

Intracapsular Allogenic Dermal Grafts for Breast Implant–Related Problems

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Despite advances in surgical techniques and breast implant design, certain problems unique to breast implant surgery remain. The historically most onerous problem, capsular contracture, is relatively uncommon now. However, problems related to thin capsules and periprosthetic atrophy are becoming more common; these problems include rippling, symmastia, implant malposition, and bottoming out. Options for treatment of these conditions remain extremely limited, particularly with saline implants. Allogenic dermal grafting provides one satisfactory option. Techniques for use of allogenic dermal grafts and early results from 10 patients are summarized in this article, along with histologic analysis confirming viability of the grafts at 6-month follow-up in one patient. No graft-related complications were identified. (*Plast. Reconstr. Surg.* 112: 1692, 2003.)

Breast augmentation remains a popular procedure, with saline implants the default option for most women in the United States because of ongoing restrictions on the use of silicone gel implants.¹ These regulations are attributable in part to concern over high reported rates of complications, particularly capsular contracture, in up to 81 percent of gel implant recipients over the long term.^{2–4} Improved implant design, more common use of the subpectoral plane for implant placement, antibiotic irrigation, and the shift to saline implants have reduced the incidence of capsular contracture dramatically.^{5–7} However, problems that can be related to insufficient capsular support have increased in parallel fashion. These problems manifest as rippling, bottoming out, implant malposition, and symmastia. Thin scar capsules that are inadequate to conceal rippling or to prevent bottoming out or medial implant displacement may be termed “capsular atrophy” for purposes of discussion.

Many factors likely contribute to capsular atrophy. Tissue expansion almost always produces some degree of tissue thinning. Other factors are exaggerated by atrophic capsules. Rippling is often a manifestation of circumferential constriction of the implant, which forces the implant to “scallop” around the perimeter. Thin scar capsules fail to conceal rippling, although this may be of less concern to the patient with greater subcutaneous fat and more breast tissue. Bottoming out may be partly a consequence of unopposed muscle action with release of the lower pectoral origin for adjustment of the inframammary fold, as symmastia⁸ may follow overzealous medial release. Regardless of the cause, these problems are more apparent in thin patients, especially with capsular atrophy. Capsular reinforcement with grafts may provide a satisfactory solution in many of these cases.

SURGICAL TECHNIQUE

Before the surgical procedure, surface markings are made over the areas where capsular reinforcement is needed, usually with the patient in the upright position. As the grafts are available in specific sizes, the markings need to correlate with the dimensions of the selected grafts. The grafts also come in various thicknesses, and generally the thickest grafts are used. Capsulotomies are frequently required for implant repositioning or expansion of the pocket to accommodate the implants without circumferential constriction and in the desired orientation.

Access is usually through scars from previous operations, with at least a 5-cm incision re-

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quired. AlloDerm acellular dermal grafts (Life-Cell Corp., Branchburg, N.J.) are prepared by hydration in saline baths according to the manufacturer's instructions. The dermal side of the graft (the less shiny surface) is oriented toward the capsular surface, and the grafts are placed in an onlay fashion after any capsulotomies that may be required (Fig. 1). Sutures of 000 polyglactin are placed around the periphery of the graft, typically 1 cm apart. Secure attachment to the chest wall is important for cases of symmastia repair, bottoming out, and implant repositioning. Rippling may require grafts on the anterior aspect of the capsule in addition to the periphery. Irrigation with an antibiotic solution is then performed, followed by implant insertion.

RESULTS

Allogenic dermal grafts were used in 10 patients with conditions related to capsular atrophy, namely the two cases each of rippling, capsular reconstruction, bottoming out, sym-

mastia, and expansion atrophy. Follow-up ranged from 6 to 24 months. The revisions were clinically stable in all but two patients, with one symmastia repair and one case of bottoming out partially relapsing after 3 months. In one case, reoperation after 6 months for additional grafting provided an opportunity to evaluate the grafts grossly and microscopically; the viability of the previously placed grafts was confirmed. There were no instances of capsular contracture or graft-related problems.

CASE REPORTS

Case 1

A 50-year-old woman who had undergone bilateral mastectomies for breast cancer and reconstruction with an expander-implant sequence with McGhan style 68 saline implants (McGhan Medical Corp., Santa Barbara, Calif.) (Fig. 2, *above*) sought improvement of asymmetry, unnatural feel, rippling, and malposition. Examination revealed implants palpable through an estimated tissue thickness of only a few millimeters despite submuscular placement and a reportedly slow expansion schedule.

The operative strategy included capsulotomies for implant repositioning, implant replacement (350 cc) for more favorable base diameter dimensions, and a series of four 2 × 4-cm AlloDerm grafts around the periphery, as depicted in Figure 1. This patient was recently seen 24 months after the revision, with stable results.

Case 2

A 37-year-old woman developed symmastia following a vertical mastopexy and retropectoral augmentation with McGhan style 68 saline implants, 420 cc filled to 450 cc. Repair of the symmastia was accomplished with lateral expansion capsulotomies and medial capsule repair with 3.5 × 5-cm AlloDerm grafts (Fig. 3). Her results are shown in Figure 4.

Case 3

A 41-year-old woman with a history of multiple procedures (Fig. 5) had undergone an augmentation with submammary silicone gel implants, followed by capsular contracture on both sides, 15 years earlier. She underwent capsulotomies, mastopexy, and implant replacement 3 years later. Recurrent contracture led to reoperation with additional capsulotomies and another implant exchange, this time with Mentor style 1600 saline implants (Mentor Corp., Santa Barbara, Calif.), 425 cc with fill volumes of 450 cc. Six months after that, a capsular flap procedure was performed, with temporary success. She presented with gross rippling of the left breast and severe atrophy of the periprosthetic tissues.

The left breast was revised with expansion capsulotomies and AlloDerm grafts on the anterior capsule. This provided encouraging results but not a total correction, so it was elected to place additional grafts 6 months later. The original grafts were inspected grossly and biopsy samples were taken. The grafts appeared to be completely intact, with no signs of volume loss or fibrosis. The appearance was reminiscent of a patch on a bicycle tire's inner tube. Results were stable clinically at 6 months after the second grafting procedure.

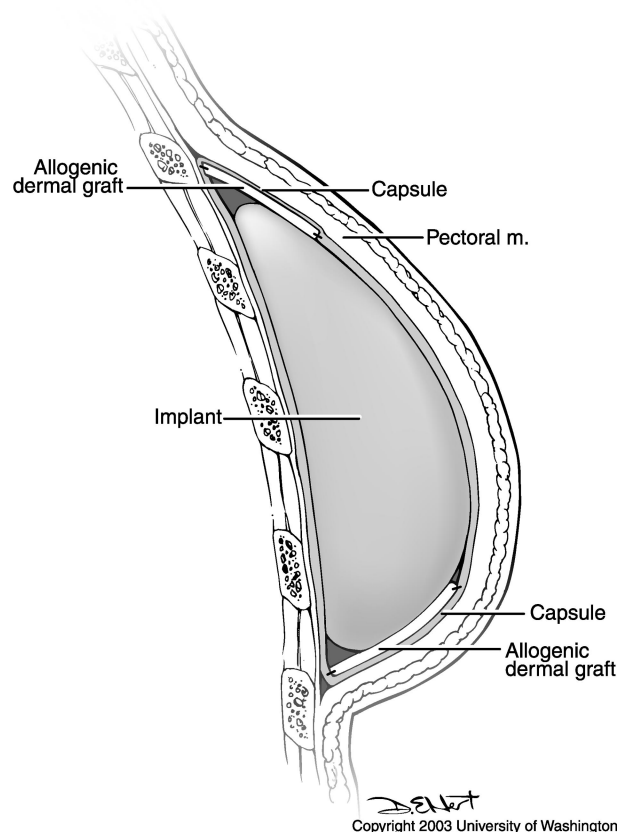


FIG. 1. Placement of the AlloDerm grafts. The point of fixation of the edge of the graft to the chest wall is critical for correction of symmastia, bottoming out, or implant malposition. Grafts may also be affixed to the anterior capsule.

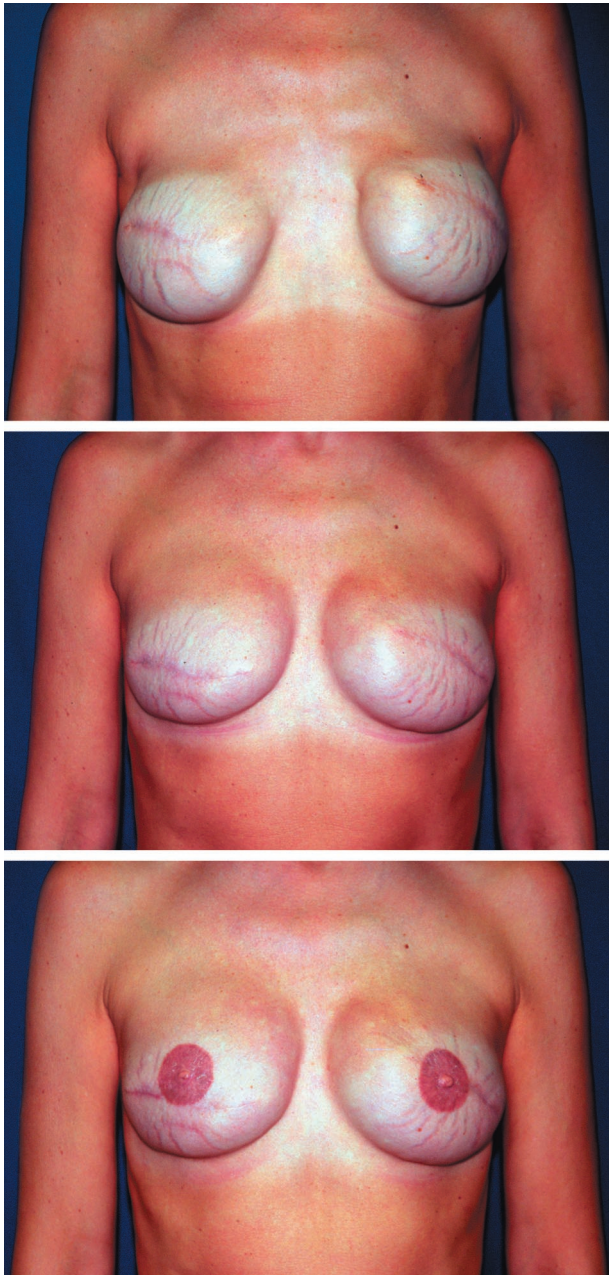


FIG. 2. (Above) Implant malposition after bilateral mastectomies and reconstruction with tissue expansion and saline implants. (Center) Six months after implant exchange, repositioning with capsulotomies, and placement of four 2×4 -cm AlloDerm grafts on each side. (Below) View of patient at 18-month follow-up with interim nipple-areola reconstruction.

The biopsy results confirmed complete viability of the grafts. Hematoxylin and eosin staining demonstrated organized collagen fibers and vascular ingrowth (Fig. 6, *above*). Specific cell populations can be evaluated with immunohistochemistry stains. The vimentin stain showed active fibroblasts and vascular smooth muscle (Fig. 6, *center*). A marker for vascular endothelium, the CD34 stain, provided additional evidence of vascular ingrowth (Fig. 6, *below*). No areas of scarring or inflammation were seen in any of the sections.

DISCUSSION

Periprosthetic atrophy may be replacing capsular contracture as the primary adverse sequela of breast implant surgery. Thinning of pericapsular subcutaneous fat, along with minimal capsular scar formation, manifests a vari-

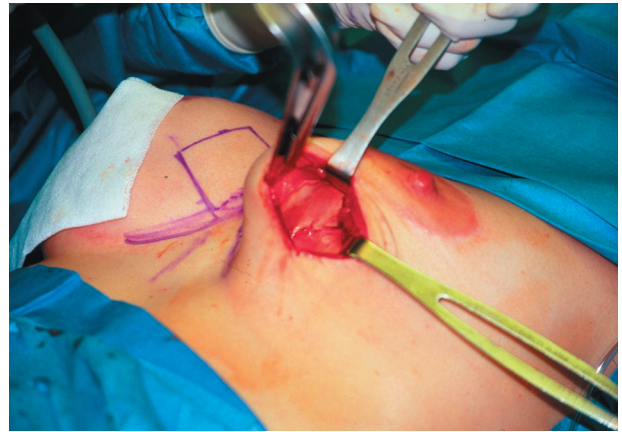


FIG. 3. Intraoperative view shows placement of the graft for symmastia repair.

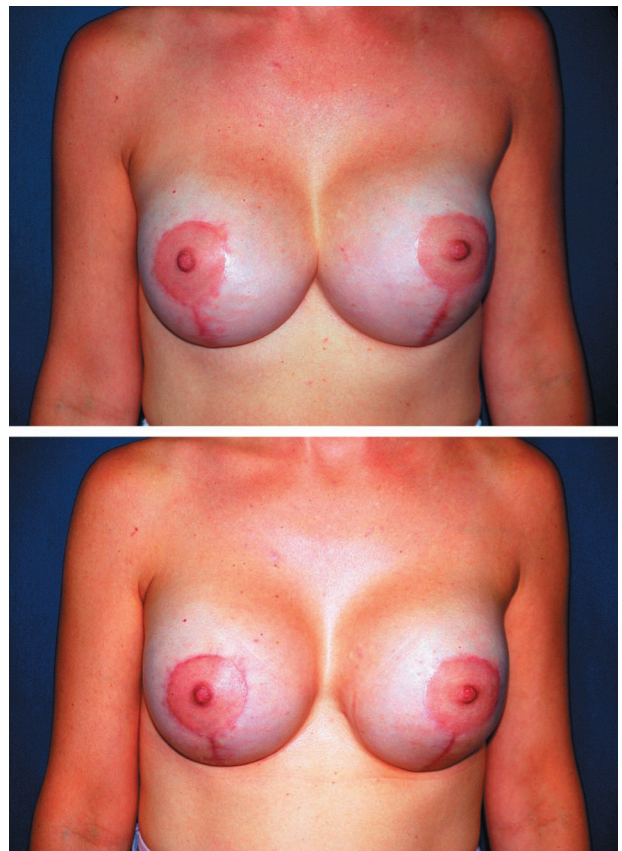


FIG. 4. (Above) Symmastia following bilateral submuscular augmentation with saline implants and vertical mastopexy. (Below) Three-month follow-up view shows stable repair with AlloDerm grafts.



FIG. 5. (Above) Severe capsular atrophy and contracture of the left breast following multiple prior procedures. Note the visible ripple beneath the areola. (Below) View of patient 1 year after mastopexy revision, onlay grafting to the anterior capsule, and 6 months after additional grafting. Although the shape is not ideal, the visible rippling has been completely corrected and the match to the opposite breast is improved.

ety of implant features that would otherwise be less apparent. Rippling, often an inherent feature of saline implants (though sometimes mislabeled a “complication”) is more obvious through a thin soft-tissue envelope. Inadequate scar encapsulation may contribute to implant migration or bottoming out. Tissue expansion almost always results in some degree of thinning of the overlying tissues and, in rare cases, exposure of the expander even with submuscular placement. Symmastia may follow overzealous release of the medial origin of the pectoral muscle, which allows medial displacement where there is deficient scar encapsulation.

Options for capsule reinforcement are few. Replacing saline implants with silicone gel prostheses may help in some cases by improving implant feel rather than providing better support, but this option is not always available

or desired by the patient. Muscle flap procedures carry significant donor-site morbidity and are generally not appropriate for aesthetic cases. Capsular flaps may be helpful in some cases,⁹ but patients with already atrophic scar capsules are unlikely to have adequate tissue available. In addition, it is desirable to avoid additional operations that involve extensive dissection, because a history of multiple prior

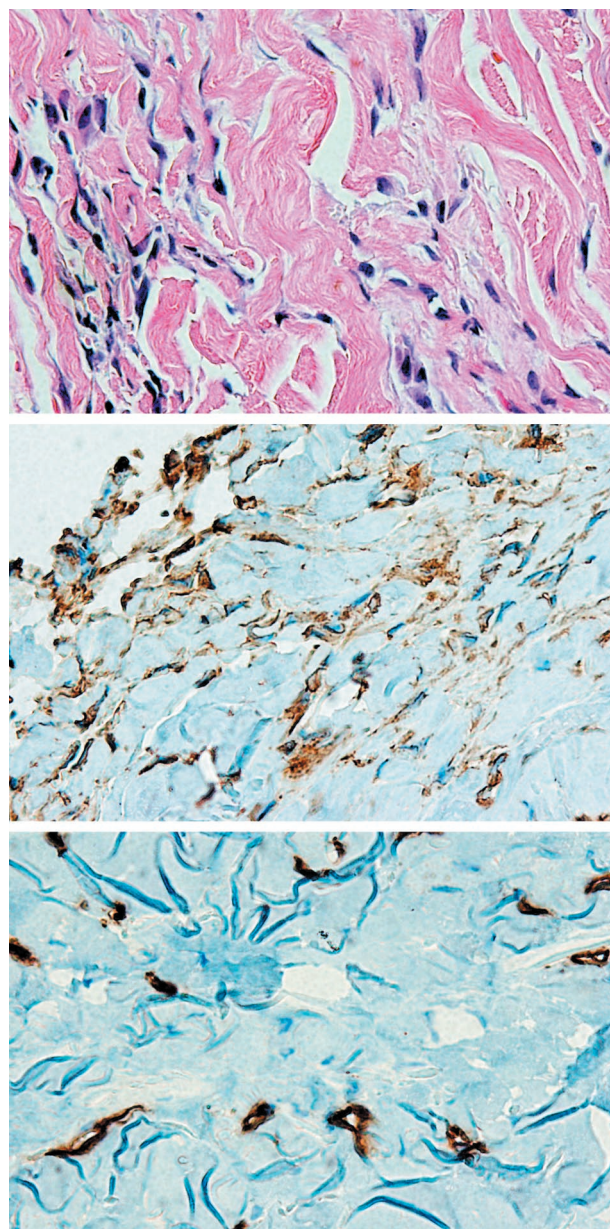


FIG. 6. (Above) Hematoxylin and eosin stain of onlay intracapsular AlloDerm graft 6 months after placement. Note organized collagen structure. (Center) Vimentin stain reveals an active population of fibroblasts. (Below) The CD34 stain marks the vascular endothelium, illustrating vascular ingrowth.

procedures appears to be a common feature in these patients.

The addition of durable, nonreactive graft material that can be placed with minimal surgical trauma is the goal for these difficult cases. Allogenic dermal grafts have been used in a variety of applications and provide a viable option for capsular reinforcement. Early vascular ingrowth and graft survival have been documented in a rabbit model,¹⁰ and clinically stable results have been reported in soft-tissue facial augmentation.¹¹ Correction of implant rippling with AlloDerm has previously been reported,¹² but the histologic fate of onlay capsular grafts has not previously been verified.

Placement of the grafts in an onlay fashion minimizes the extent of dissection required. One possible factor contributing to periprosthetic atrophy is a history of multiple prior procedures, and the additional dissection that would be required to "sandwich" the graft between two layers of vascularized tissue might be counterproductive. This material was originally developed for application as an onlay graft, and the histologic analysis indicates that it becomes vascularized from the capsular surface.

Although it has not been observed clinically, concerns about the possibility of graft necrosis leading to fibrosis and capsular contracture have probably hindered enthusiasm for periprosthetic grafting. However, no graft-related problems were encountered in this small series. The two cases with relapse are likely attributable to insufficient graft size and/or fixation. Further experience will help define guidelines for use of allogenic dermal grafts.

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