The role of mesh reinforcement for hiatal hernia repair in bariatric surgery

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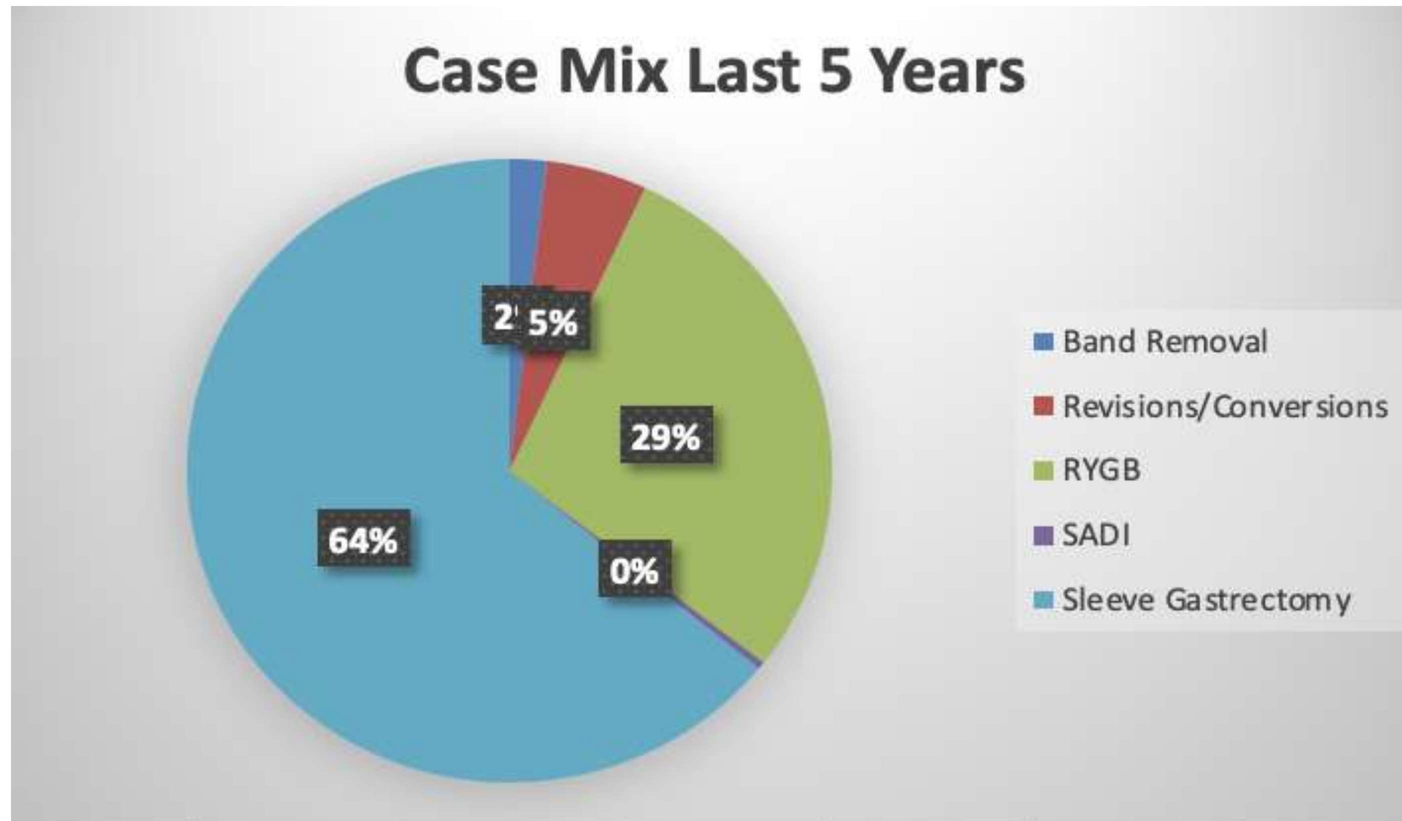
Disclosures

- Food and Travel from Medtronic
- Travel and Stipend from Moon Surgical

Disclosures



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Introduction

Obesity is a significant independent risk factor for hiatal hernia

Incidence of HH increases with body mass index (up to 37%)

Mechanisms of hiatal hernia development is thought to be multifactorial in bariatric patients

- intraabdominal pressure
- congenital defects
- shortened esophagus due to chronic acid reflux

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Introduction

However, the relationship between hiatal hernia and postoperative GERD remains controversial in the literature

There is an increased rate of GERD after SG, intrathoracic sleeve migration, and GERD after bypass

Identifying the presence of HH in bariatric patients before the operation can facilitate informed discussion with patients and plan for repair at the time of surgery

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Introduction

1

Despite repairing HH at time of bariatric surgery, recurrences are common.

2

HH recurrence rate ranges 12% - 55%. (Sutherland et al., 2016) and as high as to 55% following posterior cruroplasty repair at a 7-year follow-up (Angrisani et al., 2020).

3

This has led to the use of reinforcement of the crura at the time of the index procedure

- Prosthetic
- biological
- bioabsorbable mesh.

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How often are HH repairs performed at time of index bariatric surgery?

Safety of concurrent sleeve gastrectomy and hiatal hernia repair: a propensity score–matched analysis of the MBSAQIP registry

Michał R. Janik, M.D., Ph.D.[a,b,*], Christopher Ibikunle, M.D., F.A.C.S.[c,d], Amir H. Aryaie, M.D., F.A.C.S.[a,c,d]

The incidence of HHR in the analyzed cohort was 18.4%.

HHR did not increase risk of leak (.43% versus .45%; RR, .97; 95% CI,.81–1.16, P=5.775) and bleeding complications (.63% versus .62%; RR, 1.0; 95% CI,.86–1.17, P=5.968).

SG1+HHR cases had a slightly higher risk of 30-day readmission (4.01% versus 2.96%; RR,1.35; 95% CI,1.27–1.45, P<.001), 30-day reoperation (1.10%versus.77%;RR,1.42;95%CI, 1.25–1.61, P<.001), 30-day intervention (1.24% versus .95%; RR, 1.31; 95%CI, 1.16–1.47,P< .001), and 30-day morbidity (1.85% versus 1.47%; RR, 1.25; 95% CI,1.141.38 ,P,.001).

Did not look at mesh.

Concomitant Hiatal Hernia Repair with Sleeve Gastrectomy: A 5-Year Analysis

Benjamin Clapp, MD, FASMBS, Evan Liggett, MD, Ashtyn Barrientes, MD, Katherine Aguirre, PhD, Vidur Marwaha, BS, Alan Tyroch, MD

Results: In the OPUDF, there were 6,193 (33.7%) patients who underwent SG+HHR out of 18,403 patients who underwent SG. Mean charges were $94,741 [standard deviation (SD) = $87,284]. Length of stay (LOS) was 2.1 (SD = 3.5) vs 2.3 days (SD = 3.3) with a shorter stay for SG+HHR vs SG alone (P < 0.001). In the IPUDF, there were 11,536 (21.1%) patients who underwent SG+HHR out of 54,545 patients who underwent SG. Mean charges were $69,006 (SD = $46,365). LOS was 1.59 days (SD = 3.7) for SG+HHR vs 1.63 days (SD = 1.6) for SG (P = .043). The rate of SG+HHR increased over the study period.

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N=72,948 SG

4.5% had mesh repair

Figure 1. Total Number of Sleeve Gastrectomies and Hiatal Hernia Repairs in Outpatient Public Use Data File and Inpatient Outpatient Public Use Data File, 2013–2017.

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Concurrent bariatric surgery and paraesophageal hernia repair: an analysis of the Metabolic and Bariatric Surgery Association Quality Improvement Program (MBSAQIP) database

Joshua Hefler, M.D.[a,*], Jerry Dang, M.D.[a], Valentin Mocanu, M.D.[a], Noah Switzer, M.P.H., M.D., F.R.C.S.C.[a,b], Daniel W. Birch, M.Sc., M.D., F.R.C.S.C.[a], Shahzeer Karmali, M.P.H., M.D., F.R.C.S.C.[a]

- 265,052 patients undergoing bariatric surgery
- 42,732(16.1%) underwent HHR
- 7453 (17.4%) had RYGB.

42,732 patients undergoing concurrent PEH repair, 2569(6.0%) were done with mesh.

Complications similar, higher OR time

Surgery for Obesity and Related Diseases 15 (2019) 1746–1754

Table 5

Perioperative outcomes for patients undergoing bariatric surgery with PEH repair, stratified by use of mesh

Outcome	Unmatched cohort		*P* value	Matched cohort		*P* value
	No mesh 40,048 (93.7%)	Mesh 2684 (6.3%)		No Mesh 2569 (50.0%)	Mesh 2569 (50.0%)	
Mortality	21 (.1)	3 (.1)	.209	0 (0)	3 (.1)	.083
Major complication	1384 (3.5)	105 (3.9)	.212	103 (4.0)	99 (3.9)	.774
Leak	157 (.4)	9 (.3)	.648	11 (.4)	9 (.4)	.654
Bleed	308 (.8)	15 (.6)	.224	21 (.8)	15 (.6)	.316
Reoperation	498 (1.2)	30 (1.1)	.568	32 (1.3)	29 (1.1)	.699
Reintervention	526 (1.3)	38 (1.4)	.653	42 (1.6)	37 (1.4)	.571
Readmission	1582 (4.0)	127 (4.7)	.046	120 (4.7)	120 (4.7)	>.999
Cardiac event	18 (0)	3 (.1)	.130	1 (0)	3 (.1)	.317
Pneumonia	68 (.2)	9 (.3)	.050	8 (.3)	9 (.4)	.808
AKI	45 (.1)	9 (.3)	.002	3 (.1)	9 (.4)	.083
VTE	112 (.3)	17 (.6)	.001	12 (.5)	13 (.5)	.841
Deep SSI	86 (.2)	9 (.3)	.199	10 (.4)	9 (.4)	.818
Wound disruption	15 (0)	0 (0)	.316	2 (.1)	0 (0)	.157
Sepsis	40 (.1)	4 (.2)	.442	2 (.1)	4 (.2)	.414
Unplanned intubation	46 (.1)	5 (.2)	.299	0 (0)	5 (.2)	.025
Coma >24 hr	1 (0)	0 (0)	.796	0 (0)	0 (0)	>.999
CVA	6 (0)	0 (0)	.526	0 (0)	0 (0)	>.999
Any complication	1608 (4.0)	120 (4.5)	.246	122 (4.8)	113 (4.4)	.548
SSI	219 (.6)	18 (0.7)	.403	22 (.9)	18 (.7)	.525
Postoperative ventilation	22 (.1)	2 (0.1)	.678	2 (.1)	2 (.1)	>.999
UTI	127 (.3)	6 (.2)	.399	12 (.5)	5 (.2)	.089
Operative time, min	85.7 ± 43.3	106.2 ± 54.1	<.001	87.9 ± 43.7	107.2 ± 54.7	<.001

PEH = paraesophageal hernia; AKI = acute kidney injury; VTE = venous thromboembolism; SSI = surgical site
CVA = cerebral vascular accident; UTI = urinary tract infection.

Cohorts shown before and after propensity match.

Surgery for Obesity and Related Diseases 15 (2019) 1746–1754

Incidence of Hiatal Hernia Repair During Primary Bariatric Surgery Conversion: an Analysis of the 2020 MBSAQIP Database

Alexander Friedman [1], Ya-Huei Li [2], Richard L Seip [1], Connie Santana [1], Tara L McLaughlin [3], Dale S Bond [2], Edward Hannoush [1], Darren Tishler [1], Pavlos K Papasavas [4]

The rate of hiatal hernia (HH) repair during conversion bariatric surgery is largely unknown. We sought to determine this rate in 12,788 patients undergoing conversion surgery using the 2020 participant use file of the MBSAQIP database. Concurrent HH repair was performed in 24.1% of conversion cases; most commonly during SG to RYGB (33.1%), followed by AGB to SG conversion (20.2%). The remaining conversion pathways had a repair rate around 13%. Only 12.1% of HH repairs were performed using a mesh. GERD was the primary indication for conversion in 65% of the SG to RYGB cases. A much higher proportion of patients with concomitant HH repair reported GERD as the main reason for conversion than those without a HH repair (44.5% vs. 23.7%; $p<0.001$).

Obes Surg. 2023 May;33(5):1613-1615. doi: 10.1007/s11695-023-06521-6.

So what do we have so far?

- HHR ranges from 18-33% of bariatric cases
  - GERD diagnosis is predictive
- Mesh is rarely used
  - 4-6% primary cases
  - 12% revisions/conversions
  - Also GERD
- All short-term data

When should we use mesh? What should the rate be?

Does everyone need it?

Does the use of bioabsorbable mesh for hiatal hernia repair at the time of bariatric surgery reduce recurrence rates? A meta-analysis

Benjamin Clapp, M.D.[a,*], Ali M. Kara, M.D.[a], Paul J. Nguyen-Lee, M.D.[a], Luis Alvarado, M.S.[a], John D. Marr, D.O.[a], Hani M. Annabi, M.S.[a], Brian Davis, M.D.[a], Omar M. Ghanem, M.D.[b]

Background: Anywhere from 16% to 37% of patients undergoing bariatric and metabolic surgery are estimated to have a hiatal hernia. To address the lack of long-term data showing the efficacy of bioabsorbable mesh in reducing the recurrence of hiatal hernia in patients who undergo bariatric surgery, we evaluated the world literature and performed a meta-analysis.

Objective: To evaluate hiatal hernia recurrence rates after placement of bioabsorbable mesh in bariatric patients.

Setting: Meta-analysis of world literature.

Methods: We performed a literature search using PubMed and MEDLINE with search terms including "hiatal hernia recurrence," "bariatric surgery," "bioabsorbable mesh," "Gore BIO-A," and "trimethylene carbonate." Analysis was conducted to compare surgical time, length of stay, recurrence rate, hernia size, and changes in body mass index before and after surgery between mesh-group (MG) and nonmesh (NM) patients. The meta-analysis was described using standardized mean difference, weighted mean difference, effect size, and 95% confidence interval (CI). An I^2 statistic was computed to assess heterogeneity.

Results: Twelve studies with 1351 patients were included in our meta-analysis. Four studies had both an MG and an NM group. There were 668 patients in the MG and 683 patients in the NM group. Hernia size noted in the NM group (7 cm^2) was compared with that in the MG (6.5 cm^2) (95% CI: 3.89–9.14; $P = .86$). The MG had fewer recurrences than the NM group (effect size, 2% versus 14%; 95% CI: –.26 to –.02; $P = .027$). The average follow-up was 28.8 months for the MG and 32.8 months for the NM group.

Conclusion: Repair with bioabsorbable mesh at the time of the index bariatric surgery is more effective at reducing the recurrence rate of hiatal hernia than suture cruroplasty. Further studies investigating the long-term outcomes of bioabsorbable mesh placed at the time of bariatric surgery are needed. (Surg Obes Relat Dis 2022;18:1407–1415.) © 2022 American Society for Metabolic and Bariatric Surgery. Published by Elsevier Inc. All rights reserved.

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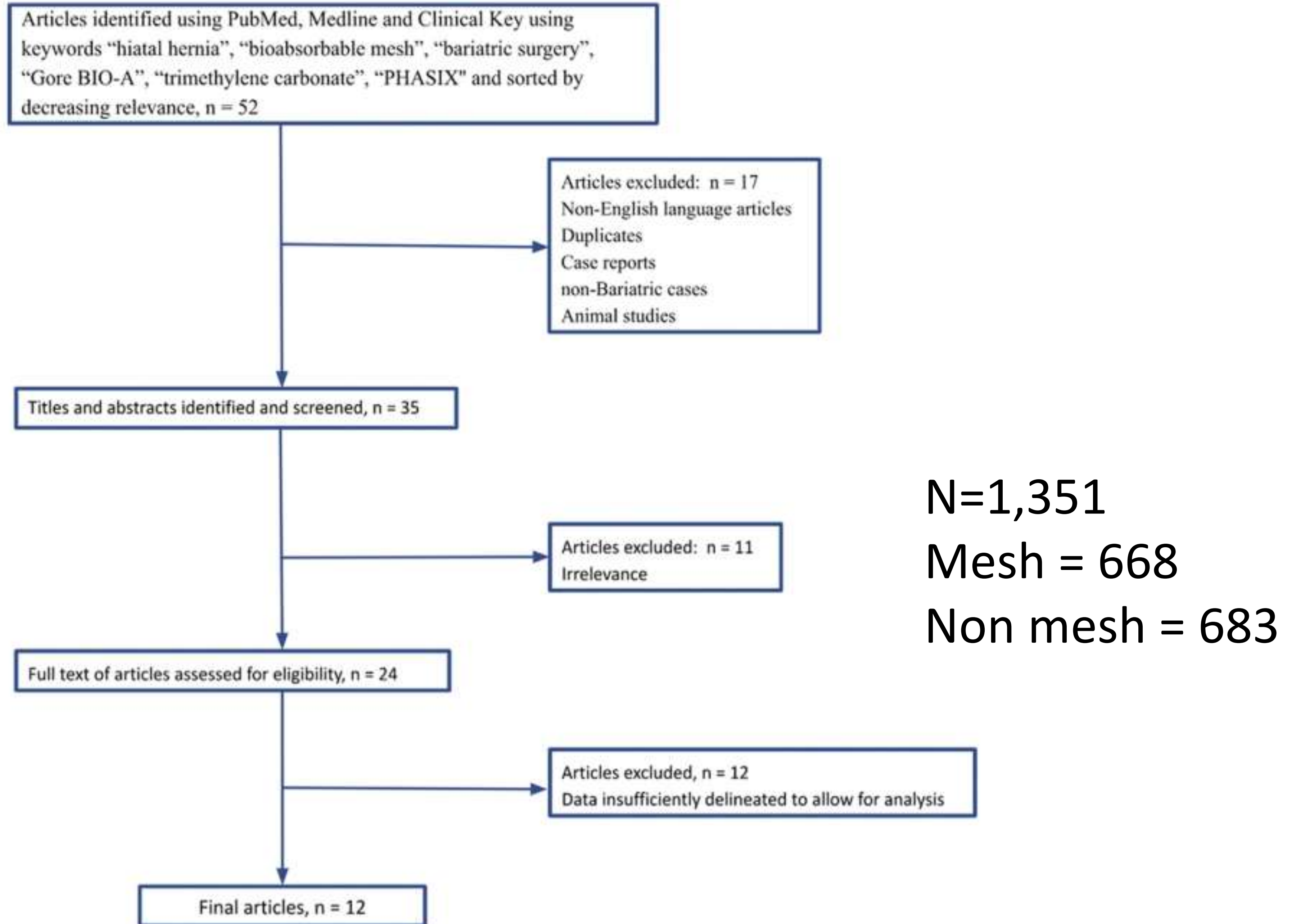

Articles identified using PubMed, Medline and Clinical Key using keywords "hiatal hernia", "bioabsorbable mesh", "bariatric surgery", "Gore BIO-A", "trimethylene carbonate", "PHASIX" and sorted by decreasing relevance, n = 52
Articles excluded: n = 17
Non-English language articles
Duplicates
Case reports
non-Bariatric cases
Animal studies
Titles and abstracts identified and screened, n = 35
Articles excluded: n = 11
Irrelevance
Full text of articles assessed for eligibility, n = 24
Articles excluded, n = 12
Data insufficiently delineated to allow for analysis
Final articles, n = 12
N=1,351
Mesh = 668
Non mesh = 683

Reference	Country	Year	Mesh type	n	Type of index procedure	Hernia size (mean)	Mean age in years (SD)	Number of female patients	Mean preoperative BMI (SD)	Mean surgery time in minutes (SD)	Mean hospital stay in days (SD)	Mean follow-up in months (SD)	Recurrence (%)
Silecchia et al. [24]	Italy	2014	Gore Bio-A mesh	20	SG	4.2 ± 1.6 cm^2	36 ± 8	13	43.2 ± 6	89.1 ± 21.8	4.5 ± 2	17.4	0%
Iossa & Silecchia [22]	Italy	2019	Gore Bio-A mesh	92	60 SG, 15 re-SG, 17 RYGB	6 ± 2 cm^2	45 ± 10	72	43.4 ± 5.65	80 ± 12.4	3.9 ± 1.3	41	5.4%
Balla et al. [20]*	Italy	2017	Gore Bio-A mesh	17	LSG	≤4 cm^2	48.4 ± 9.2	13	43.5 ± 4.7	184.3 ± 39.1	5 ± 1.06	18.1 ± 11.3	0%
Boru et al. [21]*	Italy	2021	Gore Bio-A mesh	99	62 SG, 22 RYGB, 15 re-SG	6.7 ± 2 cm^2	47.5 ± 12.1	77	44.6 ± 7.7	141 ± 52.2	4 ± 1.43	50.9	4%
Love et al. [25]*	United States	2021	Gore Bio-A mesh	392	188 RYGB, 204 SG	10.2 ± 1.2 cm^2	46.28	91.9%	46.88	NA	NA	26.3	3.7%
Ruscio et al. [23]*	Italy and Egypt	2015	Gore Bio-A mesh	48	SG	>4 cm^2 (5.4 ± 1.5 cm^2)	44.3 ± 11.6	40	42.56 ± 9	132 ± 69.4	3.9 ± 1.33	19	0%
Ruscio et al. [23]*	Italy and Egypt	2015	None	48	SG	<4 cm^2 (3.2 ± 1.1 cm^2)	43.2 ± 10.4	37	43.85 ± 6.05	111 ± 45.1	3.6 ± 1.4	21	10.4%
Love at al. [25]*	United States	2021	None	28	14 RYGB, 14 SG	10.2 ± 1.21 cm^2	46.3	91.9%	46.88	NA	NA	26.3	7.1%
Boru et al. [21]*	Italy	2021	None	151	130 SG, 5 re-SG, 16 RYGB	3.4 ± 2 cm^2	43.2 ± 10.4	37	43.4 ± 5.8	105 ± 38.2	3 ± 1.29	49.1	8%
Balla et al. [20]*	Italy	2017	None	12	SG	≤4 cm^2	46.4 ± 11	10	42.1 ± 8.3	195.4 ± 51.9	5.6 ± 1.3	29.7 ± 4.1	16.6%
Soricelli et al. [29]	Italy	2013	None	97	SG	NA	NA	NA	44 ± 3.5	Median: 75 min	NA	18	NA
Boules et al. [30]	United States	2015	None	83	22 SG, 61 RYGB	16 ± 1.7 cm^2	57.2	74	44.5 ± 7.9	164.4 ± 56.2	3.5 ± 1.7	12	1.2%
Snyder et al. [26]	United States	2016	None	41	SG	2.3 ± 1.7 cm^2	44 ± 1	NA	44 ± 5.7	90.9 ± 29.5	NA	Until 12 mo	NA
Aridi et al. [27]	Lebanon	2017	None	76	SG	n = 28, <4 cm^2; n = 16, ≥4 cm^2	42.2 ± 12.6	51	42.7 ± 15.3	116.9 ± 28.6	NA	Maximum 2 yr	21.3%
Samakar et al. [28]	United States	2017	None	58	SG	NA	49.5 ± 11.2	43	44.2 ± 6.6	NA	NA	22.4	34.6%
risani	Italy	2020	None	89	SG	NA	38.8 ± 11.8	75	44.8 ± 6.1	NA	NA	84	30.6%

Characteristics

- Mesh Group
  - SG = 441
  - RYGB =227
- Non Mesh group,
  - SG = 592
  - RYGB = 91
- Average BMI 42
- MG mean follow-up of 28.8 +/- 14.0 months
- NM mean follow-up of 32.8 +/- 23.4 months.

Mesh repairs had a lower recurrence rate of 2% (I^2=15%;95%CI: 0%-3%)

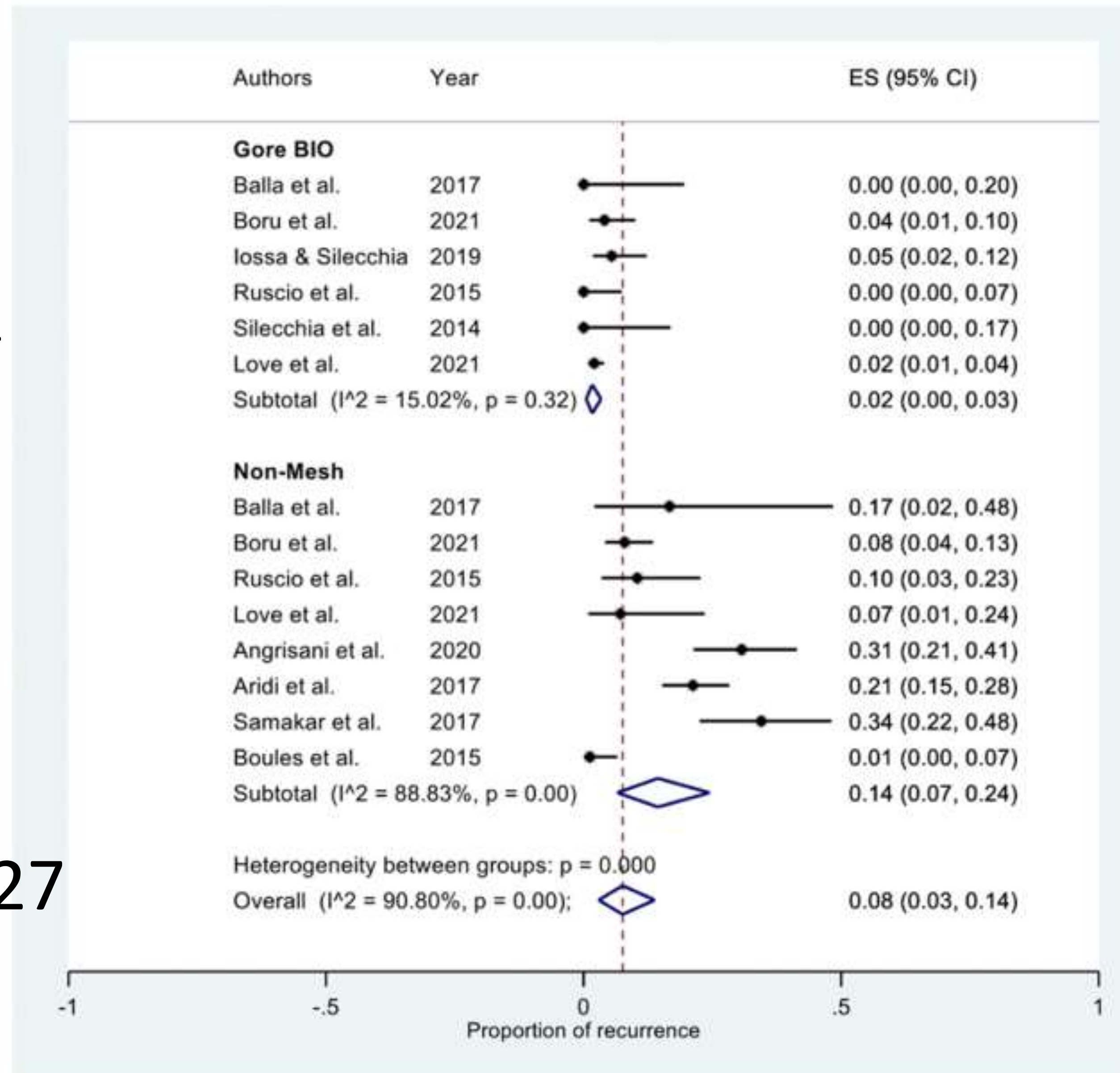

Fig. 2. Forest plot of recurrence rates.

NM repairs had a recurrence rate of 14% (I^2=88.8%; 95% CI:7%–24%)

P value = 0.027

Operative time

MG = 124.5 minutes (79–165.7).

NM = 120.2 minutes (72–166)

Not significant

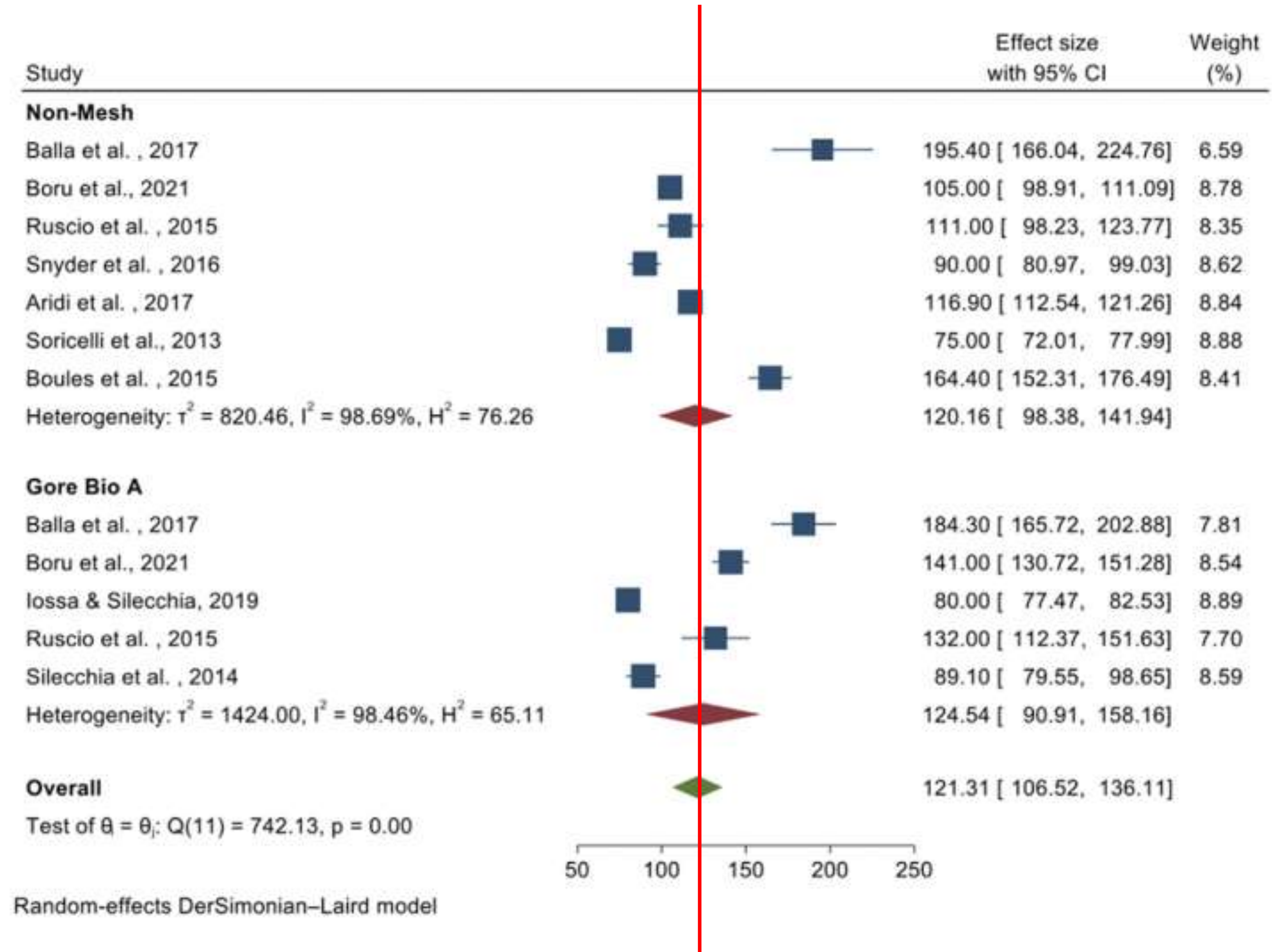

Fig. 3. Forest plot of operative times.

Length of Stay

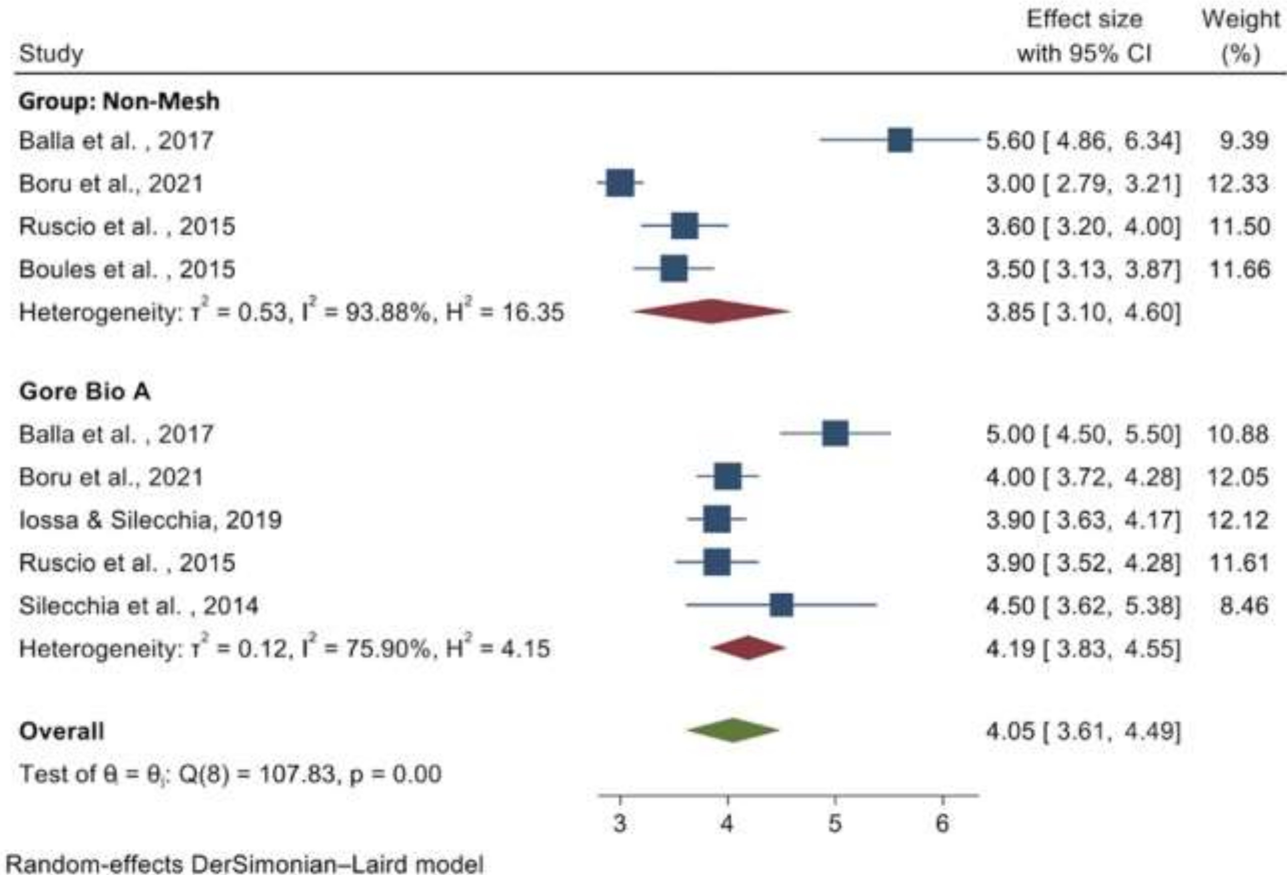

Fig. 4. Forest plot of length of stay.

Not statistically significant

Take home points

- About 18% of MBS undergoes mesh repair
- Use of mesh is growing in the US at least
- Mesh reduces recurrence in the mid-term

Conclusions

- Bioabsorbable mesh has a lower recurrence rate.
- Bioabsorbable mesh should be considered when repairing a HH at the time of metabolic and bariatric surgery.
- No data on P4HB
- All of the reported studies were PGA-TMC

Questions?