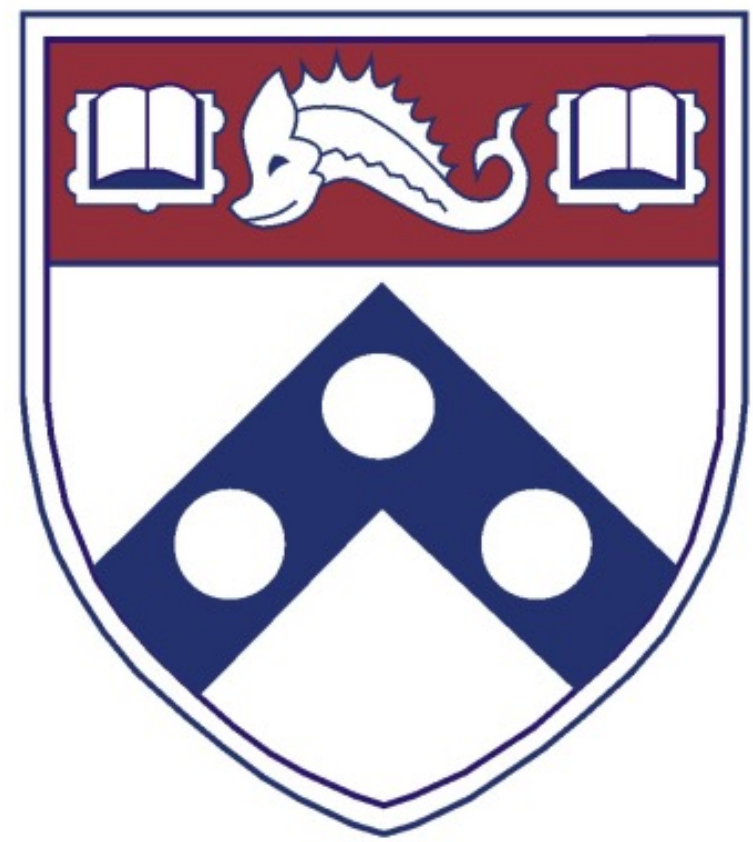
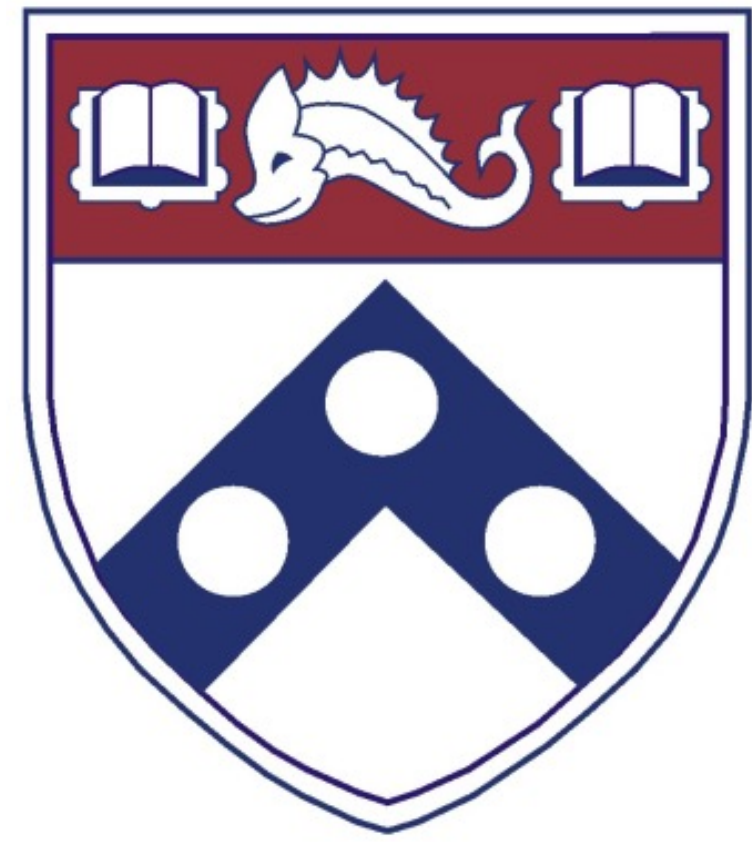




Biosynthetic vs. Synthetic Mesh in Retrorectus Ventral Hernia Repair: A Matched Analysis with Three-Year Outcomes

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BACKGROUND

Ventral hernias are a common surgical issue, with over **600,000 repairs** performed annually in the U.S. Surgical repair with **mesh reinforcement** significantly reduces recurrence rates compared to suture repair alone.

Synthetic meshes provide strong reinforcement but are associated with complications such as **infection, chronic pain, and adhesions**. In contrast, **biologic meshes** were developed to reduce foreign body response, but they are **significantly more expensive** and may have **higher recurrence rates**.

Biosynthetic meshes aim to combine the strength of synthetic materials with the biocompatibility of biologics. These include fully resorbable polymers like **poly-4-hydroxybutyrate (P4HB)**, offering potential benefits in tissue integration and infection resistance.

However, **comparative data between biosynthetic and synthetic meshes remain limited**, especially regarding **long-term outcomes** such as recurrence and complications. The evidence is often conflicting, with **heterogeneity in study designs, indications, and follow-up durations**.

This study compares **long-term outcomes of retrorectus ventral hernia repair (VHR)** using **uncoated polypropylene synthetic mesh** vs. **P4HB biosynthetic mesh in clean wounds**, focusing on:

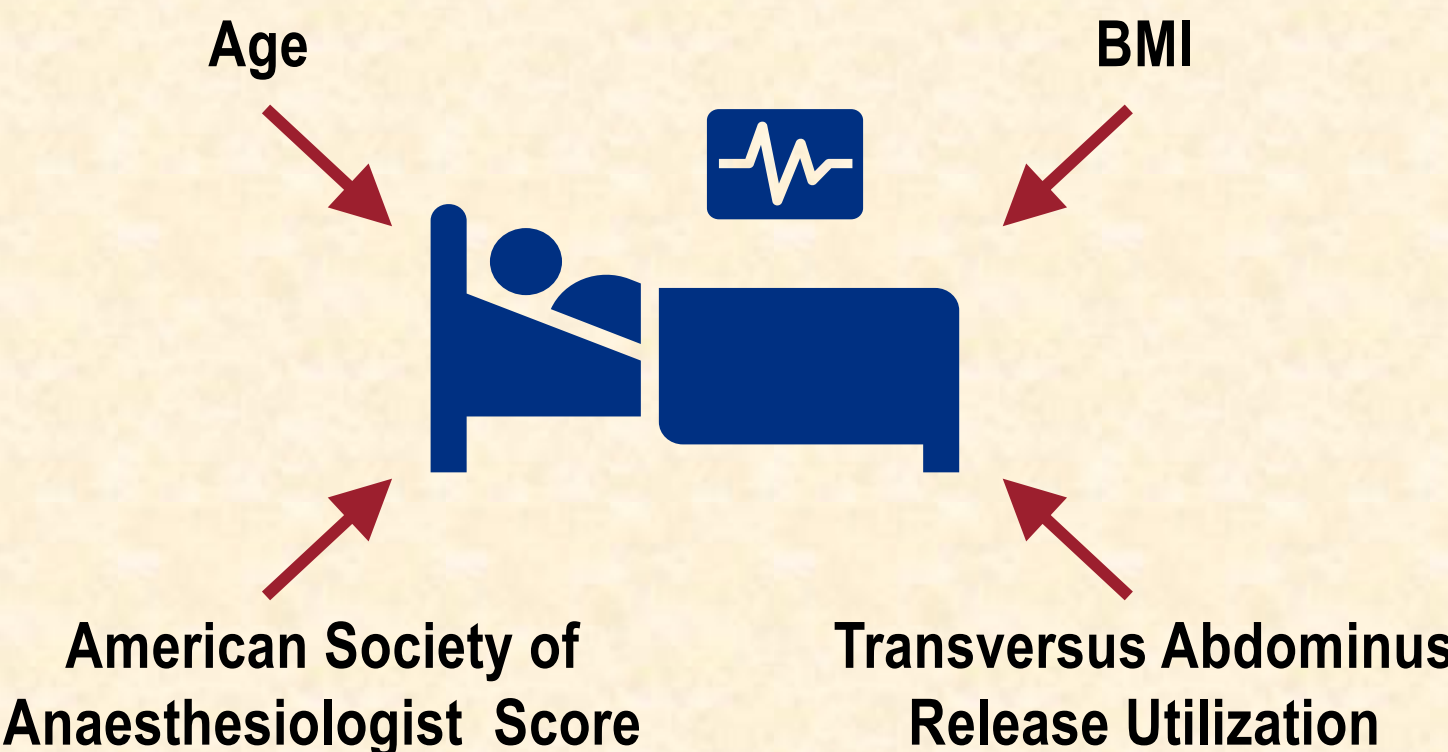
- **Hernia recurrence**
- **Surgical site occurrences (SSOs)**
- **Reoperation/Readmission/ED visit rates**

METHODS

Retrospective Cohort Study

- Adults undergoing retrorectus ventral hernia repair in clean wounds
- Compared uncoated polypropylene synthetic mesh vs. P4HB biosynthetic mesh
- Follow-up limited to 3 years

Mahalanobis Distance Optimal Full Matching



RESULTS

Demographics

Variable	Baseline Cohort			Matched Cohort		
	Synthetic Mesh n = 49 ^a	Biosynthetic Mesh n = 111 ^a	P-value ^b	Synthetic Mesh n = 49 ^a	Biosynthetic Mesh n = 111 ^a	P-value ^c
Race			0.6			0.530
Black	12 (24%)	23 (21%)		11 (22%)	23 (21%)	
White	37 (76%)	82 (74%)		38 (78%)	82 (74%)	
Other	0 (0%)	6 (5%)		0 (0%)	6 (5.4%)	
BMI (kg/m ²)	36 (11)	34 (8)	0.3	34 (9)	34 (8)	0.601
Age	62 (12)	62 (13)	>0.9	61 (11)	62 (12)	0.794
Gender			0.7			0.672
Male	20 (41%)	49 (44%)		24 (50%)	49 (44%)	
Female	29 (59%)	62 (56%)		25 (50%)	62 (56%)	
Smoking			0.4			0.651
Never	24 (49%)	58 (52%)		21 (43%)	58 (52%)	
Current	3 (6.1%)	13 (12%)		5 (10%)	13 (12%)	
Former	22 (45%)	40 (36%)		23 (47%)	40 (36%)	
Diabetes	12 (24%)	19 (17%)	0.3	8 (16%)	19 (17%)	0.846
COPD	5 (10%)	7 (6.3%)	0.5	6 (12%)	7 (6%)	0.314
Panniculectomy	14 (29%)	46 (41%)	0.12	11 (22%)	46 (41%)	0.067
Transversus abdominus release	4 (8%)	38 (34%)	<0.001	17 (34%)	38 (34%)	>0.999
Lysis of Adhesions	41 (84%)	87 (79%)	0.5	40 (82%)	87 (79%)	0.723
Average Defect Size (cm ²)	165 (106)	220 (160)	0.086	141 (95)	220 (160)	0.010

^a n (%); Mean (SD)

^b Pearson's Chi-squared test; Fisher's exact test; Wilcoxon rank sum test

^c Pearson's Chi-squared test; Rao & Scott adjustment; Kruskal Wallis test

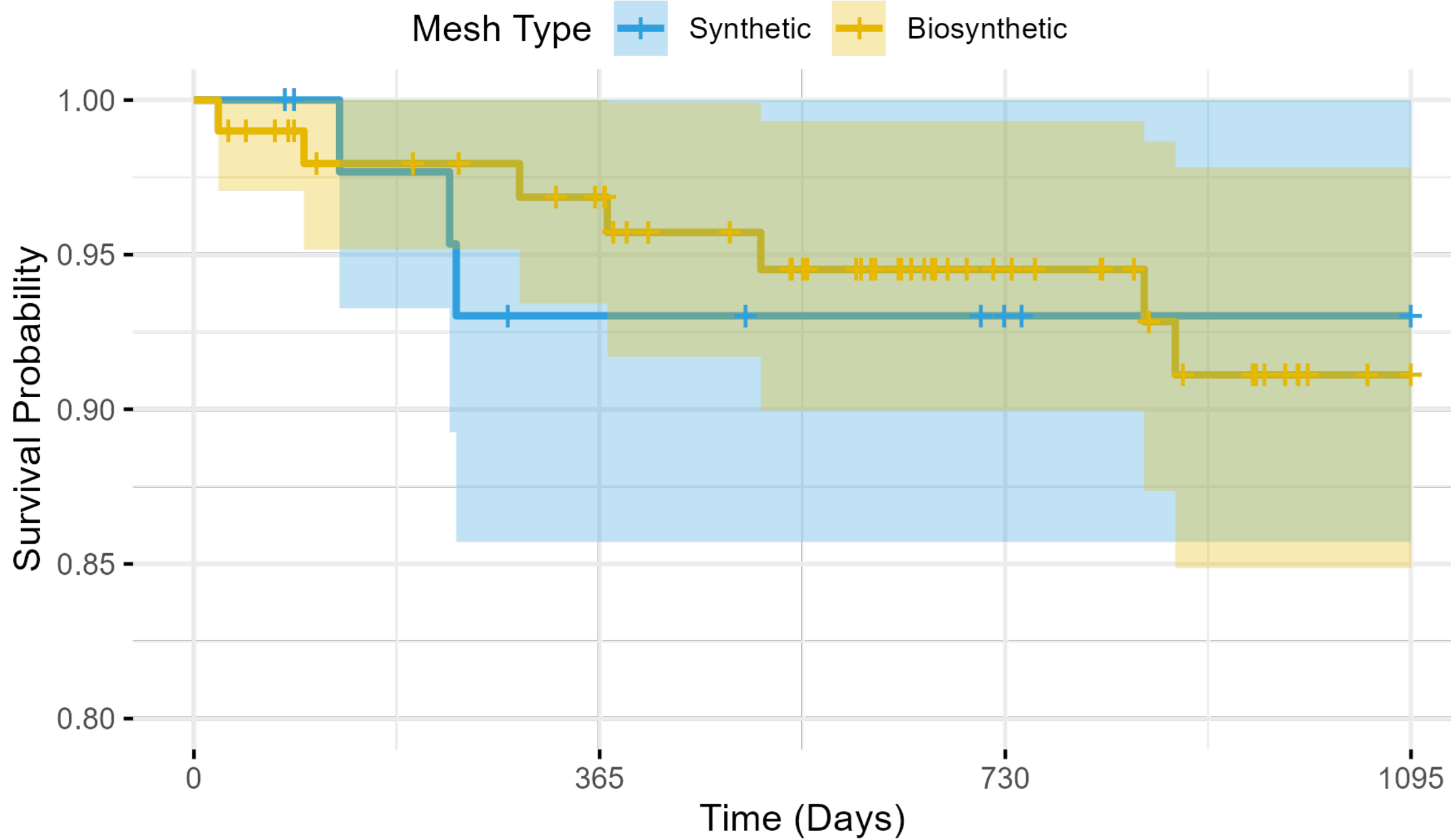
Outcomes

Outcome	Baseline Cohort		Matched Cohort		P-value ^b
	Synthetic Mesh n = 49 ^a	Biosynthetic Mesh n = 111 ^a	Synthetic Mesh n = 49 ^a	Biosynthetic Mesh n = 111 ^a	
SSO	21 (44%)	41 (37%)	13 (27%)	41 (37%)	0.3
Cellulitis	5 (10%)	8 (7.2%)	2 (5.0%)	8 (7.2%)	0.5
SSI	5 (10%)	14 (13%)	3 (5.4%)	14 (13%)	0.12
Seroma	6 (12%)	11 (9.9%)	4 (7.7%)	11 (9.9%)	0.7
Hematoma	3 (6.1%)	1 (0.9%)	2 (4.5%)	1 (0.9%)	0.13
Delayed wound healing	15 (31%)	25 (23%)	9 (18%)	25 (23%)	0.5
Wound dehiscence	3 (6.1%)	5 (4.5%)	2 (3.6%)	5 (4.5%)	0.8
Infected mesh	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
EC fistula	1 (2.0%)	1 (0.9%)	0 (0.9%)	1 (0.9%)	>0.9
Post-operative bowel obstruction	1 (2.0%)	3 (2.7%)	0 (0.9%)	3 (2.7%)	0.3
Ileus	0 (0%)	1 (0.9%)	0 (0%)	1 (0.9%)	0.3
Hernia recurrence	3 (6.5%)	7 (7.0%)	1 (3.3%)	7 (7.0%)	0.4
Hernia recurrence requiring re-repair	2 (4.1%)	7 (7.0%)	1 (3.3%)	7 (7.0%)	0.4

^a n (%); Mean (SD)

^b Pearson's Chi-squared test; Rao & Scott adjustment; stratified- Log Rank Test

Kaplan-Meier Curve for Hernia Recurrence by Mesh Type



CONCLUSIONS

- In clean retrorectus ventral hernia repair, P4HB biosynthetic mesh demonstrates comparable 3-year recurrence and complication rates to uncoated polypropylene synthetic mesh, supporting its use as a viable alternative in this setting.
- While no short-term clinical advantage was observed, the resorbable nature of biosynthetic mesh may offer potential benefits for patients where permanent foreign material is a concern.
- Given its higher cost and the need to assess long-term outcomes, future studies should incorporate extended follow-up, patient-reported outcomes, and cost-effectiveness analyses to better define its role in ventral hernia repair.

Hernia Recurrence GEE

Variable	OR ¹	95% CI ²	P-value
Mesh			0.5
Synthetic	—	—	
Biosynthetic	1.84	0.31-14.3	
Smoking History	1.95	0.31- 16.1	0.5
TAR	0.15	0.01- 1.58	0.12
COPD	8.93	1.42- 65.9	0.020
Diabetes	0.43	0.09- 2.24	0.3
Gender	1.76	0.32- 12.3	0.5
BMI	0.99	0.89- 1.08	0.9
Defect area	1.01	1.00- 1.01	0.019

¹ OR = Odds Ratio, ² CI = Confidence Interval

SSO GEE

Variable	OR (95% CI) ¹	95% CI ²	P-value
Group			0.4
Biosynthetic	—	—	
Synthetic	0.73	0.34, 1.58	
Smoking History	0.82	0.39, 1.68	0.6
TAR Procedure	1.45	0.63, 3.32	0.4
COPD History	0.56	0.12, 2.19	0.4
Diabetes History	0.46	0.19, 1.09	0.077
Gender	1.64	0.81, 3.36	0.2
BMI	1.05	1.00, 1.09	0.036
Defect Area	1.00	1.00, 1.00	0.13

¹ OR = Odds Ratio, ² CI = Confidence Interval



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