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Acellular Dermal Matrix Use in Tissue Expansion Based Breast Reconstruction: An Analysis of 3,369 Patients Using the Tracking Operations and Outcomes for Plastic Surgeons Database

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Background

Use of acellular dermal matrix (ADM) has increased in tissue expansion (TE) based breast reconstruction to provide soft tissue support.

ADM leads to an even distribution of skin growth, improved positioning on the chest wall, and decreased risk of capsule formation.

However, literature has reported that ADM is associated with increased risks of seroma, infection, and implant loss.

This study aims to compare 30-day complication rates in TE with and without ADM and identify risk factors for these complications.

Methods

Tracking Operations and Outcomes for Plastic Surgeons (TOPS) is a database for voluntary submission of cases by board certified plastic surgeons, consisting of clinical and demographic data.

A retrospective analysis of the TOPS database was conducted to identify patients who underwent TE based breast reconstruction between 2017-2022.

Patients were categorized as having undergone TE alone or TE with use of ADM.

These groups were compared for rates of complications within 30 days of surgery. Multivariate analysis was utilized to assess for risk factors in tissue expansion based breast reconstruction.

Table 1. Demographic Information

	TE	TE+ADM	p
Number	1316	2053	
Age	51.0 ± 11.5	51.8 ± 11.4	0.004
BMI	27.9 ± 9.3	27.2 ± 6.9	0.057
Diabetes	47 (3.6)	84 (4.1)	0.45
Tobacco Use			
Current Smoker	71 (5.4)	86 (4.2)	0.10
Former Smoker	172 (13.1)	233 (11.3)	0.003

Results

Table 2. Complications Rates in Tissue Expansion Based Breast Reconstruction With and Without ADM Use

	TE n = 1316 (%)	TE+ADM n = 2053 (%)	P
Seroma	29 (2.2)	22 (1.1)	**0.01**
Hematoma	14 (1.1)	31 (1.5)	0.34
Wound Disruption	38 (2.9)	52 (2.5)	0.61
Surgery Site Infection	20 (1.5)	32 (1.6)	1
Implant Loss	38 (2.9)	20 (1.0)	**< 0.001**

Table 3. Multivariate Analysis of Risk Factors in Tissue Expansion Based Breast Reconstruction

	Complication				
Risk Factor	**Seroma**	**Hematoma**	**Wound Disruption**	**Surgery Site Infection**	**Implant Loss**
No ADM					
OR	2.10	0.76	1.12	1.01	2.80
95% CI	1.21 – 3.72	0.39 – 1.41	0.72 – 1.71	0.57 – 1.77	1.64 – 4.92
p	**0.01**	0.39	0.61	0.96	**0.001**
Age					
OR	1.02	1.01	1.0	1.02	0.99
95% CI	0.99 – 1.05	0.98 – 1.03	0.98 – 1.02	0.99 – 1.05	0.97 – 1.02
p	0.13	0.55	0.72	0.08	0.52
BMI > 30					
OR	1.68	0.56	1.36	1.98	1.32
95% CI	0.88 – 3.10	0.23 – 1.19	0.81 – 2.22	1.06 – 3.63	0.67 – 2.50
p	0.11	0.14	0.24	**0.03**	0.41
Diabetes					
OR	0.98	1.09	3.47	0.77	2.12
95% CI	0.16 – 4.70	0.19 – 4.87	1.20 – 10.05	0.17 – 3.02	0.52 – 8.05
p	0.98	0.92	**0.02**	0.71	0.29
Tobacco Use					
OR	1.13	1.34	0.77	0.73	0.79
95% CI	0.23 – 4.28	0.13 – 7.20	0.22 – 2.27	0.07 – 3.60	0.18 – 2.74
p	0.87	0.77	0.65	0.73	0.73

Multivariate logistic regression analysis revealed that TE alone was independently associated with an increased risk of seroma (odds ratio, 2.1) and implant loss (odds ratio, 2.8) ($p < 0.01$).

Body mass index > 30 was associated with an increased risk for surgical site infection (odds ratio, 1.98; $p < 0.03$).

Diabetes was associated with an increased risk of wound disruption (odds ratio, 3.47; $p < 0.02$).

Conclusions

These findings suggest that ADM use is associated with a lower rate of complications in TE based breast reconstruction within 30 days of surgery.

Multi-institution studies with large cohorts are needed to evaluate the long-term effects of ADM in TE based breast reconstruction.

Future studies may consider evaluating the impact of drain use on seroma formation in TE based breast reconstruction.

References

Pires, G., Marquez, J. L., Memmott, S., Sudduth, J. D., Moss, W., Eddington, D., Hobson, G., Tuncer, F., Agarwal, J. P., & Kwok, A. C. (2023). Early Complications after Prepectoral Tissue Expander Placement in Breast Reconstruction with and without Acellular Dermal Matrix. *Plastic & Reconstructive Surgery, 153*(6), 1221–1229. https://doi.org/10.1097/prs.0000000000010801

Ledwon, J. K., Applebaum, S. A., Progri, B., Han, T., Vignesh, O., Gutowski, K. S., Chang, A. B., Reddy, N. K., Tepole, A. B., & Gosain, A. K. (2023). Acellular Dermal Matrix Cover Improves Skin Growth during Tissue Expansion by Affecting Distribution of Mechanical Forces. *Plastic & Reconstructive Surgery.* https://doi.org/10.1097/prs.0000000000010709

Ho, G., Nguyen, T. J., Shahabi, A., Hwang, B. H., Chan, L. S., & Wong, A. K. (2012). A Systematic Review and Meta-Analysis of complications associated with acellular Dermal Matrix-Assisted breast reconstruction. *Annals of Plastic Surgery, 68*(4), 346–356. https://doi.org/10.1097/sap.0b013e31823f3cd9

Pannucci, C. J., Antony, A. K., & Wilkins, E. G. (2013). The impact of acellular dermal matrix on tissue Expander/Implant Loss in breast reconstruction. *Plastic & Reconstructive Surgery, 132*(1), 1–10. https://doi.org/10.1097/prs.0b013e318290f917

DeLong, M. R., Tandon, V. J., Bertrand, A. A., MacEachern, M., Goldberg, M., Salibian, A., Pusic, A. L., Festekjian, J. H., & Wilkins, E. G. (2020). Review of Outcomes in Prepectoral Prosthetic Breast Reconstruction with and without Surgical Mesh Assistance. *Plastic & Reconstructive Surgery, 147*(2), 305–315. https://doi.org/10.1097/prs.0000000000007586