**One-stage direct-to-implant breast reconstruction using acellular dermal matrix**

In their Article published in *The Lancet Oncology*, Vera Lidwina Negenborn and colleagues report primary outcomes for the Breast Reconstruction in One Stage (BRIOS) trial.1 This is the first randomised study comparing one-stage implant-based breast reconstruction (IBBR) using acellular dermal matrix (ADM) with a conventional two-stage procedure in which a tissue expander is exchanged for a definitive implant once expansion is complete. Introduction of ADM as a surgical adjuvant was intended to offset the disadvantages of a two-stage approach, including treatment duration and complications secondary to suboptimal muscular and fascial coverage of the implant. Thus, ADM would avoid the need for a separate expansion phase by creating a compound pocket of matrix and muscle with sufficient fill-volume to allow placement of a permanent prosthesis during the initial surgery. Furthermore, superior aesthetic results were expected, such as improved shape and contour of the lower pole together with re-creation and better definition of the inframammary fold.

Although the two-stage approach to IBBR has been championed by leading surgeons,2

increased fill-volumes and improved aesthetic outcomes have been reported with ADM-assisted IBBR.3 However, many prospective observational and comparative studies on this topic were not robustly designed and have methodological flaws with confounding and much heterogeneity. With an increasing focus on patient-reported outcome measures, the primary endpoint of the BRIOS trial was patient-reported quality of life, and aesthetic satisfaction with surgical complications was a secondary endpoint. Patients were recruited between April, 2013, and May, 2015. In May, 2015, the Dutch Health Care Inspectorate issued a safety alert for ADM, which led to the suspension of surgery for patients who had not yet been operated on; others declined further participation in the trial. Moreover, this safety concern prompted a preliminary analysis of safety data, and data on surgical complications and reoperation rates were published early (in 2017). 4 The high failure rate (26%) associated with one-stage ADM-assisted reconstruction did not reflect the experience of many surgeons and far exceeded a target implant loss rate of less than 5% for oncoplastic breast practice. 5 This failure rate probably reflected poor patient selection, highlighting the unforgiving surgical environment of a one-stage procedure and the need for meticulous dissection of skin flaps6, 7 Improved understanding and attention to surgical detail might help to minimise future complications as more experience is accrued.

In their preliminary safety analysis, 4 the authors concede that use of ADM for one-stage IBBR “should be considered very carefully”. This conclusion is supported by the analysis of the primary study endpoints of patient-reported quality of life and aesthetic outcomes. 1 The authors used validated questionnaires (BREAST-Q and EuroQol 5 dimensions) completed at least 1 year after implant placement with a median follow-up of 17 months. Notably, linear regression analysis evaluated potential differences between groups for all domains of BREAST-Q with allowance for inevitable confounding, such as prophylactic versus therapeutic surgery (nipple and skin-sparing mastectomy), axillary surgery, and adjuvant treatments (eg, radiotherapy). Additionally, aesthetic outcomes were assessed by five observers (plastic surgeons) via preoperative and postoperative photographs and the Aesthetic Items Scale. Intraobserver variation was low (intraclass correlation coefficients [ICC] greater than the defined cutoff for good reliability 0·7) but there was only moderate correlation between different observers (ICC 0·516 [95% CI 0·355–0·640] to 0·758 [0·704–0·804]). The Aesthetic Items Scale has previously been evaluated and has high interobserver reliability.

After exclusions, 60 patients were randomly assigned to receive one-stage IBBR and 61 patients to receive two-stage IBBR. Postoperative satisfaction with breasts (63·4 [SD 15·8] *vs* 60·3 [15·4], p=0·35) did not differ between the groups, nor did any other domains (most notably satisfaction with outcome and psychosocial or sexual wellbeing). Furthermore, no differences in aesthetic assessment were evident. These are important findings from a randomised trial and challenge claims that IBBR with ADM yields superior results in terms of aesthetic outcomes and patient satisfaction compared with two-stage procedures that are reliant on total muscle coverage of the implant. Correlation between BREAST-Q scores and physician-reported aesthetic scores at 12 months was poor (Pearson correlation of r=0·343; p=0·002). Thus, levels of patient satisfaction are not necessarily concordant with aesthetic outcomes judged by health-care professionals. Moreover, the suggestion that increased numbers of complications with ADM might be acceptable if greater intraoperative fill volumes lead to improved patient satisfaction is not upheld. 8 Rates of questionnaire completion were relatively modest and are a limitation of this study; only 80% of patients in the one-stage group and around 70% in the two-stage group completed postoperative questionnaires. Around 50% of patients responded to preoperative questionnaires. Although the study might be affected by a type II error, this error is unlikely to be clinically meaningful. Despite the fact that research is ongoing to better define so-called minimal important differences, the inclusion of greater numbers of patients and higher rates of questionnaire completion are unlikely to change the basic conclusions of this study pertaining to the use of ADM for one-stage IBBR. Moreover, when adjustments were made for the high rate of complications and reoperation in the one-stage group, there were still no statistically significant differences between the two groups for these primary outcome measures. The mean BREAST-Q scores reported by Negenborn and colleagues are similar to those reported in the existing scientific literature.

This study provides valuable level 1 evidence that should be used to inform patients and guide clinical decision making. ADM assisted-IBBR has been rapidly adopted in the past 5 years, with a dramatic reduction in the use of latissimus dorsi flap reconstruction. 9

It remains uncertain whether or not use of ADM can protect against adverse effects of irradiation on capsular contracture.10. This issue must be factored into ongoing evaluation of ADM-assisted IBBR, alongside those of complication and re-operation rates, patient-reported experiences, and cost. Different types of ADM must be individually assessed, with distinctions made between generic and type-specific clinical properties. The Mastectomy Reconstruction Outcomes Consortium (MROC) study ([NCT01723423](http://clinicaltrials.gov/show/NCT01723423)) will provide important information about the specific role and status of ADM in one-stage procedures, while prepectoral approaches are being explored with the aim of minimising functional morbidity. Meanwhile, the implant Breast Reconstruction evaluation (iBRA) study (ISRCTN37664281) will prospectively collect data on the use of biological and synthetic meshes for either subpectoral or prepectoral IBBR.

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I declare no competing interests.

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