

CASE REPORT



Non-integrated acellular dermal matrix in breast reconstruction: a case report

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ABSTRACT

Acellular Dermal Matrices have become increasingly popular in breast reconstruction especially in the last decade. There is a debate on whether Acellular Dermal Matrices increase the risk of complications or not. Common complications include infection, wound dehiscence, necrosis, seroma, haematoma, capsular contracture, extrusion, loss of implant and reconstruction failure. Non-integration is not listed as a typical complication to the use of Acellular Dermal Matrices. We report a case of a completely non-integrated Acellular Dermal Matrix following breast reconstruction in a patient without significant risk factors.

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KEYWORDS

Acellular dermal matrix; breast reconstruction; complications; non-integration

Introduction

Acellular Dermal Matrix (ADM) is a biological cell-free, extracellular matrix mesh [1]. An ADM derives from human, bovine or porcine tissues. ADMs are biodegradable and act as a scaffold and may be completely replaced by the patient's own soft tissues [2].

ADMs have been used since the mid-1990s in soft tissue reconstruction and were introduced in breast reconstruction in the early 2000 [3]. Several versions of ADMs are now available on the market [4]. They are commonly used as a tissue expander in immediate breast reconstruction following mastectomy—a procedure which is rapidly increasing [5]. ADMs create a well-suited pocket for the breast implants, a so-called 'inner bra', resulting in a superior cosmetic result as the inframammary fold is preserved [6], but at an increased economic cost [7]. In skin sparing mastectomies, ADMs allow for a one-stage implant-based reconstruction, saving the patient from additional surgery and achieving a faster reconstruction compared to a two-stage reconstruction [8,9].

Strattice (LifeCell Corpth) is a sterilised biological ADM manufactured from porcine skin [10]. It is available in one thickness (1.5–2 mm) and ranges in size from 5.5 cm × 10 cm to 8 cm × 16 cm. Strattice has a relative higher tensile strength compared to other ADMs i.e. Alloderm [2]. The collagen-fibers are



non-cross-linked and the exact cellular components are so far unknown. The pliable version of Strattice is recommended for breast reconstruction. Compared to other ADMs, Strattice appears to be integrated slower, perhaps due to its greater thickness [11]. A large-animal study [12] found in that ADMs typically obtain early angiogenesis at 4 weeks after implantation and flow at 12 weeks after implantation.

Long-term outcome data is limited, however, as ADM's have only been used for breast reconstruction for about a decade [13].

Case report

A 51-year-old female patient was in 2011 diagnosed with a lobular carcinoma in situ in the right breast and treated with lumpectomy, sentinel node procedure and postoperative radiation therapy with 50 grey in 25 fractions.

In 2014 the patient suffered relapse in the right breast. A 1 mm invasive ductal carcinoma, T1a N0 M0, oestrogen receptor positive tumour was found. The patient underwent nipple-sparing mastectomy and primary reconstruction. Reconstruction was performed with Strattice fixed with Vicryl. A circular 275 CC Mentor breast implant was used for reconstruction. Postoperatively the patient was re-operated due to seroma caused by a plugged drain tube. The patient

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received anti-hormone treatment with letrozol, but the treatment was stopped prematurely due to side effects.

12 months after reconstruction, the patient underwent corrective surgery due to significant asymmetry. Lipofilling of the lower quadrants of the reconstructed breast and contra lateral breast lift was performed. The cosmetic result was not improved and capsular contracture forced the implant cranially, worsening the cosmetic outcome.

In 2016 the patient had an additional corrective operation with removal of the capsular contracture and replacement of the implant. A completely non-integrated ADM in its original measurements alongside 40 mL of seroma was found (see Figure 1). The ADM was removed and the round implant exchanged with an anatomical implant. Histopathology of the ADM showed no sign of neoangiogenesis or ingrowth of the patient's own cells. No pathology was found in the seroma or capsulae and no microbiological agents were found.

Discussion

Immediate breast reconstruction with ADM has several benefits over delayed breast reconstruction. One is the preservation of the skin envelope and shape, as well as maintaining the inframammary fold. This leaves the patient with a better cosmetic outcome. Additionally, immediate reconstruction can save the patient from further surgery and thus achieving a faster reconstruction compared to a two-stage reconstruction.

In breast reconstruction with expanders or implants in general, several risk factors are known. Significant risk factors include smoking, obesity/breast size and radiation therapy. Smoking causes a three times increased risk of complications. Obesity (BMI 25–30) causes a two to three times increased risk and severe obesity (BMI >30) an 18 times higher risk of complications [14]. Diabetes however does not seem to be a significant risk factor [14]. Moreover, hypertension is known to increase the rate of complications [15].

Known risk factors in using ADM in breast reconstruction include smoking, high age, high BMI, large breast size (particularly >600 grams) and axillary dissection [16]. Common complications to the use of ADM include infection, wound dehiscence, necrosis, seroma, haematoma, capsular contracture, extrusion, loss of implant and reconstruction failure. Thick ADMs appear to have an overall higher rate of complications compared to thinner ADMs [11].

Most studies report complication rates by pooling different ADMs, potentially masking an inter-ADM difference in complication rates. The reports on whether

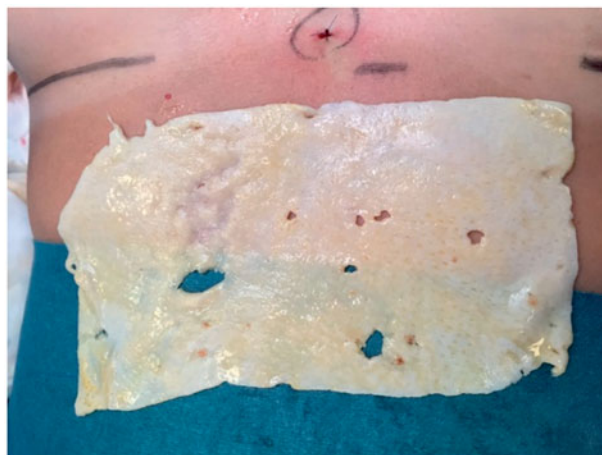


Figure 1. The patient and the non-integrated ADM.

the use of ADM in breast reconstruction increases the risk of complications compared to breast reconstructions without the use of ADM, are inconsistent. Ibrahim et al. [17] found no significant difference in complication rates between breast reconstructions with and without the use of ADM (5.3% vs. 4.9%). Similarly, Vardanian et al. [6] found no improved risk of complications, but a superior aesthetic result when using ADM in breast reconstruction. In a study [18] including 1297 patients, no increased rate of complications when using ADM in breast reconstruction was found. In a matched cohort study including 574 breast reconstructions, no increased risk of complications in the group treated with ADM was reported. Schnarr et al. [19] found no difference in complication rates between AlloDerm, AlloDerm RTU, FlexHD and hMatrix, though Ranganathan et al. [20] found a significantly higher risk of infection when using FlexHD compared to AlloDerm. Paprottka et al. [21] report a slightly higher rate of complications using bovine-derived ADM compared to human and porcine ADMs. A study of 440 immediate implant-based breast reconstructions found equal complication rates between human ADM (AlloDerm) and bovine ADM (SurgiMend), but with a \$1024 less cost per breast reconstruction using SurgiMend [22]. Ball et al. [23] reported a significantly higher rate of skin erythema and a trend towards higher complication rates in reconstructions using Strattice (porcine) compared to SurgiMend (bovine).

A meta-analysis [24] found an increased overall complication rate in patients with ADM compared to patients without ADM in terms of infection and seroma, but no difference in explantation. Another meta-analysis [25] found an increased risk of seroma, infection, and reconstructive failure compared to prosthetic-based breast reconstructions using traditional

musculofascial flaps, but a lower rate of capsular contracture.

Simple prophylactic procedures like draining both the submastectomy and sub-ADM planes and lowering the threshold for drain removal appear to minimise the risk of complications [26].

Radiation increases the risk of complications by 3.3 to 5 times, though timing of the radiation does not seem to affect the complication rate. Radiation therapy should be started within 8 weeks of mastectomy to avoid an increased risk of recurrence.

Many options are available in reconstruction of the breast. The surgeon must carefully consider the risks involved in primary breast reconstruction. Through close dialogue with the patient, the surgeon and the patient must choose the best suited reconstruction when considering cosmetic outcome as well as risk of complications.

Capsular contraction and persistent production of seroma could indicate a non-integrated ADM, and non-integrated ADMs should always be removed.

The manufacturer of the ADM was contacted regarding a possible material fault. The manufacturer stated seroma as the main reason for the non-integration. Whether this is the case or whether the non-integration and subsequent seroma was due to inflammation caused by the ADM is debateable.

Conclusion

This case report demonstrates that non-integration of ADM in breast reconstruction is possible and might be associated with prolonged and severe seroma formation and early formation of capsular contraction.

Ethical approval

The patient has given written consent to the use of her case and picture.

Informed consent

The patient has given written consent to the use of her case and picture.

Disclosure statement

No potential conflict of interest was reported by the authors.

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