

Visualized immediate breast reconstruction with dermal flap and implant

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Abstract: Immediate breast reconstruction with dermal sling and implant has been known for almost three decades, but has not gained as much popularity as biological or synthetic meshes. The technique is well suited for women with large ptotic breasts. Its pre-operative planning is based on the Wise pattern mammoplasty and the actual surgery is rather straightforward and relies on the patient's own tissue and a standard breast implant. The aim of this paper is to visualize the dermal sling technique for immediate breast reconstruction. A dermal flap in combination with an implant seems to be safe, simple and reliable for immediate breast reconstruction.

Keywords: Breast reconstruction; breast cancer; mastectomy; dermal sling

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Introduction

Immediate implant based breast reconstruction has been used for more than 50 years (1), and skin-sparing as well as nipple-sparing direct-to-implant breast reconstruction has gained popularity over the last decade for both risk reducing and therapeutic cases (2,3). The use of biological and synthetic meshes has become a favored addition to immediate breast reconstruction (4,5). However, the extra cost of these meshes encourages surgeons to develop and refine the classic surgical techniques (6). Reconstructive methods are undergoing constant refinement, but treating women with large, ptotic breasts is still a surgical challenge. These women need reduction and reshaping of the skin envelope, and a higher nipple position for an optimal cosmetic result. Two-stage procedures are commonly used, either by removing skin and nipple with expander to implant reconstruction, or breast reduction prior to directto-implant reconstruction (7). Bostwick described the use of a dermal sling and implant for Wise pattern mastectomy and immediate expander prosthesis reconstruction in 1990, and a few modifications have been reported (6,8), however,

this method is not yet widely used.

The aim of this paper is to visualize direct to implant immediate breast reconstruction using an inferior dermal flap.

Operative technique

The surgical technique is demonstrated in the video (*Figure 1*) "Immediate breast reconstruction with dermal flap and implant".

Patient evaluation

Patients with large, ptotic breasts where the skin envelope is too large for a standard direct-to-implant reconstruction, may be eligible for dermal flap and implant reconstruction. Women with macromastia are the obvious candidates, but women with less volume and considerable ptosis may also be eligible for this procedure. The dermal flap needs to have a certain size to fulfill its purpose, i.e., reaching the border of the pectoralis major muscle while allowing for a sizable implant pocket large enough for sufficient implant projection. S256

Wideo 1, Immediate breast reconstruction with demail flap and important perative markings, surgical procedure Wideo 2, Immediate breast reconstruction with demail flap and important perative markings, surgical procedure Wideo 2, Immediate breast reconstruction with demail flap and important perative markings, surgical procedure Wideo 2, Immediate breast reconstruction with demail flap and important perative markings, surgical procedure Wideo 2, Immediate breast reconstruction with demail flap and important perative markings, surgical procedure Wideo 2, Immediate breast reconstruction with demail flap and important perative markings, surgical procedure Lena Carstensen Department of Surgery, Hospital of Southwest plastic Surgery, Aleris-Hamiler Privat Hospital, Copenhagen, Denmark

Figure 1 Immediate breast reconstruction with dermal flap and implant. Pre-operative markings, surgical procedure and final results are shown in this video (9).

Available online: http://www.asvide.com/watch/32975



Figure 2 Schematic drawings of preoperative markings, front view and side view (left breast).

The amount of redundant skin is evaluated by drawing a standard Wise pattern on the patient's skin. The distance from the inframammary fold (IMF) to the lower part of the Wise pattern (*Figure 2*), should be no less than 7 cm, and the skin laxity should be such that the medial part of the drawing can arch to give the flap a few cm height at the medial corner.

Previous scars in the IMF may compromise the blood supply of the dermal flap, which should be taken into consideration when planning the procedure.

Preoperative markings

The standard Wise pattern is drawn with the patients in the

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upright position.

The IMF and the breast meridian and its continuance under the breast are marked. The new position of the nipple is marked on the breast meridian at the level of the IMF or a little higher. Depending on patient build and planned breast size, this point should be between 18 and 23 cm from the sternal notch. A dome-shaped areola (4 cm \times 6 cm) is marked. Then, the breast is pushed laterally with moderate tension to draw the medial "leg" of the Wise pattern in alignment with the upper and lower part of the breast meridian. The lateral leg is drawn in a similar fashion. The "legs" of the drawing should be around 6 cm for a medium sized reconstruction. Let the vertical legs meet just below the new nipple position, to avoid a suture line just beneath the nipple graft at the point where the graft is thickest.

The lower part of the Wise pattern is drawn like an S-shape, starting with a large semicircle and towards the medial and lateral end, the line switches direction. This shapes the lower pole to a more rounded, natural appearance, and it gives the dermal flap a little more height medially and laterally (*Figure 2*).

The vertical legs and the upper edge of the dermal flap form a triangle (*Figure 2*), and this triangle is the only skin that needs to be removed. Depending on the size and shape of the breast, the nipple may be located within the triangle or below it.

In the very large breast, the breast footprint is often too wide for a standard implant, and the pocket will therefore be too wide and cause lateral displacement or rotation of the implant. A back-cut can be made, to free the dermal flap laterally and attach it to the serratus fascia, in order to reduce the width of the pocket. The length of the backcut should not exceed the height of the flap. The back-cut should be avoided if there is a previous scar in the IMF.

Surgical technique

Infiltrate the dermal flap intradermally with a diluted solution of lidocaine and adrenaline (max 7 mg/kg diluted to 50 mL per breast) to facilitate de-epithelialization. Take care not to go through the deep part of the dermis, when de-epithelializing the skin, in order to preserve vessels of the subdermal plexus, the main blood supply of the flap.

Cut along the lower line of the Wise pattern, and leave the triangle (*Figure 2*) on the upper mastectomy flap until the mastectomy is done. This may seem unusual for the oncologic surgeon, in that the tissue under the nipple

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is removed from the main mastectomy specimen and sent separately. The reason is that if you cut the triangle out primarily and perform the mastectomy, there is a considerable risk of damaging subcutaneous tissue under the corners, which may lead to wound breakdown at the T-junction.

The breast tissue is removed along its superficial fascia, and along the pectoral fascia. Take care not to damage the dense connective tissue sometimes seen along the IMF. Remove the nipple-areola graft from the specimen, and leave it in an isotonic saline solution until needed.

A subpectoral pocket is dissected by lifting up the edge of the pectoralis major muscle and by dividing its costal and sternal attachments up to the level of the nipple graft. Local anaesthetic (Lidocaine with adrenaline 10 mg/mL, max 7 mg/kg) is injected at the sites of the anterior and lateral intercostal nerves, and a pectoral nerve block is injected into the loose connective tissue between the pectoralis minor and major muscles (10).

If the breast is wide, a back-cut can be made along the lower border of the de-epithelialized flap and the abdominal skin, from lateral to medial. This "lateral flap" should not be longer than its width. The lateral flap is sutured to the serratus fascia with interrupted vicryl 3.0 or PDS 3.0 sutures. The dermal flap is sutured to the muscle edge from medial to lateral, with absorbable interrupted 3.0 sutures. Leave a lateral opening to insert the desired implant, and close the pocket. In most cases, you will need to leave a triangle of uncovered implant in the upper lateral corner. Trying to pin down the muscle at this location will cause discomfort for the patient, and should be avoided.

Now, remove the triangle of the Wise pattern (*Figure 2*), and drape the upper pole skin over the reconstruction. The corners of the inverted T should meet at the breast meridian. A suction drain is placed in the mastectomy pocket. The skin is closed by interrupted 3.0 vicryl sutures and running intradermal monocryl 4.0 sutures.

The nipple-areola graft is trimmed, and all ducts are removed from the center of the nipple. The drawing for the nipple recipient site is adjusted, and the skin is deepithelialized. The graft is sutured with a running prolene 5.0 suture, and a compressive bolster dressing with Vaseline gauze and surgical sponge is placed, and sutured to the skin by a prolene 3.0 suture.

In cases where a tumor is located close to the nipple (<1 cm), or according to patient preference, a delayed nipple reconstruction can be used instead of a graft.

Post-operative care

Patients wear a non-wired supportive bra for 3 months. If extra support is needed laterally (depending on level of lateral dissection), a foam roll is used for 2 weeks.

The drains are kept in place until the daily accumulation is less than 50 cc, maximum 10 days.

Intravenous antibiotics (cefuroxime 1.5 g) are distributed three times daily until the patient is fully mobilized and well enough to be discharged (usually 1–2 days post-op). The antibiotic treatment is then changed to tablets (dicloxacillin 1 g \times 3) until 24 hours after removal of drains. The dressing and sutures around the nipple graft are removed after 5 days.

Patients should refrain from heavy sports during the first six weeks.

Case series

Patient population

Between March 2016 and January 2019, 15 women aged 27–62 were treated by mastectomy and immediate breast reconstruction with a dermal flap and implant at the Hospital of South West Jutland, Esbjerg, Denmark. Five of these patients were referred for risk reducing surgery after genetic counseling, and treated bilaterally. Ten patients were treated for breast cancer, three bilateral mastectomies, and seven unilateral mastectomies with symmetrizing mastopexy or breast reduction on the contralateral breast (*Table 1*).

Results

The 15 women had 23/23 (100%) successful breast reconstructions, 22/23 (96%) of these with a dermal flap (*Figure 3*). The median hospital stay was 1 day (range, 1–5 days), and the drains were kept for 4 days (range, 1–13 days). The median weight of the breast specimen was 485 g (range, 250–1,570 g), and the median implant size 445 cc (range, 205–685 cc). Four patients had asked for an increase in volume, the rest wanted a volume reduction (*Table 1*). The median follow-up was 12 months (range, 1–34 months).

There were no cases of implant loss or delayed adjuvant treatment due to complications following surgery. Three patients had a superficial wound at the T-junction that healed without surgical intervention. In all cases with free nipple grafts (14 breasts), there was some epidermolysis of the free nipple graft and loss of projection of the transplanted nipple, but 100% take of the graft (*Figure 4*). Three patients

Table 1	Mastectom	y and im	mediate breast r	econstruction w	ith dermal f	lap and impla	ınt						
Patient	Age (years)	BMI	Reason for surgery	Chemo- therapy*	Radio- therapy*	Side (left/ right)	Specimen weight (grams)	Implant size (cc)	Days in hospital	Drain (days)	Complications	Follow-up (months)	NAC
÷	62	27	Therapeutic	No	**		493	540	-	-	None	34	7 months
0	61	26	Therapeutic	Neo-adjuvant	No	_	350	365	÷	-	Epidermolysis	25	9 months
			Prophylactic			ш	352	365		-	None		9 months
С	45	21	Therapeutic	Neo-adjuvant	No	Ш	485	350	0	-	Late seroma	22	9 months
4	60	28	Therapeutic	Adjuvant	No	ш	437	350	.	ი	None	22	11 months
ى ا	53	20	Therapeutic	Adjuvant	No		250	205	.	4	Capsular contracture	21	6 months
9	35	25	Prophylactic			_	647	445	÷	ი	None	21	Free graft
			Prophylactic			Ш	634	445		ი	None		Free graft
7	50	28	Therapeutic	Adjuvant	No	_	433	390	÷	7	Epidermolysis	19	None
ω	27	28	Therapeutic	Neo-adjuvant	t Yes	_	616	525	5	4	Wound dehiscence	12	Free graft
			Prophylactic			Ш	617	525		4	None		Free graft
0	42	23	Therapeutic	Neo-adjuvant	No	_	467	350	-	7	None	12	7 months
10	55	38	Prophylactic			_	889	640	З	ი	None	11	Free graft
			Therapeutic	Neo-adjuvant	**	ш	750	640		8	Late seroma		Free graft
11	54	26	Prophylactic			_	358	365	ю	7	None	10	Free graft
			Prophylactic			Ч	322	365		4	None		Free graft
12	62	28	Therapeutic	No	No	_	405	350	ю	11	Haematoma***	10	7 months
13	49	34	Prophylactic			_	700	540	-	4	Epidermolysis	8	Free graft
			Prophylactic			ш	867	540		13	None		Free graft
14	33	25	Prophylactic			_	447	500	2	7	None	С	Free graft
			Prophylactic			Я	318	500		7	Late seroma		Free graft
15	45	34	Prophylactic			_	1570	685	2	4	None	-	Free graft
			Prophylactic			ш	1550	685		4	None		Free graft
*, for th∈ right; N,	erapeutic c no; Υ, yes;	ases on NAC, ni	ly; **, breast co	inserving surge mplex.	ry and radi	otherapy 26	years prior to the	e local recu	irrence; ***,	re-recons	tructed with mesh	and implant.	L, left; R,

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Figure 3 Before and 4 months after bilateral risk reducing mastectomy and immediate reconstruction with dermal flap, implant and free nipple grafts.



Figure 4 Nipple graft epidermolysis. Before, 1 week and 6 months after mastectomy, immediate reconstruction with dermal flap, implant and free nipple graft.

had acute onset late seroma after strenuous exercise (at 6 weeks, 3 and 13 months, respectively), of which one required puncture, the others were treated conservatively and regressed within a few weeks. One patient had a major complication; 16 days after surgery, she had a sudden haematoma and was reoperated at a different hospital by a surgeon who was not familiar with this procedure. The surgeon opened the cavity by cutting through the IMF incision from medial to lateral, through the base of the flap, and removed the implant. S260

Two days after, she came back to the primary surgeon, who re-reconstructed the patient by removing the now necrotic flap and replaced it with a synthetic mesh (Tigr[®] Matrix, NovusScientific, Uppsala, Sweden) and a bigger implant. The healing was uneventful.

Comments

The use of a dermal flap for internal support in direct-toimplant breast reconstruction is visualized. The technique can be used for large ptotic breasts and for smaller ptotic breasts with redundant skin. The dermal flap has many advantages compared to the use of acellular dermal matrices or artificial meshes: Acellular dermal matrices may carry the risk of immunological reactions (11) and are quite costly. The patient's own tissue is more elastic and moldable than the artificial products, and stretches naturally over time, and the double layer of dermis and subcutaneous fat provides good coverage and support of the implant. In cases of wound dehiscence at or around the T-junction, the flap underneath provides extra implant cover and reduces the risk of implant exposure (8). The risk of T-junction breakdown in Wise pattern mastectomies may be as high as 25% (12).

The concept of using de-epithelialized tissue from the lower pole of the breast is not new; internal dermal slings for mastopexy is widely used in massive weight loss patients in various forms (13,14) and for aesthetic augmentationmastopexy for support of the implant and tissue cover under the T-junction (15). De Vita et al. reported a series of 74 direct to implant breast reconstructions with dermal sling, where they occasionally needed to elevate the serratus muscle to increase the width of the pocket, and also used ADM if the dermal flap could not reach the muscle in the medial aspect (16). The design with a S-shaped incision instead of a straight line, will provide enough flap height in the medial part of the breast in most cases. In addition, the back-cut in the lateral part of the dermal flap has shown to provide good lateral support for the implant without disrupting normal anatomy of the serratus muscle. Nava suggested that the distance from nipple to IMF should be ≥ 8 cm and sternal notch to nipple ≥ 25 cm (17). However, we find the nipple position irrelevant in the preoperative evaluation; the new nipple position and the size of the area left under the Wise pattern are the most important anatomical markers.

In some cases, where the skin envelope has been too

small for a true dermal flap and implant reconstruction, a balcony-like (15), smaller dermal flap has been used to support the lower pole, as well as using synthetic mesh, but these patients are not reported in this case series.

When planning the procedure, the final breast size is discussed with the patient, since it is possible to adjust implant size and skin excision according to their desires. Most cases with macromastia call for a reduction of volume, and in these cases the implant size can be chosen preoperatively. In many cases, patients ask for the same size or a little larger than current breast volume, and in these cases implant size is chosen during the operation. The thickness of the subcutaneous fat is the same in all areas of the breast, but vary between patients, and range from very thin (1-2 mm) to quite substantial (more than 2 cm). The thicker the fatty laver, the smaller the implant for the same final result. Thicker flaps tend to produce more natural final results. In some patients, the fatty subcutaneous layer may even provide enough volume for a full breast reconstruction (18). Patients with a thinner fatty layer do not seem to have an increased risk of compromised blood supply to the flaps.

We perform the operation using monopolar cautery, and do not inject tumescent solutions before performing the mastectomy. In our experience, tumescent mastectomy tends to blur the planes, and makes the thin fascial layer over the breast difficult to follow—especially in women with fatty breasts and in very skinny patients. Other surgeons advocate tumescence (19), and this is left up to each surgeon, guided by their personal experience.

The dermal flap is a one-stage direct to implant and an inexpensive alternative to the more expensive twostage Wise pattern mammoplasty and direct-to-implant reconstruction with ADM as described by Gunnarsson *et al.* (7). If performed properly, this technique is easy and safe, and the subdermal network provides sufficient vascular supply. However, if there are previous scars in the IMF, the flow through the subdermal plexus may not be enough to nourish the flap. This should be taken into consideration when planning the flap. A short IMF scar in a wide breast should not pose a problem since collateral vessels will supply the flap from the areas medial and lateral of the scar. It would be unwise to do a back-cut in these cases, since it will cut off the lateral blood supply.

This technique requires that you trust your colleagues; if the de-epithelialization is too deep or if the mastectomy plane has been too superficial, the blood supply of the flap

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may be damaged, which may lead to necrosis of the flap.

Conclusions

Immediate breast reconstruction using a dermal flap and an implant is a safe, quick one-stage procedure.

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None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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