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Immediate breast reconstruction with acellular dermal matrix: Factors affecting outcome

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Summary *Background:* The use of acellular dermal matrix (ADM) for coverage of the lower pole in immediate implant-based breast reconstruction has changed surgeons' practice. We present our experience using a porcine ADM (Strattice), focusing on short-term outcomes, patient selection, and technique adaptations that may influence outcome.
Methods: A two-center, retrospective, cohort study was performed from December 2008 to October 2012 at Guy's and St. Thomas' Hospitals, London, and Clinic Pyramide, Zürich. The study period was divided into two periods: Period 1 which spanned from December 2008 to October 2010 and Period 2 from January 2011 to October 2012 wherein technique adaptations were introduced. Short-term complications after reconstructive surgery were compared between Periods 1 and 2.
Results: A total of 149 patients underwent 200 reconstructions (110 one-stage and 90 two-stage) following oncologic (134 breasts) or prophylactic (66 breasts) mastectomy. The mean follow-up was 22.2 months. The total complication rate was 32.5%, including infection, 11.5%; hematoma, 5%; seroma, 10.5%; skin necrosis, 3.5%; and serious wound breakdowns with implant exposure, 1.5%. Complications resulted in 3% requiring an early exchange of implant/expander and in 12.5% requiring explantation. A significant reduction in total complications, infection, implant exposure, and implant loss were noted in Period 2. Multivariate analysis showed time period of surgery (Period 1), single-stage reconstruction, and patient characteristics (mastectomy weight >600 g, or body mass index (BMI) > 30, or smoking) to be statistically significant risk factors for the development of postoperative complications. Neoadjuvant chemotherapy showed a trend towards higher complication rates.

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Conclusion: The high rate of early complications in this study was mostly related to patient characteristics and learning curves and highlights the importance of patient selection and technique principles in optimizing the outcome.

Introduction

Over the past decade, the use of acellular dermal matrix (ADM) in immediate implant-based breast reconstruction has gained acceptance. Currently, half of all implant-based reconstructions are performed with the use of an ADM.[1] The reported benefits of using human ADM (HADM) include better aesthetic outcome due to better control of the inframammary fold and coverage of the implant,[2,3] creation of a larger implant pocket allowing for single-stage reconstruction,[4–11] and possible decrease in capsular contracture.[2,3,10,12–14]

The majority of the evidence base for the use of ADM in breast reconstruction lies with human ADMs and particularly AlloDerm® (LifeCell Corp., Branchburg, NJ, USA).[2,4,6,10,12,15–18] However, a number of other nonhuman ADMs, derived from bovine pericardium, bovine dermis, porcine dermis, and porcine small intestinal submucosa, are now available and are used in a similar capacity as human ADMs in breast reconstruction. Published experience with theses matrices is, however, limited and highlights a need to evaluate their efficacy and safety before widespread adoption.[14,19–23] The aim of this study was to report our early outcome using Strattice™ (LifeCell Corp., Branchburg, NJ, USA), a porcine ADM, in immediate implant-based breast reconstruction with particular emphasis on technique adaptations and learning curves that may influence outcomes.

Patients and methods

All patients who underwent Strattice-assisted implant-based breast reconstructions at Guy's and St. Thomas' Hospitals, London, and at Clinic Pyramide, Zürich, from December 2008 to October 2012 were retrospectively reviewed. Single-stage reconstruction was offered unless there was concern with skin viability or when patient had opted for simultaneous augmentation; in these cases, a two-stage procedure was performed.

Mastectomy was performed via a skin-sparing or nipple-sparing approach by breast surgeons in attendance of the plastic surgeon. Following mastectomy, the pectoralis major muscle was raised and a subpectoral pocket was created using standard techniques. Strattice was rinsed in saline solution according to manufacturer's recommendation prior to insertion. The inferior border of the Strattice was sutured to the chest wall along the inframammary fold, extending medially and laterally. A silicone cohesive gel implant or expander was placed into the pocket and the upper border of the Strattice was sutured to the inferior border of the freed pectoralis muscle in an underlay technique resulting in closure of the pocket. Extra care was taken to avoid creases or folds of the Strattice and dead space between the Strattice and host tissue. Two drains were placed, one in the pocket and the other subcutaneously along the inframammary fold. If axillary clearance was performed, a third drain was placed in the axilla. All drains were removed when drainage was <30 ml over 24 h. Typically, prophylactic intravenous antibiotics were commenced 30 min prior to surgery; this was followed by three more intravenous doses before switching to oral antibiotics, which were continued for 5 days. Tissue expansion was started in the outpatient clinic after wounds had healed, usually 2 weeks after surgery. The field over the port was cleaned with antiseptic solution and sterile instruments and gloves were used during expander filling. Expansion was stopped for chemo- and/or radiotherapy and continued after termination of cancer therapy, if needed.

During the second half of the study period (January 2011 to October 2012), adaptations to the technique of Strattice-assisted reconstruction were made starting from January 2011 after an intradepartmental audit. In particular, Strattice was rinsed in an antibiotic solution (1.2 g amoxicillin/clavulanic acid (1 g cephalosporin if allergic to penicillin) and 80 mg gentamicin) instead of a saline solution. Skin flap viability was more carefully assessed clinically (capillary refill, flap thickness, and change in skin color with inflation of sizer) and cut more generously if perfusion of the skin flap was critical. Drains were placed in a long subcutaneous tunnel to avoid communication from the outside to the Strattice. Particular attention was paid to leakproof and sterile drain dressings. Drain bottles created a slight compression of the breast, thus reducing the dead space between the layers. In addition, patients with more than one risk factor ($>$600 g estimated mastectomy weight, body mass index (BMI) $>$ 30, or smoking) were not operated with this procedure. Changes were introduced at both institutes at the same time after receiving consent from each institute's senior surgeon.

Patient charts were reviewed for demographic information (age and BMI), comorbid conditions (diabetes, hypertension, or smoker), type of reconstruction (single-stage or two-stage), implant or initial expander volume, adjunctive therapy (radio- and/or chemotherapy) use, length of patient follow-up, and type and incidence of early complications during the follow-up period. Early complications were defined as those occurring in the first 3 months after the procedure and included, but not limited to, infections requiring intravenous antibiotics, seroma requiring drainage, hematoma, and skin necrosis leading to operative intervention, and serious wound breakdown leading to