How Absorbable is Bio-absorbable Mesh? A Meta-Analysis.

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INTRODUCTION

The use of bio-absorbable mesh at the hiatus is controversial. There are two widely available meshes that can be placed during hiatal hernia repair. These are polyglycolic acid (PGA):trimethylene carbonate (TMC) and poly-4-hydroxybutyrate (P4HB) that are both considered bio-absorbable.

The rates of resorption are 6 months and 12 – 18 months respectively. Both provide a "scaffold" for tissue ingrowth. But the long-term data is scant. We evaluated the world literature and performed a meta-analysis to determine if these meshes were effective in reducing recurrence.

METHODS

- A literature search was performed to evaluate for articles reporting on both PGA:TMC and P4HB used at the hiatus, including non-mesh repairs for comparative reasons
- The DerSimonian-Laird random effects model was used to estimate the overall pooled treatment effect with a 95% confidence interval
- Analysis was conducted to compare the clinical outcomes i.e., recurrence rate, mean surgical time, mean hospital stay and mean follow-up duration between non-Mesh and Mesh group
- The I-square statistic was computed to assess the heterogeneity in effect sizes across the studies
- Publication bias was evaluated using Begg's test to assess if there is a significant correlation between the ranks of the effect estimates and the ranks of their variances

RESULTS

A total of 16 studies (10 mesh studies with 845 subjects and 6 non-mesh studies with 494 subjects) were included to conduct the meta-analysis. There was 1 article reporting outcomes on P4HB and 9 on PGA:TMC. Six studies in the non-mesh group were included.

The proportion of recurrence proportion was found to be less in the mesh group at 0.07 compared to non-mesh group (0.14); however, the finding was not statistically significant. Length of stay was almost the same between the groups (p=0.77). There tended to be a longer follow-up period in the mesh group (27.41 months vs 21.35 months). Surgery time was significantly shorter in the mesh group (127.89 mins vs. 216.72 mins; p< 0.001).

FIGURE 1.

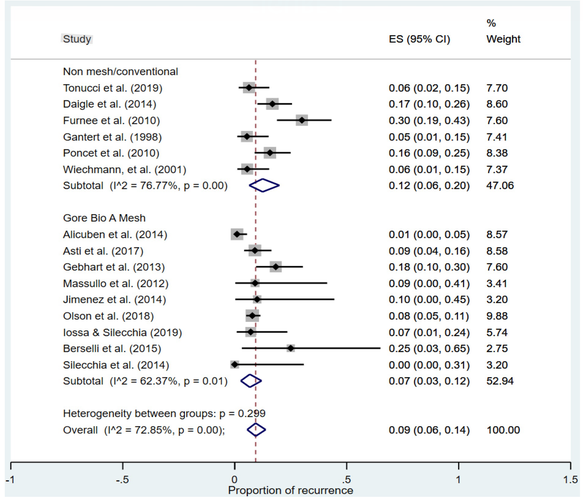


Figure 1. Hiatal Hernia recurrence rate in non-mesh vs. TMC mesh group

CONCLUSIONS

- Bioabsorbable mesh is another attempt to reduce recurrent hiatal hernia rates.
- In our meta-analysis, there was no improvement in recurrence rates using bio-absorbable mesh at an average follow-up of 29 months over the non-mesh group.
- PGA:TMC was reported 8 x more than P4HB and only had 17 months of follow-up.
- Further study of P4HB mesh is needed.

REFERENCES

1. Olson MT, Singhal S, Panchanathan R, Roy SB, Kang P, Ipsen T, Mittal SK, Huang JL, Smith MA, Bremner RM. Primary paraesophageal hernia repair with Gore® Bio-A® tissue reinforcement: long-term outcomes and association of BMI and recurrence. Surg Endosc. 2018 Nov;32(11):4506-4516. doi: 10.1007/s00464-018-6200-6. Epub 2018 May 14. PMID: 29761272.
2. Andujar JJ, Papasavas PK, Birdas T, Robke J, Raftopoulos Y, Gagné DJ, Caushaj PF, Landreneau RJ, Keenan RJ. Laparoscopic repair of large paraesophageal hernia is associated with a low incidence of recurrence and reoperation. Surg Endosc. 2004 Mar;18(3):444-7. doi: 10.1007/s00464-003-8823-4. Epub 2004 Feb 2. PMID: 14752653.
3. Panici Tonucci T, Asti E, Sironi A, Ferrari D, Bonavina L. Safety and Efficacy of Crura Augmentation with Phasix ST Mesh for Large Hiatal Hernia: 3-Year Single-Center Experience. J Laparoendosc Adv Surg Tech A. 2020 Apr;30(4):369-372. doi: 10.1089/lap.2019.0726. Epub 2020 Jan 7. PMID: 31910348.
4. Abdelmoaty WF, Dunst CM, Filicori F, Zihni AM, Davila-Bradley D, Reavis KM, Swanstrom LL, DeMeester SR. Combination of Surgical Technique and Bioresorbable Mesh Reinforcement of the Crural Repair Leads to Low Early Hernia Recurrence Rates with Laparoscopic Paraesophageal Hernia Repair. J Gastrointest Surg. 2020 Jul;24(7):1477-1481. doi: 10.1007/s11605-019-04358-y. Epub 2019 Aug 29. PMID: 31468330.
5. Aiolfi A, Cavalli M, Saino G, Sozzi A, Bonitta G, Micheletto G, Campanelli G, Bona D. Laparoscopic posterior cruroplasty: a patient tailored approach. Hernia. 2020 Apr 25. doi: 10.1007/s10029-020-02188-5. Epub ahead of print. PMID: 32335756.
6. Asti E, Sironi A, Bonitta G, Lovece A, Milito P, Bonavina L. Crura augmentation with Bio-A® mesh for laparoscopic repair of hiatal hernia: single-institution experience with 100 consecutive patients. Hernia. 2017 Aug;21(4):623-628. doi: 10.1007/s10029-017-1603-1. Epub 2017 Apr 10. PMID: 28396955.