Prophylactic Drain Use in Breast Expander–to-Implant Exchange: Necessity or Nuisance?

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Background: Although drain placement is widely used during the tissue expander (TE) stage of implant-based breast reconstruction, it is unclear whether surgical drains are necessary at the TE-to-implant exchange stage. The authors sought to define clinical scenarios in which drains should and should not be used.

Methods: The authors retrospectively analyzed breast TE-to-implant exchanges performed from 2018 to 2023 and compared complication rates between patients treated with and without drains. Patient demographic, disease, treatment, and outcome data were recorded. Propensity score matching was used to mitigate selection bias. Multivariable binary logistic regression identified significant predictors of complications.

Results: In unmatched comparisons, rates of overall complications, implant exposure, and implant explantation were significantly higher in the drain group compared with the no-drain group (12% versus 4.7%, 2.5% versus 0.3%, and 8.5% versus 2.6%, respectively; $P < 0.05$). This was particularly evident in the prepectoral plane, where overall complication (11% versus 4.3%; $P = 0.014$), implant exposure (2.2% versus 0%; $P = 0.047$), and implant explantation (6.7% versus 2.2%; $P = 0.041$) rates were significantly higher with drains. However, propensity score–matched comparisons, stratification by concomitant ancillary procedures, and multivariable logistic regression showed that drain placement was neither predictive of nor protective against postoperative complications.

Conclusions: Surgical drains do not protect against adverse outcomes in the second stage of implant-based breast reconstruction, even with ancillary procedures, and may contribute to higher complication rates, particularly in the prepectoral plane. However, patients with a heavy dissection burden, extensive capsular manipulation or resection, or comorbidities may benefit from drain placement. *(Plast. Reconstr. Surg.* 156: 702, 2025.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, III.

Staged implant-based breast reconstruction (IBBR) involves 2 stages: the placement of a tissue expander (TE) and serial expansion (stage 1), and eventual exchange of the TE for an implant once the desired volume is achieved (stage 2). Although generally considered less complex than autologous breast reconstruction, this approach carries a considerable risk of complications such as seromas, hematomas, periprosthetic infection, skin flap necrosis, wound dehiscence, and implant exposure.[1,2] In addition, postmastectomy radiation therapy, which is becoming more common, exacerbates the risk of these complications, potentially leading to reconstructive failure.[3]

Postoperative surgical drains are commonly placed during breast reconstruction. Drains associated with TE placement have several functions: (1) they reduce seroma development by providing an egress route for fluid[4]; (2) the negative pressure generated by the bulb reservoir encourages healing of dissection planes; and (3) through

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functions 1 and 2, drains contribute to a better-defined implant pocket. However, despite their beneficial effects, drains have many negative attributes: they are uncomfortable and frequently painful, require additional care by the patient or caregiver, represent an additional cost,[7] are burdensome, limit clothing choices, and may contribute to device infections.[5] Although the use of drains is generally considered standard-of-care during the TE stage of IBBR, there is no consensus on their utility in the implant stage.[6,7]

In this study, we explored the outcomes of patients who underwent the second stage of IBBR with and without drain placement. We sought to identify best practices for drain use through subgroup, propensity score–matched, and multivariable regression analyses.

PATIENTS AND METHODS

Study Population

This retrospective cohort study included patients at a single, quaternary cancer center who underwent a TE-to-implant exchange during the second stage of IBBR, with or without surgical drain placement, from 2018 to 2023. We included the patients of 9 plastic surgeons with a minimum of 1 month of follow-up and excluded cases involving TE-to-TE exchanges, implant-to-implant exchanges, TE explantation without implant placement, and latissimus dorsi muscle flap reconstruction performed during the first or second stage of IBBR.

Detailed patient profiles were extracted from prospectively maintained electronic medical records, including demographics, comorbidities, breast cancer characteristics, chemotherapy and radiation therapy treatments, operative details, and postoperative outcomes. A 5-item modified frailty index score was calculated per patient, which accounted for diabetes, hypertension, congestive heart failure within 1 month of surgery, chronic obstructive lung disease, and preoperative partial or total physical dependency.[8] The operative data included both stage 1 (mastectomy type, lymph node dissection, plane of TE placement, and use of acellular dermal matrix [ADM]) and stage 2 (final TE volume; implant volume; site of exchange incision; and additional procedures such as fat grafting, capsulectomy or capsulorrhaphy, placement of a new ADM, débridement, chest wall repair, mastopexy, or change of plane) IBBR details. In assessing reconstructive outcomes, we evaluated postoperative infection (defined as erythema requiring antibiotics, abscess drainage, or immediate implant removal), seroma, hematoma, wound dehiscence (defined as a skin edge separation >1 mm requiring dressing changes or surgical revision), implant exposure, implant rupture or deflation, and implant explantation (including the reasons for explantation).

Statistical Analysis

Categorical variables were represented as percentages and compared using chi-square or Fisher exact tests as appropriate. Continuous variables were assessed for normality and presented as medians and interquartile ranges, with comparisons made using the Wilcoxon rank sum test. Missing data were imputed using a single-layer neural network model per variable. Genetic propensity score matching with a 1 to 2 drains-to–no-drains ratio, set at a caliper of 20% of the SD of the logits of the propensity scores without replacement, was used to mitigate selection bias and enhance comparability between the drain and no-drain groups. Propensity scores for placing a drain were calculated using logistic regression, including all baseline variables: follow-up time, age, race, BMI, smoking history, medical comorbidities, history of mammaplasty, mastectomy type, lymph node dissection, duration of TE placement preexchange, neoadjuvant/adjuvant therapies, TE plane, acellular dermal matrix use, preexchange TE volume, implant volume, and type of incision. (**See Figure, Supplemental Digital Content 1**, which shows a jitter plot visualizing the distribution of matched and unmatched treatments [drain use] and controls [no drains used], ***https://links.lww.com/PRS/I24***.) The balance of baseline factors between matched pairs was assessed using standardized differences.

Multivariable binary logistic regression of the unmatched cohort was used to identify significant predictors of post-TE–to-implant exchange complications. All baseline demographic, medical, and surgical variables were assessed for inclusion in the multivariable regression models by means of univariate logistic regression in a foreword selection manner, whereby a value of P less than 0.1 prompted their inclusion.

A value of P less than 0.05 was considered statistically significant. Formal statistical analysis was conducted using R-studio (version 2024.04.2) and Jamovi statistical software (version 2.3.21).[9,10] The study received approval from the Institutional Review Board at The University of Texas MD Anderson Cancer Center and is reported according

to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.[11]

RESULTS

Baseline Characteristics

Our study included 343 patients who underwent 502 TE-to-implant exchanges: 118 (24%) with drains and 384 (76%) without drains. (**See Table, Supplemental Digital Content 2**, which shows baseline characteristics of propensity score–unmatched and –matched cohorts by drain use, ***https://links.lww.com/PRS/I25***.) The median follow-up was 20 months (interquartile range [IQR], 11 to 31 months) for the drain group and 13 months (IQR, 4 to 29 months) for the no-drain group ($P < 0.001$). Other significant differences between the drain and no-drain cohorts, respectively, included tobacco use (3.4% versus 0.5%; $P = 0.017$), hypothyroidism (5.1% versus 12%; $P = 0.032$), plane of TE placement (21.7% of prepectoral versus 32.9% of subpectoral implants had drains; $P = 0.028$), use of acellular dermal matrices in stage 1 IBBR (82% versus 90%; $P = 0.029$), additional procedures during stage 2 of IBBR (78% versus 41%; $P < 0.001$), and fat grafting during stage 2 of IBBR (27% versus 72%; $P < 0.001$), as shown in Table 1. Frailty (67% versus 72% scoring 0; $P = 0.061$) and prior chemotherapy (81% versus 73%; $P = 0.072$) trended toward

Table 1. Surgical Characteristics of Propensity Score–Unmatched and Propensity Score–Matched Cohorts by Drain Use in Stage 1 and 2 of IBBR[a,b]

	Unmatched			Matched		
Characteristic	**Drain (%)**	**No-Drain (%)**	***P***	**Drain (%)**	**No-Drain (%)**	***P***
No.	118 (24)	384 (76)		81 (33)	162 (67)	*P*
Stage 1 of IBBR						
Mastectomy[1]			0.16			0.2
Total	4 (3.4)	5 (1.3)		3 (3.7)	1 (0.6)	
Skin-sparing	84 (71)	280 (73)		60 (74)	126 (78)	
Nipple-sparing	29 (25)	97 (25)		18 (22)	34 (21)	
Segmental	1 (0.8)	0 (0)		0 (0)	0 (0)	
Lymph node dissection[2]	16 (14)	46 (12)	0.68	12 (15)	19 (12)	0.52
Plane of TE placement[3]			0.028[c]			0.59
Prepectoral	90 (77)	325 (86)		66 (82)	138 (85)	
Subpectoral	27 (23)	55 (14)		14 (18)	24 (15)	
ADM with TE[4]	97 (82)	340 (90)	0.029[c]	70 (86)	142 (88)	0.79
Stage 2 of IBBR						
Time from stage 1, days[5]			0.47			0.53
Median	141	147		133	148	
IQR	106–224	112–220		105–226	112–210	
TE preexchange volume, cc[6]			0.52			0.97
Median	425	425		400	428	
IQR	350–575	350–550		324–556	325–548	
Implant volume, cc			0.65			0.92
Median	510	495		480	490	
IQR	415–685	405–630		405–650	400–605	
Exchange incision			0.46			>0.99
Mastectomy scar	89 (75)	302 (79)		60 (74)	120 (74)	
Remote	29 (25)	82 (21)		21 (26)	42 (26)	
Concomitant ancillary procedures	48 (41)	298 (78)	<0.001[c]	40 (49)	82 (51)	0.86
Fat grafting	32 (27)	275 (72)	<0.001[c]	31 (38)	65 (40)	0.78
Capsulectomy	11 (9.3)	27 (7.0)	0.41	8 (9.9)	13 (8.0)	0.63
New ADM with implant	4 (3.4)	3 (0.8)	0.056	1 (1.2)	0 (0)	0.33
Débridement	3 (2.5)	3 (0.8)	0.15	1 (1.2)	1 (0.6)	>0.99
Complex repair of chest wall	2 (1.7)	5 (1.3)	0.67	2 (2.5)	4 (2.5)	>0.99
Mastopexy	1 (0.8)	3 (0.8)	>0.99	1 (1.2)	2 (1.2)	>0.99
Delayed insertion of implant	0 (0)	3 (0.8)	>0.99	0 (0)	0 (0)	—

[a]Unknown values in unmatched population: [1]$n = 2$; [2]$n = 4$; [3]$n = 5$; [4]$n = 5$; [5]$n = 2$; and [6]$n = 9$.
[b]Unknown values in matched population: [1]$n = 1$; [2]$n = 2$; [3]$n = 1$; [4]$n = 0$; [5]$n = 0$; and [6]$n = 1$.
[c]Statistically significant.

but did not attain statistical significance. No significant differences were found in race, age, BMI, breast cancer type, mastectomy type, lymph node dissection, radiation history, and prior mammaplasty between the 2 groups.

After propensity score matching, 81 TE-to-implant exchanges with drains (33%) were compared with 162 exchanges without drains (67%). All characteristics had a standardized mean difference of less than or equal to 11%, indicating adequate balance between the groups. (**See Figure, Supplemental Digital Content 3**, which shows summary of absolute standardized mean differences between patients with drains and without drains in the propensity score–matched cohort [*black dots*] versus original patient cohort [*white dots*]. *CT*, chemotherapy; *RT*, radiotherapy, ***https://links.lww.com/PRS/I26***.) After matching, all previously significant differences in baseline characteristics between the drain and the no-drain groups, respectively, were rendered insignificant, including median follow-up time (20 months [IQR, 11 to 29 months] versus 14 months [IQR, 5 to 32 months]; $P = 0.15$), tobacco use (0% versus 1.2%, $p = 0.49$), plane of expansion (32.4% of prepectoral versus 36.8% of subpectoral implants had drains; $P = 0.59$), use of ADM in stage 1 of IBBR (86% versus 88%; $P = 0.79$), additional procedures during stage 2 of IBBR (51% versus 49%; $P = 0.86$), and fat grafting during stage 2 of IBBR (38% versus 40%; $P = 0.78$), as shown in Table 1.

Outcomes of Stage 2 of IBBR with Drains versus No Drains

In unmatched comparisons, the overall complication rate was significantly higher in the drain group (12%) compared with the no-drain group (4.7%; $P = 0.005$) (Table 2). Implant exposure was also significantly more frequent in the drain group (2.5%) compared with the no-drain group (0.3%; $P = 0.042$), as was the need for implant explantations (8.5% versus 2.6%, respectively; $P = 0.012$). Although infections and wound dehiscence were more common in the drain group, these differences did not reach statistical significance. After propensity score matching, overall complications (8.6% versus 5.6%; $P = 0.36$), implant exposure (3.7% versus 0.6%; $P = 0.11$), and explantation rates (4.9% versus 3.1%; $P = 0.49$) remained higher in the drain group but no longer reached statistical significance.

Table 2. Postoperative Outcomes of Stage 2 IBBR by Drain Use in Propensity Score–Unmatched and Propensity Score–Matched Cohorts[a]

	Unmatched			Matched		
Characteristic	**Drain (%)**	**No-Drain (%)**	***P***	**Drain (%)**	**No-Drain (%)**	***P***
No.	118 (24)	384 (76)		81 (24)	162 (76)	
Postoperative hospital stay, days			0.11			0.32
0	107 (91)	363 (95)		73 (90)	151 (93)	
1	9 (7.6)	17 (4.4)		6 (7.4)	10 (6.2)	
2	0 (0)	2 (0.5)		0 (0)	0 (0)	
3	1 (0.8)	0 (0)		1 (1.2)	0 (0)	
4	0 (0)	2 (0.5)		0 (0)	1 (0.6)	
7	1 (0.8)	0 (0)		1 (1.2)	0 (0)	
Any complications	14 (12)	18 (4.7)	0.005[b]	7 (8.6)	9 (5.6)	0.36
Infection	5 (4.2)	9 (2.3)	0.33	2 (2.5)	4 (2.5)	>0.99
Seroma	3 (2.5)	5 (1.3)	0.4	1 (1.2)	2 (1.2)	>0.99
Hematoma	0 (0)	1 (0.3)	>0.99	0 (0)	1 (0.6)	>0.99
Exchange wound dehiscence	2 (1.7)	4 (1.0)	0.63	1 (1.2)	2 (1.2)	>0.99
Implant exposure	3 (2.5)	1 (0.3)	0.042[b]	3 (3.7)	1 (0.6)	0.11
Implant rupture	1 (0.8)	0 (0)	0.24	0 (0)	0 (0)	—
Skin flap necrosis	0 (0)	0 (0)	—	0 (0)	0 (0)	—
Explantation	10 (8.5)	10 (2.6)	0.012[b]	4 (4.9)	5 (3.1)	0.49
Reason for explantation			>0.99			0.36
Infection	3 (38)	3 (33)		1 (20)	1 (33)	
Implant exposure	1 (12)	1 (11)		1 (20)	1 (33)	
Implant rupture	0 (0)	1 (11)		0 (0)	0 (0)	
Pursuing autologous reconstruction	4 (50)	3 (33)		3 (60)	0 (0)	
Other (patient preference, neuropathy)	0 (0)	1 (11)		0 (0)	1 (33)	

[a]Values are no. (%) unless otherwise indicated.
[b]Statistically significant.

In unmatched subgroup comparisons, analysis based on the plane of implant placement revealed that in the prepectoral plane, overall complications (11% versus 4.3%; $P = 0.014$), implant exposure rates (2.2% versus 0%; $P = 0.047$), and implant explantations (6.7% versus 2.2%; $P = 0.041$) were significantly higher with drain use (Table 2). However, statistical significance was lost after propensity score matching.

Subgroup Analysis of Patients Who Had Concomitant Ancillary Procedures

Among patients undergoing further procedures during stage 2 of IBBR, overall complication rates (8.3% versus 4.7%; $P = 0.29$) and explantation rates (6.2% versus 2.7%; $P = 0.19$) were higher in the group with drains. However, these differences were not statistically significant (Table 3). When stratified by the plane of expansion, a similar trend was observed in prepectoral expansion (Fig. 1). In contrast, in subpectoral expansions, the drain group had fewer complications than the no-drain group (0% versus 4.2%; $P > 0.99$), but the difference was statistically insignificant.

Multivariable Binary Logistic Regression of Outcomes in Stage 2 of IBBR

Adjuvant radiation (adjusted odds ratio [aOR], 4.7; 95% CI, 1.7 to 13.4; $P = 0.003$) and débridement (aOR, 8.4; 95% CI, 1.3 to 56.3; $P = 0.028$) were significant predictors of overall complications (Table 4). Similarly, adjuvant radiation therapy was an independent predictor of infection (aOR, 5.4; 95% CI, 1.2 to 23.3; $P = 0.025$). Significant predictors of seroma formation were concomitant débridement (aOR, 13.7, 95% CI, 1.2 to 156.3; $P = 0.035$) and mastopexy (aOR, 33.4; 95% CI, 2.5 to 439.6; $P = 0.008$). In addition, adjuvant radiation therapy (aOR, 17.8; 95% CI, 1.9 to 170; $P = 0.012$) and higher BMI (aOR, 1.3; 95% CI, 1.0 to 1.6; $P = 0.026$) were independent predictors of wound dehiscence. Greater implant volume (aOR, 0.99; 95% CI, 0.98 to 0.998; $P = 0.024$) and higher BMI (aOR, 1.4; 95% CI, 1.1 to 1.9; $P = 0.011$) were statistically significantly linked to implant exposure, although the clinical significance of greater implant volume was likely negligible. Adjuvant radiation therapy was also the only independent predictor of explantation (aOR, 4.4; 95% CI, 1.3 to 15.7; $P = 0.021$). Notably, drain placement was not significantly predictive of or protective against any complications.

DISCUSSION

Surgical drains are commonly utilized with TEs in 2-stage IBBR to prevent seroma and create a well-defined pocket. In a survey-based study of members of the American Society of Plastic Surgeons and the Canadian Society of Plastic Surgery, all of the surgeons surveyed used drains during stage 1 of IBBR: 50.3% used 1 drain, 48.3% used 2, and 1.3% used more than 2 drains.[12] Plastic surgeons vary in their approach to using drains during the second stage of IBBR. While there is no clear "threshold" for this decision, some surgeons may be inclined to use them in higher-risk patients, such as smokers and those with obesity, extensive radiation, or additional procedures at the time of exchange. Our findings indicate that drains do not provide a significant advantage and should be avoided in routine practice. Our study identified that, in unmatched cohorts, the use of drains during TE-to-implant exchange was associated with significantly higher

Table 3. Subgroup Analysis of Drain Outcomes in the Case of Concomitant Ancillary Procedures during Stage 2 IBBR[a]

	Regardless of Plane			Prepectoral Plane			Subpectoral Plane		
Characteristic	Drain (%)	No-Drain (%)	*P*	Drain (%)	No-Drain (%)	*P*	Drain (%)	No-Drain (%)	*P*
No.	48 (14)	298 (86)		39 (13)	250 (87)		9 (16)	48 (84)	
Any complications	4 (8.3)	14 (4.7)	0.29	4 (10)	12 (4.8)	0.25	0 (0)	2 (4.2)	>0.99
Infection	1 (2.1)	7 (2.3)	>0.99	1 (2.6)	6 (2.4)	>0.99	0 (0)	1 (2.1)	>0.99
Seroma	1 (2.1)	4 (1.3)	0.53	1 (2.6)	3 (1.2)	0.44	0 (0)	1 (2.1)	>0.99
Hematoma	0 (0)	0 (0)	—	0 (0)	0 (0)	—	0 (0)	0 (0)	—
Exchange wound dehiscence	0 (0)	3 (1.0)	>0.99	0 (0)	3 (1.2)	>0.99	0 (0)	0 (0)	—
Implant exposure	0 (0)	0 (0)	—	0 (0)	0 (0)	—	0 (0)	0 (0)	—
Implant rupture	0 (0)	0 (0)	—	0 (0)	0 (0)	—	0 (0)	0 (0)	—
Explantation	3 (6.2)	8 (2.7)	0.19	3 (7.7)	6 (2.4)	0.11	0 (0)	2 (4.2)	>0.99

[a]Values are no. (%) unless otherwise indicated.

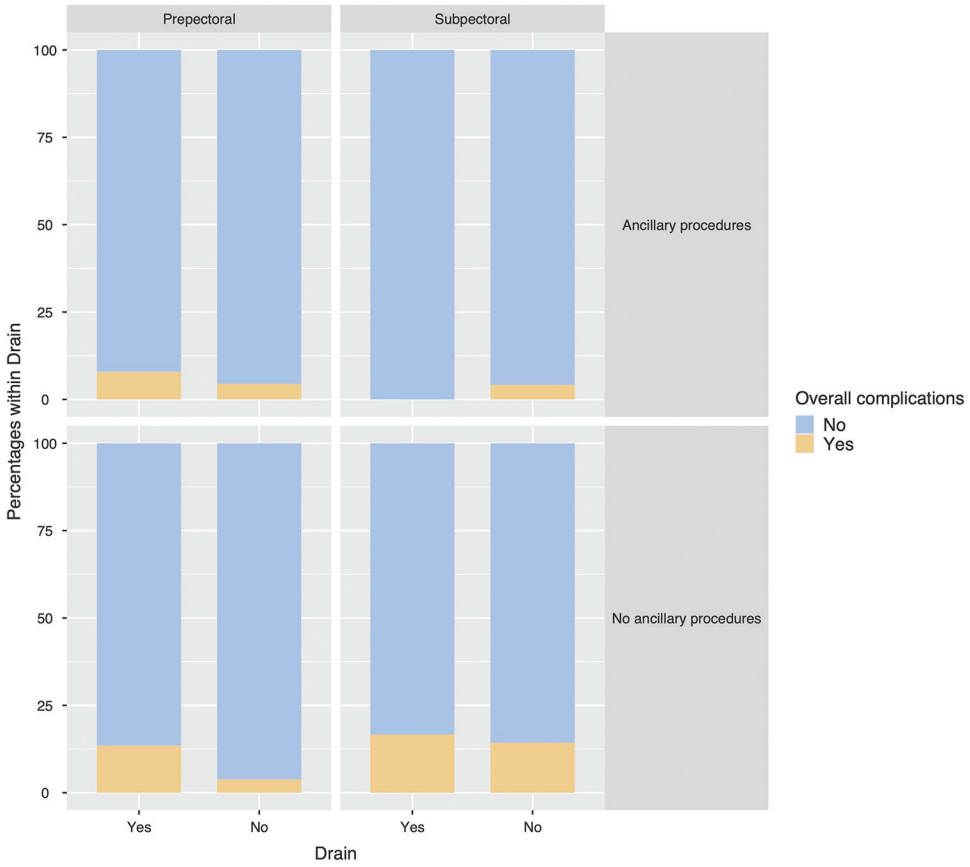

Fig. 1. Incidence of overall complications in the drain group versus the no-drain group, stratified by the expansion plane and the presence of concomitant ancillary procedures during stage 2 of implant-based breast reconstruction.

rates of overall complications, implant exposure, and implant explantations. In matched cohorts, however, drain placement was neither predictive of nor protective against postoperative complications. Subgroup analyses and multivariable binary logistic regression confirmed these findings.

In unmatched comparisons of implant planes, we found that complication rates were higher with drain use in both subpectoral and prepectoral planes, with statistical significance achieved only in the latter. This difference may be attributed to the robust soft-tissue coverage provided by the highly vascularized muscle over the subpectoral implants, which has been shown to mitigate complications.[13–15] Alternatively, the observed difference could be attributable to statistical underpowering, as the number of prepectoral implants analyzed was at least 4 times greater than that of subpectoral implants per group. Another consideration is that the shorter drain tract in prepectoral reconstruction, because of the thinner tissue, may be more susceptible to contamination compared with the longer drain tract in subpectoral reconstruction, where the thicker overlying tissue provides additional protection.

With the decline in extensive dissections and the rise in minimally invasive operations, recent studies have increasingly questioned the necessity of indwelling drains, often concluding that patients without drains experience similar or better clinical outcomes.[16–19] In the aesthetic surgery literature, drains in augmentation mammaplasty have been criticized for adding an unnecessary burden on physicians and patients and increasing the risk of infection.[20] A prospective randomized trial found that closed-suction breast drainage in breast augmentation was associated with high costs and time consumption without demonstrating postoperative benefits.[21] In addition, a retrospective study by Hadad et al. reported that drains were linked to a higher risk of infections in breast augmentation implant exchange procedures.[22] Thus, in augmentation mammaplasty, the debate is essentially settled, with surgical drains shown to be associated

Table 4. Multivariable Binary Logistic Regression of Post-Exchange Complications

Predictor	OR (95% CI)	*P*
Any complication (AUROC = 0.74, overall $P < 0.001$)		
Drain placement	2.3 (1.0–5.5)	0.056
Adjuvant radiation therapy	4.7 (1.7–13.4)	0.003
Neoadjuvant chemotherapy	1.0 (0.4–2.4)	0.947
Fat grafting	0.9 (0.4–2.2)	0.892
Débridement	8.4 (1.3–56.3)	0.028
Lymph node dissection	1.3 (0.4–3.7)	0.676
Any complication (AUROC = 0.74, overall $P < 0.001$)		
Drain placement	1.8 (0.5–5.6)	0.346
Adjuvant radiation therapy	5.4 (1.2–23.3)	0.025
Lymph node dissection	2.6 (0.6–11.2)	0.207
Mastopexy	11.2 (0.8–162.6)	0.076
Seroma (AUROC = 0.80, overall $P = 0.014$)		
Drain placement	1.1 (0.2–6.2)	0.942
Lymph node dissection	2.1 (0.3–12.8)	0.422
Débridement	13.7 (1.2–156.3)	0.035
Mastopexy	33.4 (2.5–439.6)	0.008
Mastectomy type (in reference to total)		
Skin-sparing	1.7e6 (0–∞)	0.995
Nipple-sparing	8.4e5 (0–∞)	0.995
Segmental	8.2e15 (0–∞)	0.995
Wound dehiscence (AUROC = 0.94, overall $P = 0.001$)		
Drain placement	1.1 (0.1–8.2)	0.947
BMI	1.3 (1.0–1.6)	0.026
Implant volume, cc	0.99 (0.98–1.0)	0.054
Adjuvant radiation therapy	17.8 (1.9–170.0)	0.012
Implant exposure (AUROC = 0.97, overall $P = 0.004$)		
Drain placement	6.4 (0.5–78.2)	0.145
Adjuvant radiation therapy	1.7 (0.1–23.5)	0.679
Lymph node dissection	3.4 (0.2–47.9)	0.363
Implant volume, cc	0.99 (0.98–0.998)	0.024
BMI	1.4 (1.1–1.9)	0.011
Explantation (AUROC = 0.78, overall $P < 0.001$)		
Drain placement	2.4 (0.8–7.3)	0.125
Adjuvant radiation therapy	4.4 (1.3–15.7)	0.021
Lymph node dissection	2.1 (0.6–7.6)	0.262
Prepectoral (in reference to subpectoral)	0.6 (0.2–1.7)	0.308
Fat grafting	0.7 (0.2–2.2)	0.508
Débridement	5.4 (0.7–44.6)	0.115
Mastopexy	7.4 (0.6–96.7)	0.126

AUROC, area under the receiver operating characteristic curve.

with no risk reduction, higher incidences of surgical-site infections, and unnecessarily increased costs.[20–22]

Our study suggests that drains may be similarly harmful during TE-to-implant exchange, but although the second stage of IBBR could be viewed as analogous to augmentation mammaplasty, the 2 procedures are distinct entities. In augmentation mammaplasty, the implant is placed amid physiologic breast and chest wall tissue, whereas in IBBR, the implant is placed amid expanded skin (with or without muscle) and chest wall tissue that has been traumatized during mastectomy dissections.[2]

Drains are most commonly placed to reduce the formation of a seroma, a collection of serous fluid that fills dead space and resembles either lymph or exudate.[23–25] It has been previously shown that seromas are associated with severe complications after reconstruction, including infections and device loss.[26,27] In augmentation mammaplasty, Sforza et al. identified several factors significantly associated with seroma development, including high BMI, large implant size, a submammary pocket, and smoking, with smoking being the most detrimental, as it exacerbates the effects of other variables.[28] Although these findings may support the placement of drains during TE-to-implant exchange in smokers and obese patients, our study supports the notion that drains should be placed only after a careful assessment of both patient comorbidities and, more importantly, the dissection burden, such as a debridement, change of plane, capsular manipulation, or chest wall repair.

In situations where the surgeon may prefer the use of a drain in fear of higher seroma rates, such as with obese patients and smokers, when performing concomitant débridements and/or mastopexy, or when placing a new ADM during the exchange, alternative strategies can be considered.[29] For example, fibrin glue could be used to promote plane adhesion and healing. Stable external compression, using methods such as large Tegaderm (3M, St. Paul, MN), closed incision vacuum-assisted closure, adjustable compression elastic wraps, or tight bras, can also be used to discourage tissue shearing and stabilize implants.[30,31] In addition to reducing dead space, external compression increases the interstitial hydrostatic pressure, inducing enhanced fluid absorption and reduced blood filtration through the vessels, in addition to decreased venous pooling and improved outflow, thereby reducing fluid accumulation and consequent complications.[32–34]

As with all retrospective cohort designs, our study is limited by the presence of unknown confounding variables. Nonetheless, we included the

most clinically relevant variables from the literature, in addition to using appropriate statistical methods. Our study is also subject to selection bias, because the placement of drains is largely driven by surgeon preference, with consideration of the patient's comorbidities and surgical risk factors, which we attempted to mitigate by means of propensity score–matched analyses. Surgeons who rarely use drains may only do so in high-risk cases, so the higher complication rates in these patients might reflect their elevated risk, not the drain itself. We also did not examine the number, type, or size of drains, because our participating surgeons most commonly use a single 15-French round Blake drain. Regression analysis may have been limited by the number of events per variable; however, the classic rule-of-thumb of a minimum of 10 events per variable in regression has been challenged in recent literature.[35] A fundamental limitation in assessing prosthetic breast reconstructions is the variability in the quality of mastectomy skin flaps, which is institution-specific and challenging to compare across different institutions, limiting the external validity of these comparisons. Although these limitations are inherent, our efforts to control for key variables and standardize aspects of the procedure provide a more focused assessment of the true impact of drains in the second stage of IBBR. Further prospective studies are needed to better define the specific scenarios where drains may be beneficial.

CONCLUSIONS

Surgical drains do not appear to provide a protective benefit against adverse outcomes in the second stage of IBBR. Although our findings suggest that routine or prophylactic drain use should be reevaluated, it is important to emphasize that drains may still be warranted in selected cases based on factors such as the extent of surgical dissection, capsular manipulation, prior radiation therapy, or patient-specific comorbidities. Decisions regarding drain placement should therefore be individualized, rather than routine, as our data do not support drains as a universal precautionary measure in these procedures.

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DISCLOSURE

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