis muscle. The technique seemed very safe, but this current short series needs more patients to assess safety. The distal part of the muscle flap is then folded on itself to increase the volume and projection of the reconstructed breast. Finally, the upper pole of the breast is reconstructed by the fat graft and the lower pole by the latissimus dorsi flap.

Only 2 patients underwent delayed fat graft, 7 and 8 months after the flap harvesting, to improve the outcome in the medial and upper poles of the breast. As with the other 18 patients, the aesthetic outcomes were considered good by the surgeon and the patient herself. No additional fat grafting was needed.

We preferred to perform fat grafting into the major pectoralis muscle instead of the latissimus dorsi muscle, like Santanelli et al. Indeed, according to us, this technique could lead to an increase in muscle edema, which may cause a partial or total flap necrosis, because of pedicle compression. Moreover, the pectoralis muscle is thicker than the latissimus dorsi and the injection is easier, and the amount of injected volume seems higher.

Since the beginning of this study in September 2014, we continue to perform this technique for all our breast reconstructions using autologous latissimus dorsi flap with interesting results. It is a safe, open surgery; the procedure is of short duration, reliable, with an easy learning curve; and it leads to good patient and surgeon satisfaction.

We think that intrapelvic fat injection could be useful also in addition with other flaps, as TUG flap, for example, or PAP flap. In contrary, DIEP flaps bring in most of the time a sufficient volume for breast, so we do not suggest using this technique for that type of reconstruction.

These first results obtained in this study were encouraging and motivated the conduct of a larger study with a longer follow-up to confirm our findings.

**CONCLUSIONS**

Totally autologous breast reconstruction combining latissimus dorsi flap and intrapelvic fat grafting in the same surgical procedure is a new technique allowing increased breast volume in a single surgery. It is a safe, open procedure, which does not require a longer surgical time. In most of our patients, the breast was totally reconstructed in a single surgery, with no need for other delayed fat grafting.

**Fig. 6.** Six-month postoperative frontal view.

**Fig. 7.** Lateral view.
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