

Prepectoral Hammock and Direct-to-implant Breast Reconstruction in 10 Minutes: A Focus on Technique

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Background: Breast animation deformity has sparked a reappraisal of the prepectoral implant placement in breast reconstruction. Our approach for direct-to-implant breast reconstruction (DIR) has evolved from a dual plane muscle/mesh coverage to a simple prepectoral hammock covering just the inferolateral part of the implant without the muscle. The aim of this study was to test the procedure in a prospective case series with emphasis on reconstructive outcome.

Methods: Twenty-seven patients undergoing nipple- or skin-sparing mastectomy without subsequent radiation therapy requesting a primary implant-based reconstruction were included from May 2016 to April 2017. Median age was 46 years (25–67). We registered comorbidities, complications, and long-term results of successful or failed reconstruction.

Results: Forty-seven DIR in 27 women, 20 bilateral, 7 unilateral. The median body mass index was 24 (17–31). The median time for mastectomy and DIR was 103 minutes (60–150). The inferolateral hammock consisted of Meso Biomatrix (34), Strattice (11), and Vicryl (2). The median implant size was 260 cc (140–345). Four complications (14%), 2 hematomas, 1 seroma, and 1 infection with partial nipple necrosis were all salvaged and reconstruction completed successfully. The median follow-up was 11 months (7–17).

Conclusion: The prepectoral inferolateral hammock, a swift one-stage procedure with a quick recovery, creates promising results in the presence of an adequate skin flap. The simplicity of the method has made it the authors first choice for DIR. (*Plast Reconstr Surg Glob Open* 2018;6:e1931; doi: 10.1097/GOX.0000000000001931; Published online 2 October 2018.)

INTRODUCTION

Implant-based breast reconstruction has evolved at a rapid pace over the last decade.¹ The dual plane hammock of acellular dermal matrix (ADM) and pectoralis major muscle facilitated direct-to-implant reconstruction (DIR); now increasingly performed in combination with a biologic or synthetic mesh following skin- or nipple-sparing mastectomy.^{2–8} Recent focus on breast animation deformity has caused a shift toward less or no muscle involvement.^{9–15} Preliminary reports of successful prepectoral reconstructions consisting of variations of a full wrap around ADMs or deepithelialized inferior dermal flaps all favor the site change and indicate the importance of

a full ADM coverage.^{14–18} We question the importance of full ADM coverage in DIR and feel strongly that the main purpose of the hammock is to provide an inferolateral support to the implant, alleviating the incision and recovering mastectomy skin flap.^{19–21} The aim of this feasibility study was to examine if prepectoral DIR could safely be achieved with a simple method of infero-laterally placed hammock using a single sheet of acellular matrix or mesh.

PATIENTS AND METHODS

We performed DIR in 27 women undergoing nipple-sparing or skin-sparing mastectomy without subsequent radiation therapy at Telemark Hospital, Norway, from June 2016 to April 2017. All operations were performed by the same team consisting of 1 breast surgeon and 1 plastic surgeon. The exclusion criteria were invasive cancer and planned postoperative radiation therapy. The median age was 46

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years, range 25–67. We registered known risk factors and comorbidities, diabetes, hypertension, and smoking habits. Our primary outcome measure was the number of successfully completed reconstructions. The secondary outcome was complications: infection, hematoma, skin necrosis, and wound dehiscence. The study was performed in accordance with the principles outlined in the Declaration of Helsinki, and informed consent of participation was obtained.

Operative Technique

Mastectomy, either skin sparing (SSM) or nipple sparing (NSM) was carried out as we have previously described aided by hydrodissection.^{19,20} The inferolateral inframammary incision is our preferred approach to NSM, SSM is performed through a short periareolar incision extended laterally as required. Skin flaps were evaluated and deemed sufficient relying upon clinical observation. The mesh used for the hammock was either biologic or synthetic; 10×16 cm sheet of Meso Biomatrix Porcine-derived acellular peritoneal matrix, 8×16 cm sheet of Strattice Porcine derived ADM or 15×15 cm sheet of Vicryl, polyglactin absorbable net. The mesh was sutured with a running absorbable 2.0 suture along the lateral border of the intact pectoralis major muscle to define the lateral boundary of the breast reconstruction, to medialize the implant and prevent it from lateral migration (**see video, Supplemental Digital Content 1**, which displays a postoperative animation video of the patient. This video is available in the “Related Videos” section of the Full-Text article at PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/A860>). The mesh was then inserted medially with a single 2.0 absorbable suture. One closed suction drain was placed laterally and upward along the superior implant border of each breast. The desired implant was placed into the hammock “pocket” in a craniocaudal direction before closing the hammock inferiorly using 2 or 3 interrupted absorbable 2.0 sutures along the inframammary fold. As a result, only about two-thirds of the bottom and lateral part of the implant is covered by the hammock depending on the size of the implant. The skin incision was closed in 2 layers with absorbable 3.0 monofilament sutures. Patients were

hospitalized overnight and drain(s) kept until the daily production was less than 30 ml/24 hours. We used 1 perioperative dose of antibiotics and prescribed prophylactic oral Dicloxacillin 500 mg capsules 4 times per day until drains were removed.

RESULTS

We used the prepectoral inferolateral hammock DIR method in 47 breasts of 27 women (Table 1). The reconstructions were bilateral in 20 cases and unilateral in 7. The mastectomies were prophylactic in 21 patients and therapeutic in 6; 42 NSM and 5 SSM. The hammock consisted of; Meso Biomatrix in 17 cases, Strattice in 9 cases and Vicryl in 1 case. The implants used were anatomical Mentor implants in 25 cases (41 breasts) and round shape Motiva Silk Surface in 3 cases (6 breasts). The median implant size was 260 cc (140–345). The median time for the procedure, mastectomy and immediate breast reconstruction, was 103 minutes (60–150). The median body mass index (BMI) was 24 (17–31). Three patients had major complications, 2 were reoperated for early postoperative hematoma and one due to a partial nipple necrosis and subsequent infection and was successfully salvaged with implant exchange and antibiotic treatment. One patient had a minor complication, a delayed wound dehiscence, which was resutured in the outpatient clinic: the patient was an abstaining smoker and the only smoker in this series. None of the included patients had hypertension, diabetes, or other comorbidities. The patients were discharged after an average of 2 days (1–4), and the drains were removed after 8 days (4–20). The median follow-up was 360 days, range 244–530 days.

DISCUSSION

In this series of 47 of prepectoral DIR, we have successfully used the inferolateral single sheet partial hammock to support of the implant in a one-stage approach, as opposed to recent articles presenting experience with a two-stage procedure and total coverage of the implant.^{11,14–17} The simplicity of the reconstruction enabled us to complete a bilateral mastectomy and DIR in a median time of 103 minutes or less than 2 hours in the majority of our cases with consistent results and no animation (Fig. 1; **see video, Supplemental Digital Content 2**, which displays a inferolateral Hammock reconstruction in 10 minutes. Operative procedure demonstrating DIR with inferolateral 8×16 cm Strattice Hammock and 330 cc moderate profile anatomical Mentor implant. This video is available in the “Related Videos” section of the Full-Text article at PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/A849>). This is largely due to the simple and fast suturing of the mesh along the lateral pectoral border and inframammary fold as demonstrated in the operative video (**Supplemental Digital Content 1**). We recorded the time for 3 consecutive reconstructions in preparation of this article using a stopwatch and confirmed that the time that it took to suture the mesh and place the implant was 5 minutes, leaving up to 5 minutes to close the incision, and thus complete the reconstruction in less than 10 minutes. We used 2 types of acellular meshes of porcine origin; one dermal and the



Video Graphic 1. See video, Supplemental Digital Content 1, which displays a postoperative animation video of the patient. This video is available in the “Related Videos” section of the Full-Text article at PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/A860>.



Fig. 1. The patient demonstrated in the operative video; a 43-year-old BRCA1 woman with preoperative (A–C) and 1-year postoperative (D–F) photographs after bilateral nipple-sparing mastectomy using inframammary fold incisions with immediate, permanent implant reconstruction using the 10-minute hammock reconstruction.

other peritoneal and were unable to identify any difference in our patients' outcome based on the different mesh types used in the hammock. We cannot make any assumptions in terms of the importance of total or partial mesh coverage, biological or synthetic, as this was not the aim of this study and would need to be tested in a comparative study.



Video Graphic 2. See video, Supplemental Digital Content 2, which displays a inferolateral Hammock reconstruction in 10 minutes. Operative procedure demonstrating DIR with inferolateral 8×16cm Strattice Hammock and 330 cc moderate profile anatomical Mentor implant. This video is available in the "Related Videos" section of the Full-Text article at PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/A849>.

The patient sample of this study was highly selected and consists largely of healthy women requesting prophylactic NSM and DIR, an optimal group of patients to test technical refinements and minimize possible confounders at the same time. We have previously published our experience regarding the importance of patient selection and how to overcome the challenge of large and ptotic breasts to make the mastectomy and DIR as safe as possible.^{19–21}

We notice that patients reconstructed by this simple single sheet prepectoral DIR technique seem to experience no breast animation deformity, less postoperative pain, shorter time with drains, and quicker recovery and good cosmetic outcomes, which is in accordance with recently published reports of similar muscle sparing or prepectoral implant-based reconstructions.^{11,14–17} One downside is a risk of developing implant visibility over time, particularly in patients with low BMI, which we have observed in 4 (15%) patients so far. Similar findings have been reported by Lee et al.²² in 2012 and Sbitany et al.¹⁵ in 2017.

Long-term experience from breast augmentation indicates that there is a 2-fold increase in the risk of visible capsular contraction with subglandular compared with submuscular breast implant location.²³ This may also turn out to be the case following breast reconstruction; however, we cannot expect to be able to answer the question regarding the risk of developing capsular contracture any time soon as the cumulative risk peaks after 5 years.²⁴

Table 1. Patient Demographic Data Are Displayed

Patient	Age	BMI	Side	Time Surgery	Implant Size	Major Complications	Reconstruction Completed
1	30	31	Bilateral	150	255	No	Yes
2	32	22	Bilateral	114	195	No	Yes
3	32	17	Bilateral	120	255	No	Yes
4	49	25	Unilateral	90	225	Hematoma	Yes
5	46	27	Bilateral	113	255	No	Yes
6	45	26	Bilateral	90	140	No	Yes
7	58	22	Unilateral	115	290	No	Yes
8	66	28	Unilateral	60	225	No	Yes
9	25	22	Bilateral	120	330	No	Yes
10	55	27	Bilateral	92	225	No	Yes
11	37	22	Bilateral	95	330	No	Yes
12	38	30	Bilateral	144	165	No	Yes
13	44	26	Bilateral	86	295	No	Yes
14	48	25	Bilateral	100	255	No	Yes
15	40	25	Bilateral	105	345	No	Yes
16	52	24	Bilateral	108	330	No	Yes
17	65	26	Bilateral	91	295	No	Yes
18	47	21	Unilateral	96	300	No	Yes
19	52	24	Unilateral	80	330	No	Yes
20	30	20	Bilateral	120	245	No	Yes
21	57	21	Bilateral	74	165	Hematoma	Yes
22	43	24	Unilateral	120	295	No	Yes
23	67	20	Unilateral	94	225	No	Yes
24	32	18	Bilateral	100	225	Infection (*)	Yes
25	53	25	Bilateral	110	295	No	Yes
26	38	22	Bilateral	94	260	No	Yes
27	48	26	Bilateral	106	255	No	Yes
Total	45 (25–67)	24 (17–31)		103 (60–150)	260 (140–345)		

(*) Partial nipple necrosis leading to subsequent infection.

Although the existing literature largely supports the advantage of a total coverage of the implant using a biologic acellular matrix sheet, this 1 year follow-up seems to indicate a satisfying outcome despite only a partial coverage.^{11,14–17}

There are still many unanswered questions regarding the use of mesh for breast reconstruction and where to place the implant for optimal results. One important question is if the aesthetic results will be comparable with other reconstructive methods in the long run? This, however, requires comparative studies with a longer follow-up.

CONCLUSIONS

The partial implant coverage using a prepectoral inferolateral hammock technique is a simple, fast, and reliable method of DIR. The patients seem to experience less post-operative pain, shorter time with drains, and quicker recovery than we have experienced following the dual-plane DIR. The cosmetic outcomes seem to be just as favorable as other types of DIR that we have used over time. Patient selection is important as the thickness of the mastectomy flaps and comorbidity does play an important role for the successful outcome. Further studies and longer follow-up are required to compare long-term risks of capsular contracture, implant visibility, and the significance of different degrees of mesh coverage of the implant in different types of immediate breast reconstructive techniques.

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