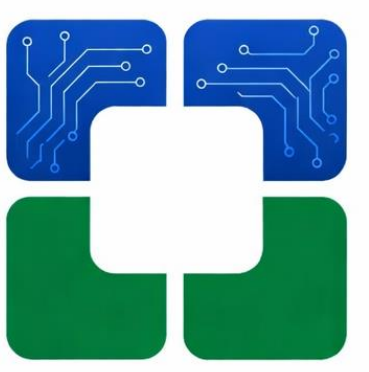




Cleveland Clinic



In-SITE
Research Group

Comparative Long-term Outcomes Of Biologic And Autologous Reinforcement Techniques In Implant-based Breast Reconstruction: A TriNetX Network Study

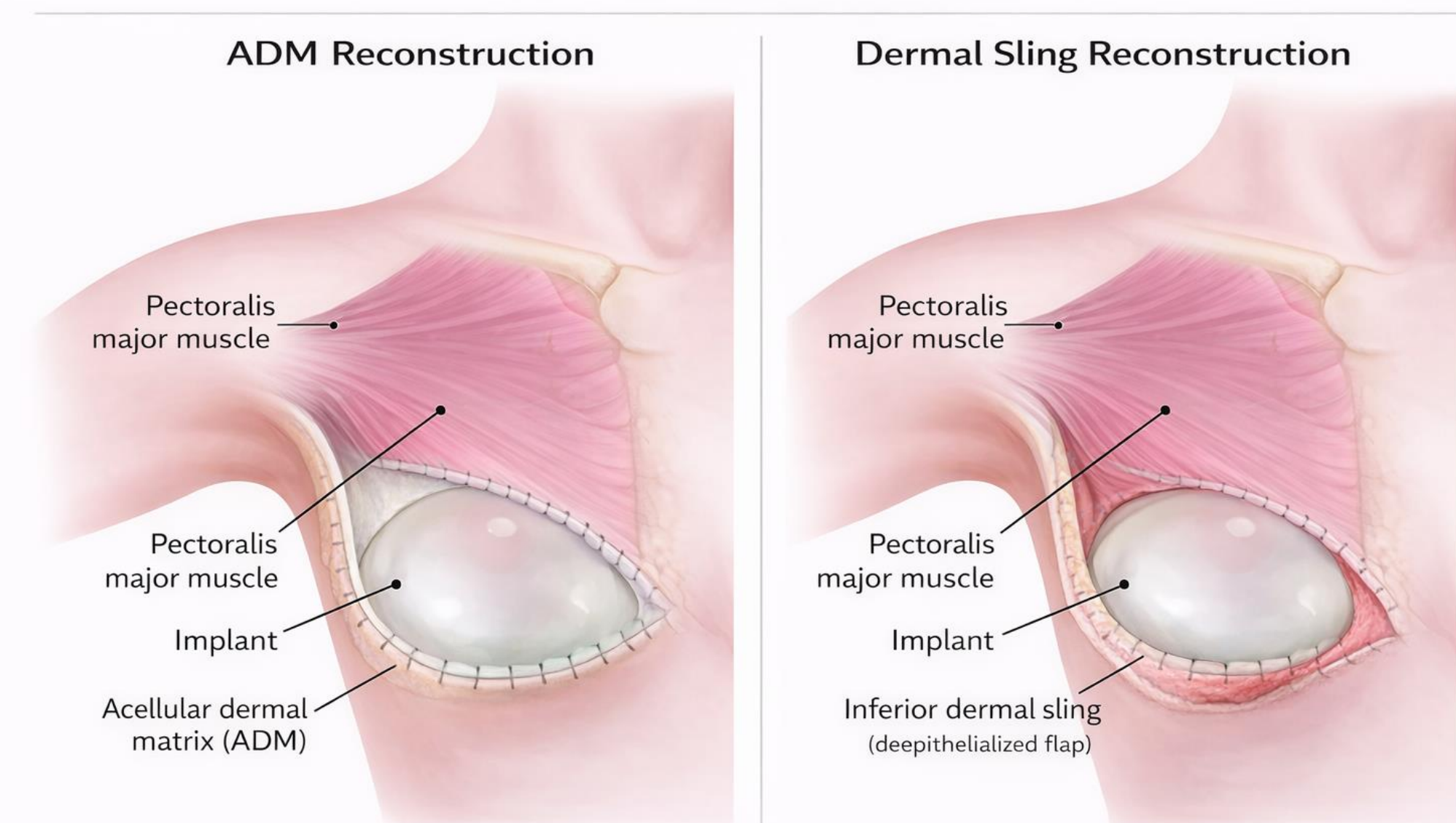
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Background

- Acellular dermal matrix (ADM) and autologous dermal sling techniques are widely used to provide lower pole support and soft tissue coverage in implant-based breast reconstruction.
- While ADM has been associated with reduced capsular contracture in small institutional series, results remain inconsistent and limited by short follow up.
- National-level data directly comparing ADM, autologous dermal sling, and reconstructions without reinforcement are lacking.
- The objective of this study is to compare capsular contracture, infection, and reoperation rates among implant-based breast reconstructions using ADM, autologous dermal sling, or no reinforcement and to evaluate whether ADM mitigates radiation-associated contracture.
- A secondary aim examined whether early autologous fat grafting influences contracture outcomes.

Methods

- A retrospective cohort study was conducted using the TriNetX Research Network (2010-2025).
- Adult women who underwent implant-based breast reconstruction were identified, excluding autologous flap procedures. Patients were categorized into three groups: ADM use, autologous dermal sling (deepithelialized inferior flap), or no reinforcement.
- Outcomes included capsular contracture, implant infection, and implant removal or revision within two years.
- Propensity score matching (1:1) balanced demographics, comorbidities, adjuvant therapies, and year of surgery.
- Subgroup analyses assessed whether ADM modified the effect of post mastectomy radiation on contracture risk, and exploratory analyses evaluated whether autologous fat grafting within 90 days reduced contracture incidence.



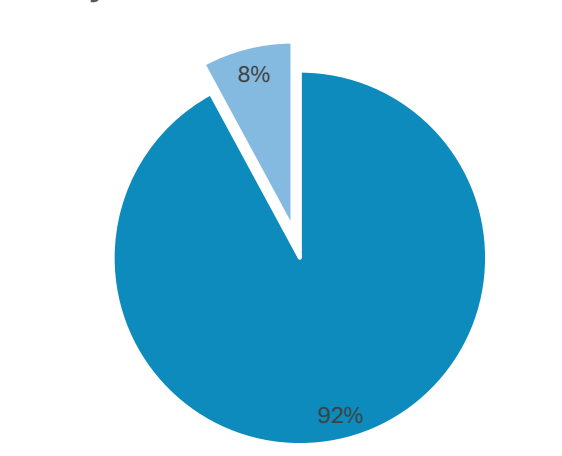
Conclusions

- This multi-institutional analysis aimed to define how biologic and autologous reinforcement, shape long-term outcomes in implant-based breast reconstruction.
- ADM reduces long-term capsular contracture, confirming its role as an effective internal scaffold.
- This benefit comes with a consistent increase in infection risk, reflecting a known trade-off.
- Dermal slings do not confer a contracture advantage and may show neutral or slightly higher rates.
- Despite being autologous, dermal slings are associated with higher infection risk, likely due to surgical complexity.
- Neither ADM nor dermal sling increases overall reoperation or reconstruction failure rates.
- Overall, both techniques shift complication profiles without compromising long-term outcomes, supporting their safe use with appropriate patient selection.

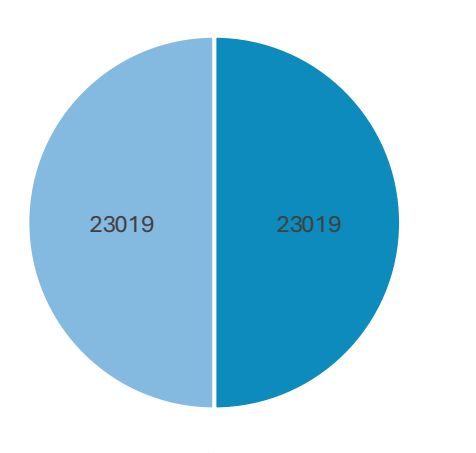
Results

- After propensity-score matching, each comparison included well-balanced cohorts with standardized mean differences <0.1 across baseline variables.
- The ADM cohort contained 23,019 matched patients per group, and the dermal-sling cohort contained 1,974 matched patients per group.
- **90-Day Outcomes**
 - At 90 days, capsular contracture occurred in 10.3% of ADM reconstructions versus 24.9% without reinforcement (RR = 0.42, 95% CI 0.40–0.43; HR = 0.39, 95% CI 0.37–0.40; $p < 0.001$).
 - For dermal sling, contracture was 31.7% vs 25.1% (RR = 1.26, 95% CI 1.14–1.40; HR = 1.28, 95% CI 1.14–1.45; $p < 0.001$).
 - Infection occurred in 5.3% ADM vs 3.3% (RR = 1.62, 95% CI 1.49–1.77; HR = 1.59, 95% CI 1.45–1.74; $p < 0.001$) and 5.6% dermal sling vs 3.6% (RR = 1.55, 95% CI 1.16–2.07; HR = 1.58, 95% CI 1.17–2.13; $p < 0.01$).
 - Early reoperation rates were 10.9% vs 25.8% for ADM (RR = 0.42, $p < 0.001$) and 27.6% vs 26.5% for dermal sling (RR = 1.04, $p = 0.45$), indicating similar short-term revision needs across groups.
- **2-Year Outcomes**
 - At 2 years, ADM reconstructions showed lower contracture risk (31.0% vs 36.9%, RR = 0.84, HR = 0.76; $p < 0.001$), whereas dermal-sling cases demonstrated higher rates (45.7% vs 37.8%, RR = 1.21, HR = 1.30; $p < 0.001$).
 - Infection was 8.1% vs 4.8% for ADM (RR = 1.69, HR = 1.67; $p < 0.001$) and 7.6% vs 4.9% for dermal sling (RR = 1.56, HR = 1.63; $p < 0.01$).
 - Reoperation within two years was less frequent with ADM (31.4% vs 38.3%, RR = 0.82, HR = 0.73; $p < 0.001$), but comparable between dermal sling and controls (39.3% vs 40.4%, RR = 0.97, HR = 1.01; $p = 0.85$).
- **10-Year Outcomes**
 - At long-term follow-up, ADM remained associated with lower contracture risk (34.0% vs 39.7%, RR = 0.86, HR = 0.79; $p < 0.001$) and lower reoperation rates (34.2% vs 40.8%, RR = 0.84, HR = 0.77; $p < 0.001$).
 - By contrast, dermal sling reconstructions showed higher contracture (48.1% vs 43.3%, RR = 1.11, HR = 1.20; $p < 0.01$) but similar reoperation rates (41.3% vs 40.1%, RR = 1.03, $p = 0.45$) and higher infection (8.2% vs 4.7%, RR = 1.73, HR = 1.84; $p < 0.001$).

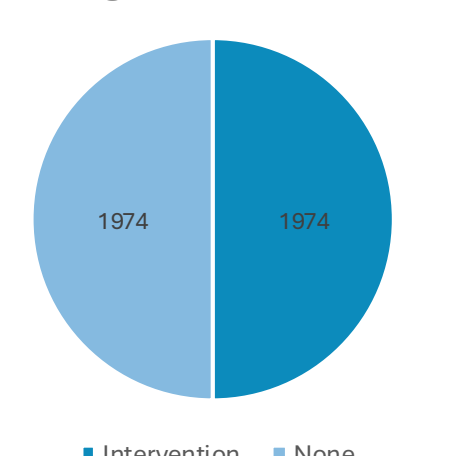
Propensity Score Matched Cohort Sizes



ADM vs No Reinforcement

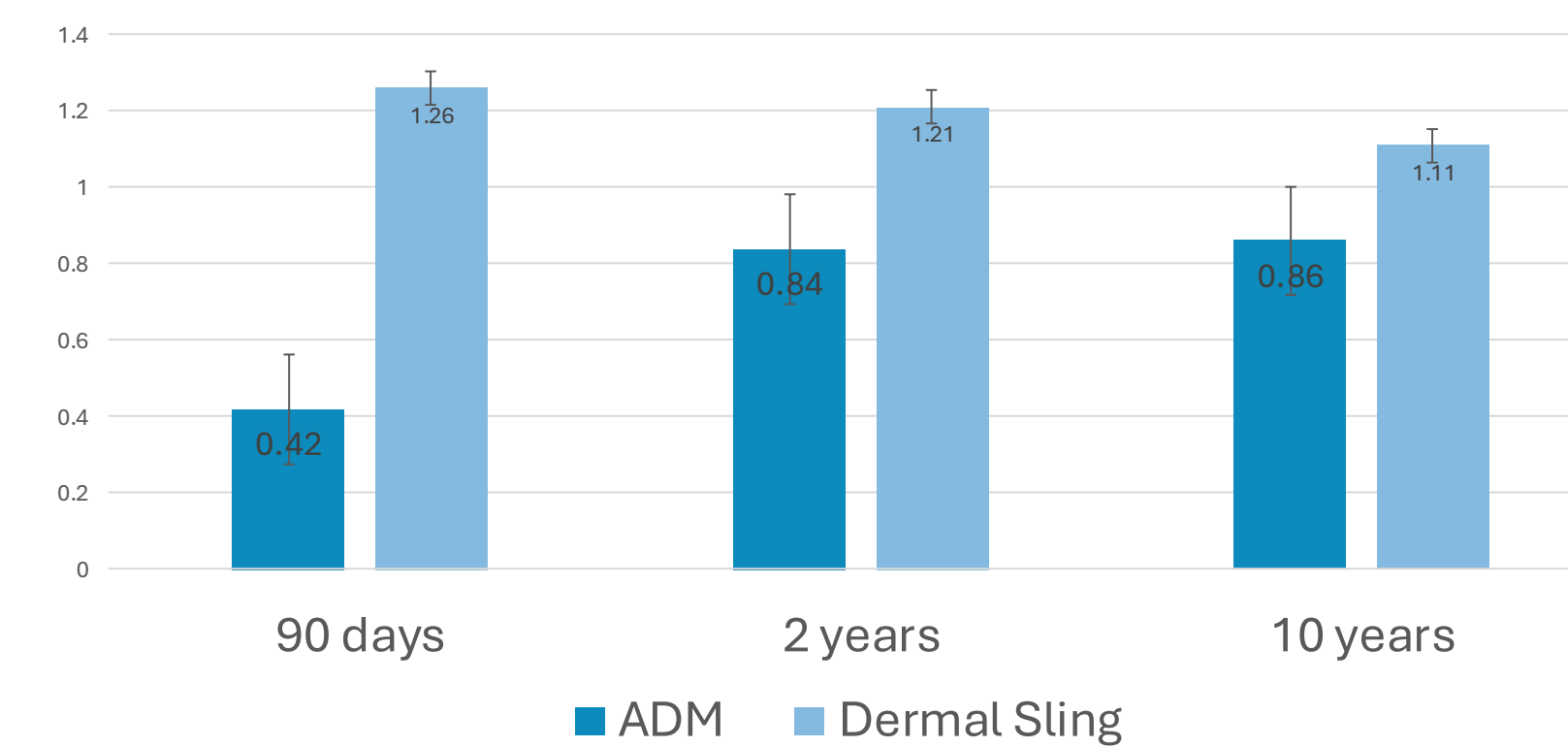


Dermal Sling vs No Reinforcement

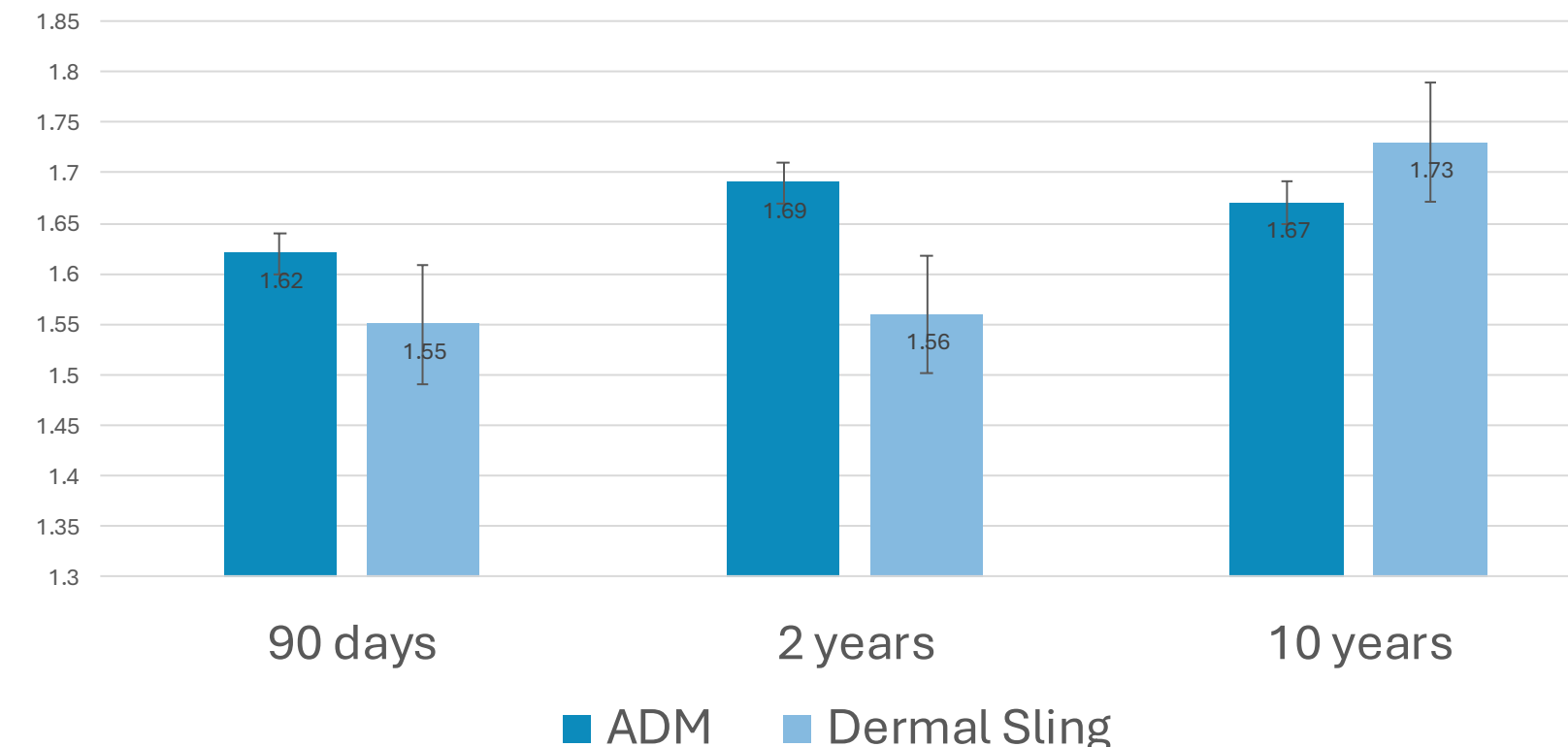


Intervention None

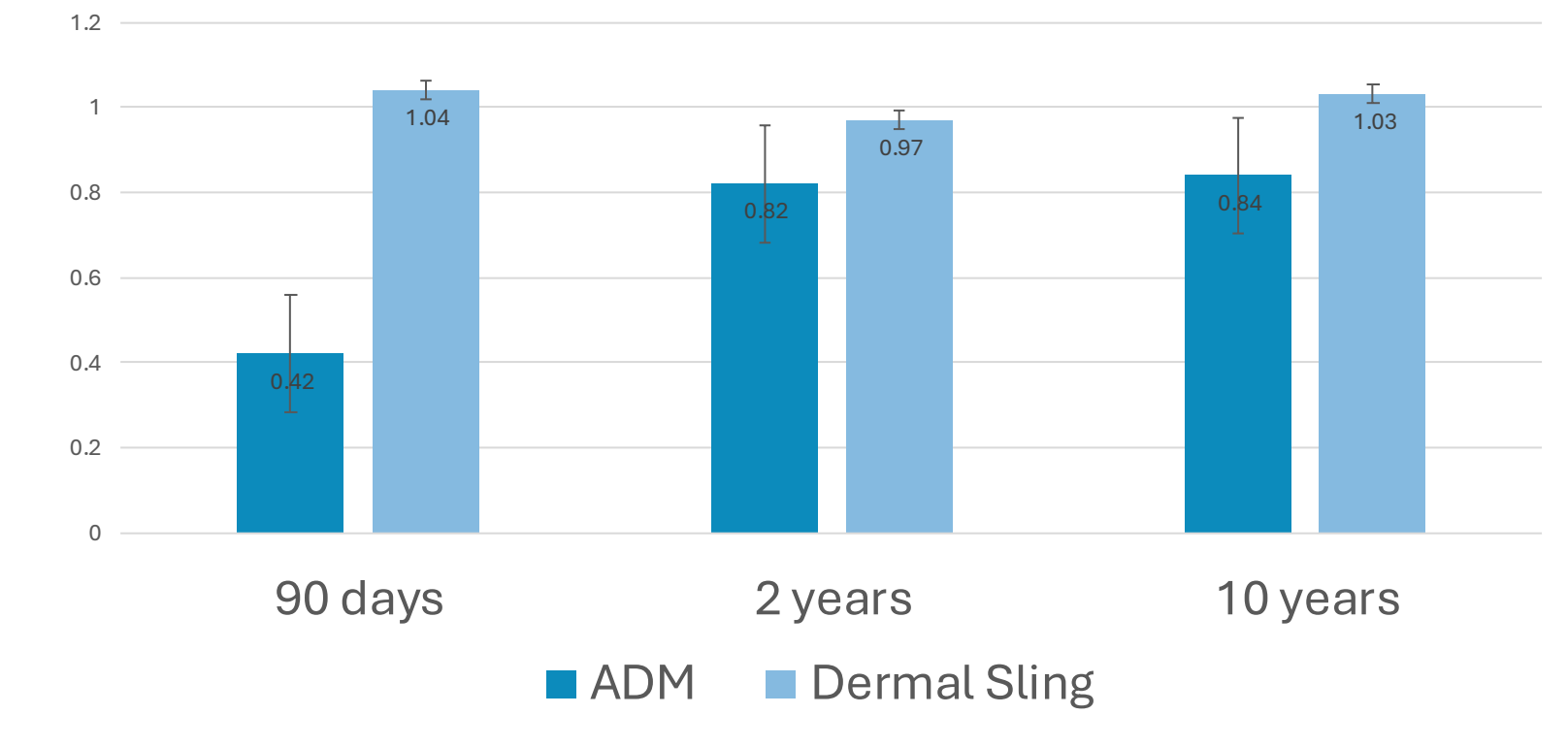
Post-op Contracture Risk Ratio



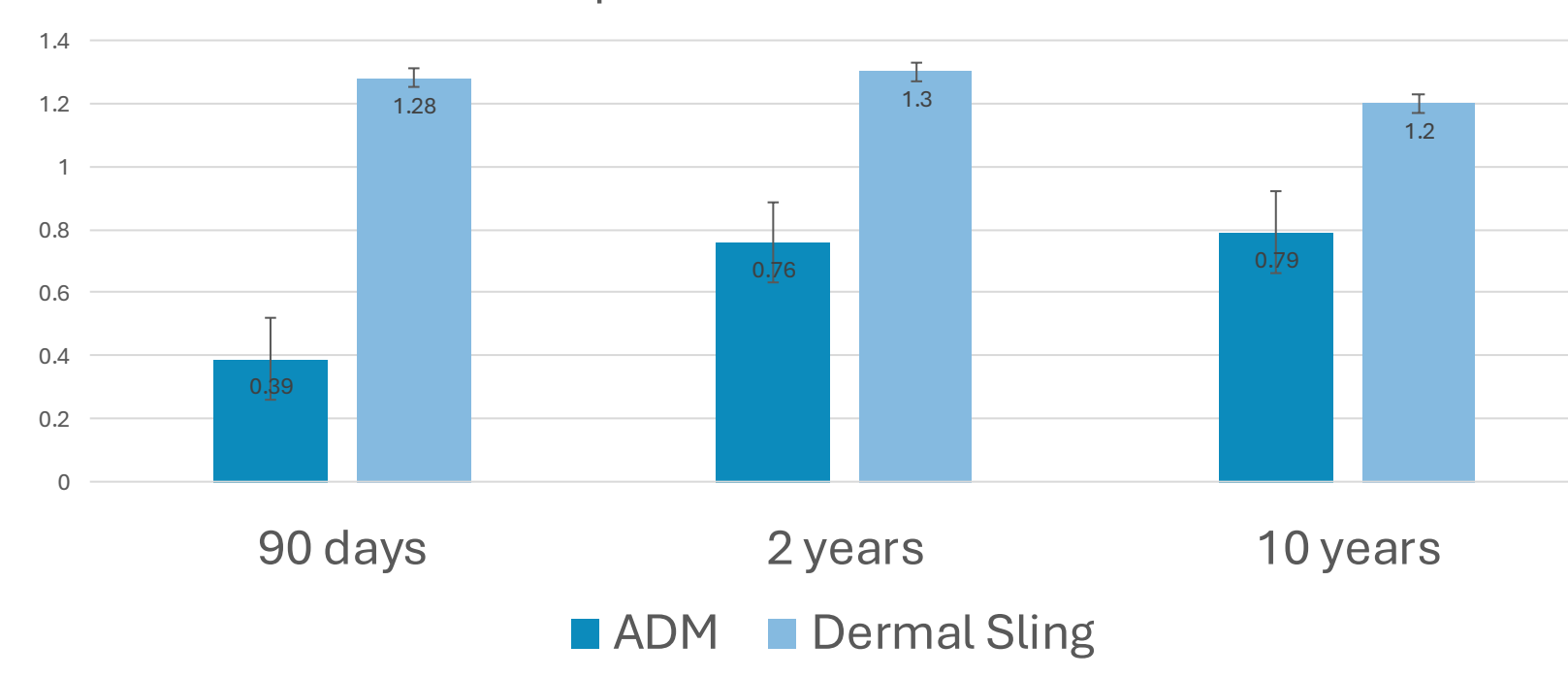
Post-op Infection Risk Ratio



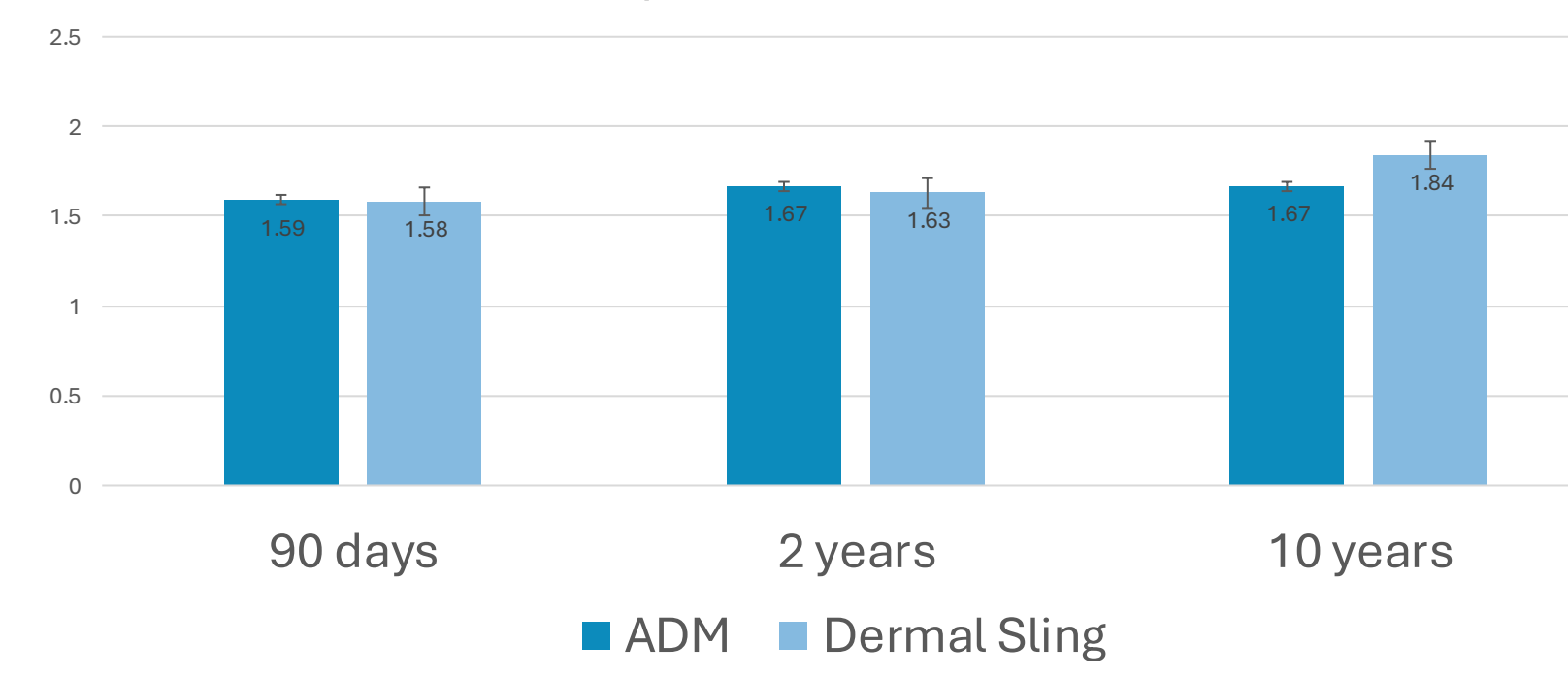
Reoperation Rate Risk Ratio



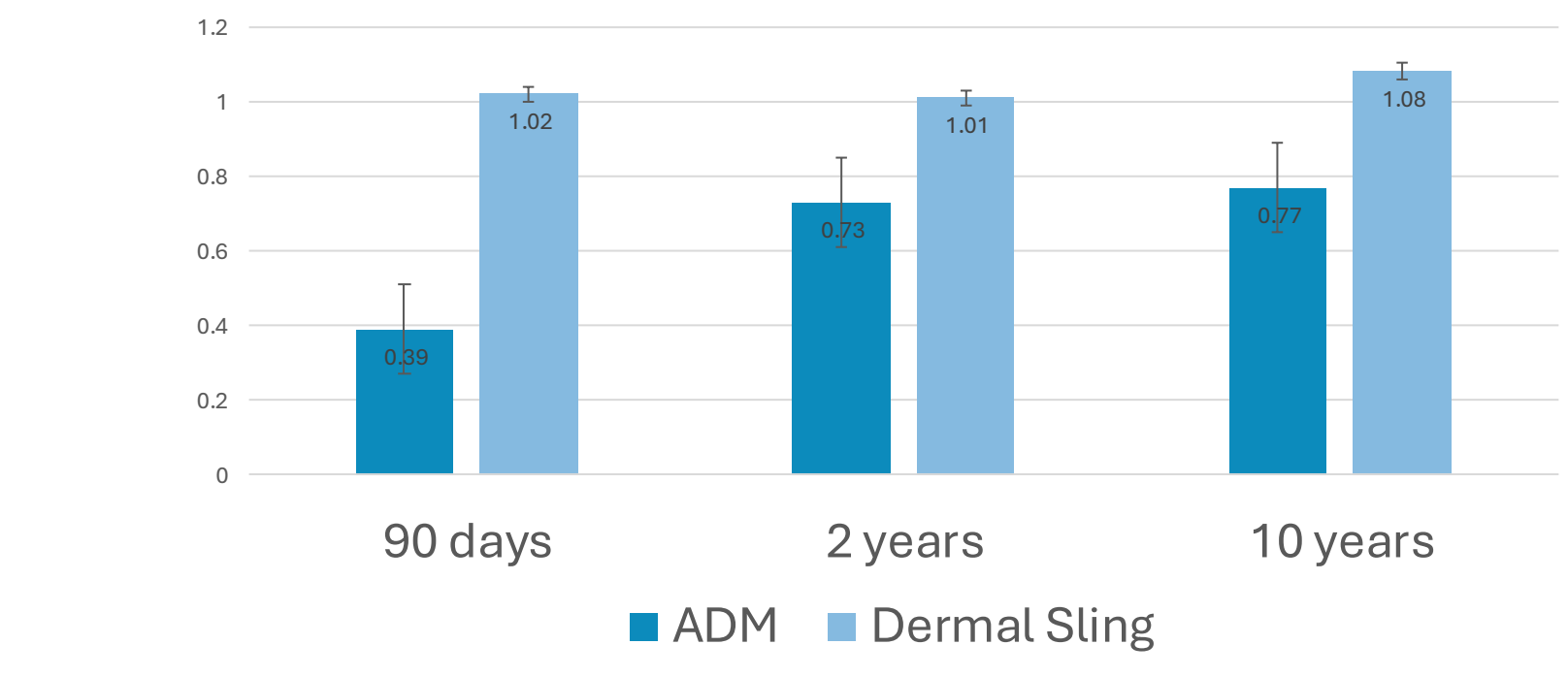
Post-op Contracture Hazard Ratio



Post-op Infection Hazard Ratio



Reoperation Hazard Ratio



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Acknowledgements

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