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IDEAS AND INNOVATIONS

Breast

Managing Postoperative Infection following Breast Reconstruction with the Sientra AlloX2 Tissue Expander

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Background: Implant-based breast reconstruction is the most common reconstructive modality in the United States. Significant advances in surgical technique and technology have resulted in improvement of clinical outcomes. A recent innovation has been the introduction of a tissue expander with an integral drain that permits access to the periprosthetic space. A new use for this drain port is presented in patients with postoperative surgical-site infection.

Methods: Patients who underwent staged implant-based breast reconstruction with the Sientra AlloX2 tissue expander and experienced postoperative infection that warranted inpatient management with intravenous antibiotics were included in the study. The integral drain port was used in these patients to perform washout of the periprosthetic space at the bedside. The ability to salvage the tissue expander in the setting of infection without the need for surgical revision in the operating room was determined.

Results: Of 31 patients who underwent a total of 52 staged breast reconstructions with the Sientra AlloX2 tissue expander, 3 patients (8.7%) with a mean age of 50.3 years (range, 34–76 years) and mean body mass index of 23.3 kg/m^2 (range, 22.3–24.1 kg/m^2) met inclusion criteria. Salvage of the device with successful progression through expansion and eventual expander-implant exchange was achieved in 2 patients. One patient failed the salvage attempt and required removal of the device.

Conclusion: Using the integral drain port of the AlloX2 tissue expander has the potential for device salvage in a subset of patients with surgical-site infection without the need for surgical revision. *(Plast Reconstr Surg Glob Open 2018;6:e2046; doi: 10.1097/GOX.0000000000002046; Published online 17 December 2018.)*

Breast cancer is the most common cancer in women in the United States with over 260,000 new cases of invasive cancer being anticipated in 2018 alone.[1] A subset of these patients undergo mastectomy with reconstruction. Encouragingly, the number of breast reconstructions in the United States has increased by almost 40% since 2000 with staged implant-based reconstruction being the most popular method.[2,3] Undoubtedly, implant-based reconstruction has numerous advantages including short operative time, lack of donor-site morbidity, patient participation and input regarding final breast volume that is independent of donor-site constraints, as well as predictability of outcome.[4,5] Additionally, with the advent of prepectoral reconstruction postoperative pain is minimized, animation deformity effectively prevented, and chest wall morbidity reduced.[6–10]

In addition to advances in surgical technique, the quality and predictability of implant-based reconstruction has improved secondary to the introduction of innovative technology, for example, fluorescence-angiography and acellular dermal matrices (ADMs).[11–15] Although the majority of technological innovations in recent years have focused on adjuncts surrounding the expansion process, such as various modalities for perfusion assessment and novel fat grafting systems,[11,16,17] a recently introduced tissue expander holds promise for addressing a particularly troubling problem following implant-based breast

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reconstruction, that is, postoperative seroma. The Sientra AlloX2 tissue expander that received 510k clearance in October 2014 has an integral drain that permits access to the periprosthetic space, thus, allowing aspiration of fluid after drains have been removed[18] (Fig. 1).

Here, a novel use of this drain port is introduced, which has permitted device salvage in the setting of postoperative infection.

PATIENTS AND METHODS

Patients who underwent staged prepectoral implant-based breast reconstruction with the Sientra AlloX2 tissue expander and who experienced postoperative surgical-site infection (Fig. 2) that warranted inpatient management with intravenous antibiotics were included in the study. Parameters recorded included patient age, body mass index (BMI), smoking history, history of radiotherapy, length of hospital stay, culture results, tissue expander size, initial (intraoperative) tissue expander fill, and implant size following expander-implant exchange. In addition to infection, we documented the occurrence of other postoperative complications, specifically the occurrence of mastectomy skin necrosis, need for surgical revision, and loss of reconstruction.

The ability to salvage the tissue expander in the setting of infection without the need for surgical revision in the operating room was determined. Patients in whom no resolution of infectious symptoms was noted following 24 hours of intravenous antibiotics were considered for intervention. The study endpoint was successful expander-implant exchange or surgical revision in the operating room for the purpose of expander removal.

Technique of Intervention

Although the integral drain in the AlloX2 tissue expander was designed for the purpose of fluid/seroma aspiration, it was used in this study for access to the periprosthetic space for the purpose of irrigation and washout.

Following prepping the injection site in sterile fashion, the drain port was accessed, fluid aspirated, and sent for culture (Fig. 3). Next, the needle/tubing system was changed and the drain port flushed with diluted betadine solution, thus, irrigating the periprosthetic space. The fluid was then aspirated and repeatedly flushed with sterile saline solution until the aspirate was clear (Fig. 4; **see video, Supplemental Digital Content 1**, which displays irrigation and washout of the periprosthetic space with sterile saline, ***http://links.lww.com/PRSGO/A940***).

RESULTS

Thirty-one patients underwent 52 staged implant-based breast reconstructions using the Sientra AlloX2 tissue expander. Of these, 3 patients (8.7 %) with a mean age of 50.3 years (range, 34–76 years) and mean BMI of 23.3 kg/m^2 (range, 22.3–24.1 kg/m^2) developed a postoperative infection that warranted inpatient management with intravenous antibiotics. All patients had undergone prepectoral breast reconstruction with anterior ADM coverage (AlloDerm) using the inferior-cuff technique. Two patients developed small areas of mastectomy skin necrosis and were treated with excision and closure in the office. Of note, 1 of the 2 patients with mastectomy skin necrosis admitted to not having discontinued smoking perioperatively. None of the patients had a history of radiotherapy. A textured tissue expander with a base width of 12 cm was used in all 3 patients. Intraoperative fill ranged from 0 to 250 cc of air (Table 1). Air to saline exchange was performed at the first clinic visit.

Aspiration via the drain port of the AlloX2 tissue expander revealed the presence of turbid fluid in all 3 cases. Daily washout at the bedside was performed until the infectious symptoms resolved and the initial aspirate was clear. Patients were discharged after 3–5 days (Table 1).

Salvage of the reconstruction with successful progression through expansion and eventual expander-implant exchange was achieved in 2 patients. Of note, coagulase-negative staphylococci were isolated in these patients. One patient developed recurrent signs of infection and required explanation of the device. The isolate in this patient was *Proteus mirabilis*.

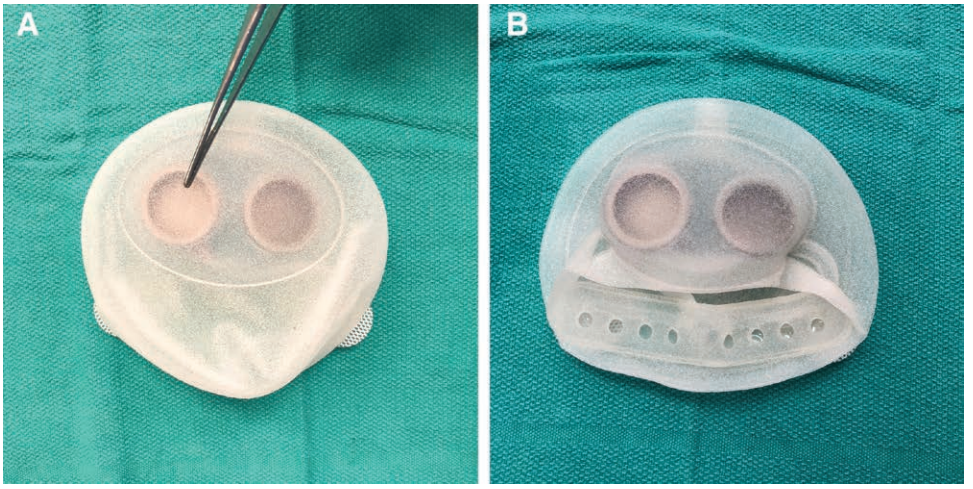


Fig. 1. Sientra AlloX2 tissue expander. A, Forceps pointing to the drain port. B, Deflated tissue expander with visible drain along inferior aspect of device.

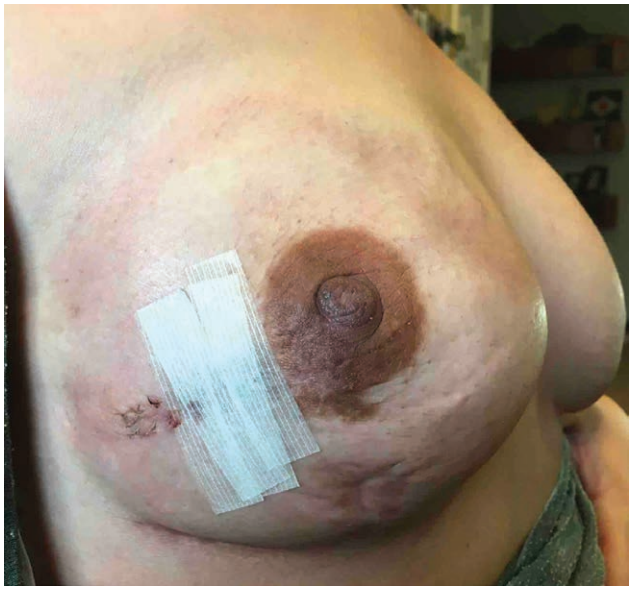


Fig. 2. Thirty-four-year-old woman with right breast cellulitis following bilateral nipple-sparing mastectomy with immediate prepectoral reconstruction with tissue expander and ADM.

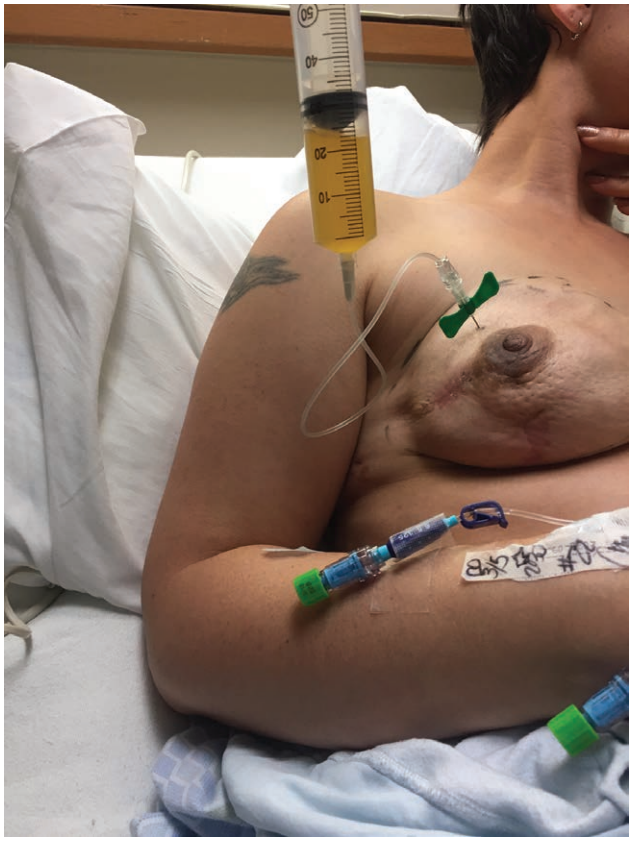


Fig. 3. Aspiration of periprosthetic fluid via the integral drain port of the AlloX2 tissue expander.

DISCUSSION

Postoperative seroma and infection remain challenges in patients undergoing implant-based breast reconstruction. Seroma is particularly troublesome in cases in which ADM is used as it prevents successful incorporation of the biologic. Here, the integral drain of the AlloX2 tissue expander provides easy access to the periprosthetic space, thus allowing aspiration of fluid following drain removal.[18] Although the concept of adding a drain to a tissue expander is quite elegant, one may argue that the risk of seroma formation can be easily reduced by implementing rigid criteria for removal of surgical drains. Hence, the author cautions against overstating the benefits of the drain port as it pertains to seroma prevention.[19]

The value of the integral drain, however, is that it allows accessibility to the periprosthetic space at all times. This is invaluable in the case of postoperative infections, as it allows diagnostic aspiration of periprosthetic fluid, thus allowing cultures to be obtained and targeted antibiotic therapy to be initiated without the need for more invasive interventions. Additionally, the integral drain permits washout of the periprosthetic space at the bedside,

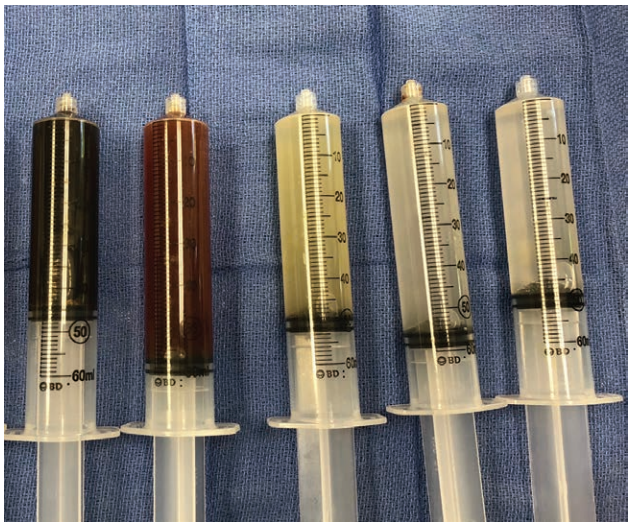
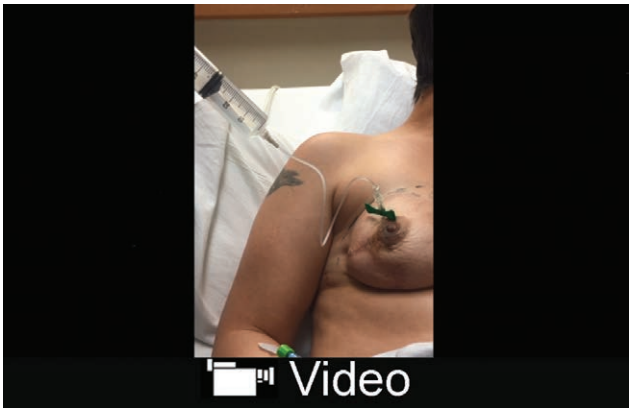


Fig. 4. Appearance of periprosthetic space aspirate following initial irrigation with diluted betadine solution and repeated washout with sterile saline until aspirate was clear.



Video Graphic 1. See video, Supplemental Digital Content 1, which displays irrigation and washout of the periprosthetic space with sterile saline, ***http://links.lww.com/PRSGO/A940***.

Table 1. Patient Demographics

Parameter	Patient 1	Patient 2	Patient 3
Age (in years)	34	41	76
BMI (in kg/m^2)	24.1	22.3	23.4
Tobacco	Yes	No	No
History of radiotherapy	No	No	No
Tissue expander width (cm)	12	12	12
Intraoperative fill (cc)	250 (air)	50 (air)	0
Length of stay (d)	4	3	5
Final implant volume (cc)	360	345	Loss of reconstruction

thus avoiding the need for surgical revision in the operating room. Although bedside washout will not successfully address all cases of postoperative infection, this intervention holds promise to being a minimally invasive approach to implant salvage in a subset of patients who develop postoperative surgical-site infection following expander insertion. In this study, patients who did not experience resolution of infectious symptoms following initiation of intravenous antibiotic therapy were treated with bedside washout via the integral drain. The device was thus salvaged in 2 of 3 patients. It is important to note that all 3 patients would have undergone open washout in the operating room without percutaneous access to the periprosthetic space. Hence, management in the operating room was successfully averted in 2 patients. Certainly, no definitive conclusions can be drawn in light of the small sample size, but the favorable impact this approach can have on some patients is noteworthy.

Interestingly, our observation of recurrent infection with eventual loss of reconstruction in a patient with *P. mirabilis* echoes the report of Spear and Seruya[20] who identified the presence of Gram-negative rods as a relative contraindication to device salvage.

We cannot comment on how this approach compares with traditional salvage maneuvers, that is, open washout in the operating room, nor can we identify the patient population that will most likely benefit from this approach. Hence, future studies are mandatory to identify where this approach falls in the treatment algorithm of patients who present with surgical-site infection following tissue expander placement.

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