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Original Research Article

AN AUDIT OF ACELLULAR DERMAL MATRIX (ADM) ASSISTED BREAST RECONSTRUCTION PROCEDURES – ARE ANTIBIOTICS UNAVOIDABLE?

Mario Metry[1], Mr. Shaaban[2], Rob Thomas[1], Zainab Shakoor[3], Youssef Magdi[2], Michael Carr[2]

[1] MRCS, SPR general Surgery, North Cambria University Trust
[2] FRCS, Consultant Breast surgery, North Cambria University Trust
[3] F2 General Surgery, North Cambria University Trust

Abstract: Introduction: The use of ADM grafts in breast reconstruction has been widely adopted in the UK. Following the National Mastectomy and Breast. Reconstruction Audit, joint guidelines from ABS and BAPRAS were published in 2013 with regards to the use of ADMs in breast reconstruction. The aim is to audit clinical outcomes in our district general unit against these guidelines. **Method:** Data were collected retrospectively from medical records over a one-year period. Indications; cautions; surgical technique; post-operative infection; implant loss; patient reported outcome measures; unit and organization criteria were recorded. **Results:** A total of 23 patients in whom ADM was used were included in the study. The median age was 52 y (40-69y), Average BMI 25. 14 patient s (60.8%) had immediate reconstruction with expander or dual chamber implant, 5 patients (21%) had delayed 2nd stage reconstruction and 4 patients (17.3%) had risk-reducing mastectomy. We met the NMBRA (National Mastectomy and Breast Reconstruction Audit) target in achieving 0% return to the theatre for local complications, compared with NMBRA of 7.6%. We also had 4% rate of implant loss within 3 months compared 9% in NMBRA. 100%of our patients received written information about breast reconstruction. 2patients (8.6%) had proven wound infection. 5 patients (23%) took a further course of antibiotics for suspected wound infection. The debate lies in the need for antibiotics for the Red Breast Syndrome that may improve without antibiotics vs. the possible loss of implant if proven infection and hence the high antibiotic rate.

Key Words: Acellular Dermal Matrix; Breast Cancer; Reconstruction; Guidelines; Breast implant; Expander

For Correspondence:
mario_elia123@yahoo.com.
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Introduction: Acellular dermal matrix (ADM) assisted breast reconstruction procedures have been regarded as revolutionising implant-based breast reconstruction (IBRR)(1).These novel biological meshes not only propose to overcome well documented challenges in breast reconstruction (namely total muscle coverage and natural posies) but have been regarded as

providing superior properties, such as structural strength and vascular in growth) 2, but also improved aesthetic outcomes, reduction in postoperative pain and decreased operative time (3).

Despite IBBR accounting for 37% of all immediate reconstructions following mastectomy in the UK complications may affect 40% of patients (2). These may include loss of the implant, capsular contracture, and implant rippling and mechanical shift of the implant; more worryingly 40% may require provisional surgery (4). Although initially ADM was used in the correction of secondary breast deformities it appears to have evolved to counteract other IBBR related shortcomings (5). ADM assisted breast reconstruction may offer a solution via perceived improvements in lower pole contour, implant positioning, filling time needed for tissue expansion, definition of the lateral mammary and inframammary folds, decreased incidence of capsular contracture and protection against the effects of radiation (6,7).

Although the procedure has been widely implemented throughout the United Kingdom (UK), quality literature related to long-term safety and benefit remains sparse. Published studies have produced conflicting and concerning results suggesting an increased incidence of postoperative complication such as infection and seroma formation (8).

Furthermore with an increasing numbers of patients diagnosed with early stage breast carcinoma or breast cancer in-situ via through improved screening methods it is imperative that we understand the implications of this procedure in the long term. Essentially we need to decipher if this one-stage procedure is really a solution for solving IBBR related issues and can manage patient's expectations for improved cosmetic outcomes and that the procedure is both cost-effective and sustainable for the National Health Service (NHS). We aim to address these questions in our audit.

The guidelines have ben jointly produced by the Association of Breast surgery and the British association of Plastic, Reconstructive and Aesthetic Surgeons and their aims are to inform those wishing to undertake ADM assisted breast reconstruction and to identify clinical standards and quality indicators for audit purposes.(2)

Background: The use of implant based reconstruction (IBR) accounts for 37% of immediate reconstruction following mastectomy in the UK.(3)However, complication rates associated with this technique can approach 40 % and include loss of implant, capsular contracture, rippling of the implant, and mechanical shift of the implant. Up to 40% of pat3eints may require revision surgery. (4)

The perceived advantages of the use of Acellular Dermal Matrix (ADM) over the traditional sub muscular technique include improved lower pole expansion, improved aesthetic outcome.(5)

Despite those potential benefits, there are some concerns regarding the potential complications.(6)The incidence of flap necrosis, infection, seroma and reconstruction failure are higher at the ADM group as was noticed by Ho et al, and Nruyen et al.(6)

BABRAS 2014 advised that breast reconstruction aims to rebuild the breast either wholly or partially, to normalize the look of the breast and leave the patient with a symmetrical bust. It also aims to improve the patient's body image and self-esteem, helping the process of recovery on a physical, emotional and psychological level'(7)

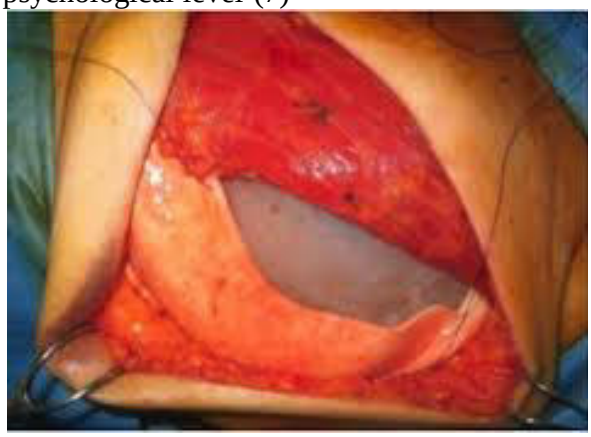

Figure 1: The ADM assisted breast reconstruction.

Methodology: Data were collected retrospectively on one year duration of 23 patients who undergone ADM assisted breast implant reconstruction over the period of 2014-2015. Patients were identified from individual consultants. Data were also collected in a retrospective manner from medical records.

Of the 23 patients 14 patients (60.9%) had immediate breast reconstruction with expander or dual chamber implant. 5 patients (21.7%) had delayed two stage breast implant based reconstruction, 4 patients (17.3%) had risk reducing mastectomy.

The median age was 52ys (40-69) with average BMI of 25.

Our audit focused on four major criteria per the ABS/BAPRAS guidance. As in the National Mastectomy and Breast Reconstruction Audit (NMBRA), there are four major criteria to achieve which includes (1) Surgical techniques are improved to reduce local complication rate following skin sparing mastectomy and the NMBRA outcome : 7.6 % of patients returned to theatre for local complications (wound infection or skin flap necrosis requiring debridement and hematoma) with a Target standard : <5% of patients requiring return to theatre within 30 days of the index operation (2) Post-operative infections are reduced by careful intraoperative technique and peri-operative infection control and the NMBRA outcome : 25% of patients requiring antibiotics within three months of their surgery for suspected infection with a Target standard : 10% of patients require antibiotics (3) Implant loss at 3 months and the NMBRA outcome: 9% of immediate breast reconstruction(IBR) and 7% of delayed breast reconstruction (DBR) reported implant loss. With a target standard: complications leading to implant loss is < 5%. Of patients (4) Patient Reported Outcome Measures (PROMS) are used to assess patient experience of information and outcomes and NMBRA outcome: 50% of patients received written information about breast reconstruction

Results: As per the NMBRA we had the following results (1) With regards to Surgical techniques are improved to reduce local complication rates, we achieved 0% return to the theatre for correction of local complications within 30% of index operation. (2) As for Post-operative infections and use of antibiotics within 3 months of their surgery for suspected infection, we had 2 patients (8.6%) had proven infection, and 5 patients (23%) took antibiotics for suspected infection in the wound. (3) Implant loss following 3 months' post-operative, we had 1 patient (4%) who lost her implant secondary top infection. (4) Finally, in regards to patient Reported Outcome Measures (PROMS) are used to assess patient experience of information and outcomes, we achieved 100% of the patients receiving written information about breast reconstruction.

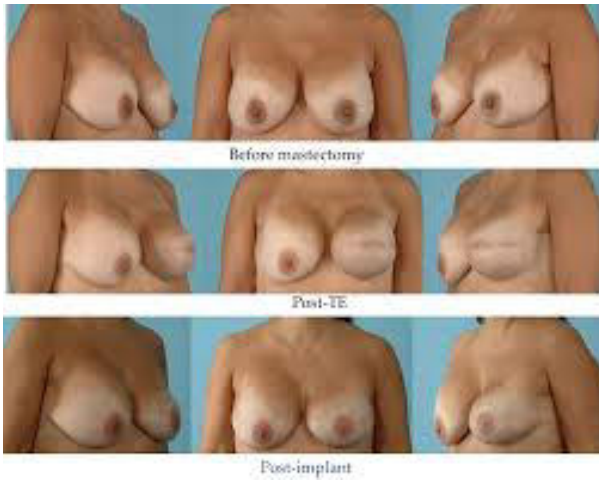

Figure2: the rule of ADM assisted implants in the final Aesthetic outcome of the breast

Discussion: As in the National Mastectomy and Breast Reconstruction Audit (NMBRA(8), the four criteria were audited. For each criterion the NMBRA outcome has been stated, followed by a target standard which individual unit should aspire to, once experienced in the technique.

We managed to achieve 3 out of the 4 national targets for ADM assisted breast reconstruction. We had low return to the theatre, low implant loss and all our patients had written information about breast reconstruction.

We had 8.6% of the patients with proved skin infection and 23% had antibiotics for suspected infections post-operatively. So, we had over target antibiotic usage.

Our current practice includes 48 hours of antibiotics starting at induction, further 5 days of oral antibiotics, pre-washing of the prosthesis and operative cavity with betadine/ saline solution and glove change.

There were some factors that could be attributed to not meeting this criterion.

Firstly, the surgeon may have a low threshold for giving antibiotics to maintain the operative field safe from infection. Secondly, possibility of immunological mediated reaction to the ADM e.g. Red Breast Syndrome could not be overlooked and this is one of the main factors that contributed to prescribing antibiotics.

Red breast syndrome(RBS)Described as **an erythema** that may be associated with 2-stage prosthetic reconstructive breast surgery using biologic mesh. Differentiated from **infectious cellulitis** through absence of fever and laboratory abnormalities and usually has a self-limiting course. This infrequent finding is reported in **5–10%** of breast reconstructions performed with ADM, and it has been called both **delayed breast cellulitis,** and red breast syndrome. The erythema tends to appear a few weeks or more after surgery on the skin overlying biologic mesh products, and then usually resolves spontaneously within 2 months and May **mimic** cellulitis but differ in several respects. **Some possible etiologies**, including dependent erythema in the lower breast, interruption of lymphatic flow, an unknown factor in ADM, a generalized histamine release, an inflammatory response to the stress on tissues of creating the pocket for an expander, the pressure of the expansion, or the initiation of revascularization.(9)

RBS could be differentiation from infectious cellulitis has been described in the limited volume of literature as **a dilemma for surgeons** considering a diagnosis of RBS.

Although the literature states that RBS does not seem to require any treatment other than watchful waiting, infectious cellulitis or infection in the expander or implant pocket requires more aggressive treatment. In cases of RBS, the surgeon may be forced **to remove the expander** because the patient has to begin chemotherapy, and the oncologist is concerned about the erythema being a sign of infection. In many cases**, a true diagnosis is never made**.

Lack of intervention in a scenario of undiagnosed infectious cellulitis could allow progression to a serious infection, necessitating invasive procedures and possibly removal of the expander or implant.(10)(11)

Thirdly, all the patients requiring post-operative chest wall radiotherapy have a fourfold increase in post-operative complications.(12)In the study, (3patients, 13%) had wound infection problems. Again, smoking is a well-known factor to increase the incidence of infection and delayed wound healing and (2 patients 8%) were actively smoking and other (2 patients 8%) stopped for only 6 months.

Conclusion: ADM provides a useful adjunct to implant based reconstruction as it has a good aesthetic outcome. The high usage of antibiotics is not an indication to the wound infection rates due to the multifactorial elements that may contribute to overusing it and Red breast syndrome is one of the factors that should be put into consideration before starting the antibiotics for the patients who had ADM assisted breast implants.

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