Use of Ovine Reinforced Tissue Matrix in Bridged Incisional Hernia Repair

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Introduction

Optimal surgical ventral hernia repair involves primary closure of the fascial defect with mesh support to minimize the risk of recurrence. However, not all hernia defects can be closed primarily despite using preoperative Botox and intraoperative components separation to increase musculofascial advancement and promote closure. In these instances, mesh needs to be placed as a bridge over the remaining fascial gap. This mesh must therefore be strong enough to support the abdominal wall at the bridged portion of the repair.

In our tertiary referral center for complex abdominal wall reconstruction, we repair many large defects that occasionally require bridging the fascia with mesh. Many of these patients, with large defects requiring bridging, are at high risk of post-operative infections. In these cases, we choose biologic meshes as they have reduced risk of mesh related infection compared to synthetic meshes. Biologic meshes are preferable as they are able to remodel, but they have been shown to be prone to stretching; possibly leading to recurrences. To avoid this problem, our center uses an ovine reinforced tissue matrix (RTM), which combines an extracellular matrix (ECM) with a small percentage of synthetic reinforcement. This combination provides the strength needed to prevent recurrence and attenuate the foreign body response compared to synthetic meshes, potentially lowering infection rates.

Methodology

OviTex reinforced tissue matrices are made 4, 6, or 8 layers of decellularized ovine (sheep) forestomach (rumen) matrix reinforced with either polyglycolic acid or polypropylene suture embroidered in a lockstitch pattern to promote maximum strength.

In the bridged cases treated in this study, 6 or 8 layered RTMs with polypropylene sutures were used (1S-P or 2S-P). This study reports results in bridged patients treated between November 2016 to June 2021.

Results

Twenty-two patients with high incidence of comorbidities and history of prior ventral hernia recurrences were repaired with OviTex RTM. The patient population was composed 12 females (68%) and 6 males (32%) with a mean age of 61 years. Many of these patients had significant comorbidities with 68% being obese, 45% being hypertensive,18% having been diagnosed with a type of cancer, etc.

Fourteen (64%) had a history of prior ventral hernia repairs (1 to 5 prior repairs), two of whom had a previous bridged repair due to abdominal wall tumor removal. Twelve (86%) were previously repaired with a synthetic (58%) or porcine ADM (25%) mesh. Prior synthetic mesh repairs led to infection in 86% of patients and bowel adhesions in 14% of patients. While the use of porcine ADMs did not result in infection, it did lead to recurrence in all the patients.

The size of the defects repaired with OviTex RTM ranged from 6x10cm to 20x28cm with a mean size of 13x19cm. The residual bridged defect after suturing in the underlay mesh and suturing the fascial edge to the mesh ranged from 1x5cm to 8x20cm for a mean residual bridge of 5x11cm. Mesh sizes ranged from 200 to 750cm² (mean 450cm²).

Six patients (27%) repaired with OviTex RTM experienced post-operative wound infections, all treated non-operatively. There were no infections nor removals of the RTM itself. Three patients (14%) developed recurrences. One patient with a BMI of 38kg/m², who developed a postoperative wound infection. The other 2 recurrences were in patients with BMI's of 50 and 55kg/m². All 3 recurrences were diagnosed 6 months post-operatively.

Patient Demographics, Perioperative Variables, and Comorbid Conditions	
Subjects Enrolled	22
Sex, n (%)	**Female:** 15 (68%) **Male:** 7 (32%)
Age	**Mean:** 61 ± 2.66 **Range:** 24-81
BMI (kg/m²)	**Mean:** 34 ± 1.81 **Range:** 23-55
Comorbidities, n (%)	**HTN:** 10 (45%),**Obesity:** 15 (68%), **prior or current smoker:** 4 (18%), **DM:** 4 (18%), **factor V ledien**: 1 (5%), **PMH**: 2 (9%), **DVT**: 1 (5%), **cancer:** 4 (18%)
Patients with Prior VH repairs, n (%)	14 (64%)
Patients with Prior VH Mesh repairs, n (%)	12 (86%) *out of 14 prior VH repairs
Prior non-VH Surgery, n (%)	19 (86%)
Prior SSI, n (%)	9 (41%)

Operative Characteristics	
VHWG Grade, n (%)	**Grade 1:** 0 (0%), **Grade 2:** 6 (27%), **Grade 3:** 12 (55%), **Grade 4:** 4 (18%)
Hernia Defect Size (cm)	**Mean:** 13x19 **Range:** 6x10 – 20x28
Mesh Size (cm)	**Mean:** 19x23 **Range:** 10x12 – 25x30
Bridge Size (cm)	**Mean:** 5x11 **Range:** 1x5 – 8x20
Type of OviTex, n (%)	**1S-P:** 7 (32%) **2S-P:** 15 (68%)
Release, n (%)	**Anterior:** 18 (82%) **Posterior:** 4 (18%)
Plane of Placement, n (%)	**Retrorectus:** 3 **Intraperitoneal:** 16
Component Separation, n (%)	10 (45%)
Concomitant Surgery, n (%)	15 (68%)

Primary and Secondary Endpoints: Adverse Events	
Average Follow Up	13 months **Range:** 1 – 45 months
Hernia Recurrence, n (%)	3 (14%)
Occurrence of an SSO*, n (%)	7 (32%)
Seroma, n (%)	2 (5%)
Fistula, n (%)	1 (5%)
Surgical Site Infection, n (%)	5 (23%)
Bowel Obstruction, n (%)	1 (5%)
Pulmonary Embolism, n (%)	1 (5%)
*** Individual patients may have experienced more than one SSO**	



Patient in case series who underwent bridged hernia repair with OviTex RTM

Conclusion

Human and Porcine acellular dermal matrices have been shown to have recurrence rates in bridged patients of 80% and 40% respectively. The recurrence rate of 14% in our experience, using ovine RTM in bridged repairs of ventral hernias appears to be an improvement. We believe the reinforcement of the biologic mesh with polypropylene suture offers a stronger, more resilient repair.