

13<sup>th</sup> Annual

# Abdominal Wall Reconstruction 2022

MedStar Georgetown University Hospital



**ABSTRACTS**

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A Dynamic Virtual Conference with Expert Faculty

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## Modified Laparoscopic Sugarbaker Repair of a Recurrent Ileostomy Prolapse

Marius Hoogerboord, MD; Adele Orovec; Samuel Minor, MD

### Background:

Stomal prolapse occurs at a rate of 1-16% and can be sliding or fixed. While most prolapses are uncomplicated and managed conservatively, more extensive prolapse can significantly impact quality of life and lead to complications. Numerous surgical techniques have been described for stomal prolapse, however, recurrence rates remain high.

### Methods:

The modified laparoscopic Sugarbaker procedure is well established for repair of parastomal hernia, and we describe here a novel application of this operation for the management of a recurrent stomal prolapse.

### Results:

Case Report: A 57-year-old male presented with a significantly symptomatic, recurrent ileostomy prolapse following a proctocolectomy for ulcerative colitis. He had undergone three local revisions, as well as resiting of his stoma to the left flank. The patient consented to a modified laparoscopic Sugarbaker procedure. We pexied the stomal limb to the anterior abdominal wall, from the stoma facial opening across the midline to the right flank, with 4 interrupted absorbable sutures using intracorporeal technique. An expanded polytetrafluoroethylene (ePTFE) mesh was trimmed to size and positioned over the pexied bowel in Sugarbaker fashion and secured to the anterior abdominal wall using titanium tacks. The patient was discharged on postoperative day three and upon one-year follow-up the stoma remained healthy with no recurrence of the prolapse.

### Conclusions:

This case demonstrates the novel application of the modified laparoscopic Sugarbaker procedure for the repair of a recurrent stomal prolapse and provides an alternative option for the surgeon managing this challenging clinical problem.

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## Surgical Reconstruction of Peri-Fistula/Stomal Soft Tissue: Revise, Isolate, Skin Graft, Pouch (Risp)

Mary Anne Obst, RN, BSN, CCRN, CWON

### Background:

A leaking ostomy or fistula pouch is devastating to the patient and provider. In some situations, the soft tissue around the fistula or ostomy makes it impossible to apply a pouch and contain effluent. "Unpouchable" peri-stomal/fistula conditions include open wounds, scarring or uneven skin, fistula under wound edge, and poorly sited or retracted stomas. Unpouchable patients can be facility bound for extensive stays.

### Methods:

RISP (Revise, Isolate, Skin graft, Pouch) is a surgical technique to reconstruct peri-stomal and peri-fistula soft tissue. We present patient cases to illustrate the RISP technique: • Revise soft tissue surgically to fully expose the stoma or fistula and create a pouching site around the fistula or ostomy stoma. Note: We do not enter the peritoneum. • Isolate and control ostomy or fistula output and apply negative pressure wound therapy (NPWT) to prepare the pouching site. • Skin graft the tissue around the ostomy or fistula. Protect the graft with an isolation device and a contact layer and bolster with NPWT. • Pouch with a standard ostomy appliance and instruct patient in self-care after the skin graft has taken.

### Results:

The RISP technique effectively creates ostomy appliance pouching sites for patients with unmanageable ostomies or fistulas. Isolation devices\* coupled with NPWT enable control of effluent after soft tissue revision and skin graft placement around the ostomy or fistula. Ultimately peri-ostomy/fistula skin grafts healed, and all patients transitioned to a reliable, easy-to-place ostomy pouch.

### Conclusions:

RISP highlights the need for a multidiscipline approach to reconstruct an improved pouching site around ostomies and fistulas. RISP can improve patient quality of life, decrease hospital stays and enable patients to return to home.

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## A New Paradigm for Abdominal Trauma Wound Therapy

Mary Anne Obst, RN, BSN, CCRN, CWON

### Background:

A 2021 press release from the American College of Surgeons notes that we are experiencing a national surge in injuries, including a significant increase in gunshot wounds. Our trauma center has felt this sharp increase including three recent gunshot wounds in children under the age of nine. Two of these incidents were fatal, but fortunately the third victim survived. We present her case along with other complex patients to illustrate advances in abdominal trauma wound therapy using Hypochlorous Acid Preserved Wound Cleanser\* (HAPWOC).

### Methods:

We report our experience using HAPWOC with and without negative pressure wound therapy with instillation (NPWT-i) on a variety of traumatic wounds. Our intent is to validate use of this therapy for healing these complex wounds.

### Results:

We utilized HAPWOC in combination with NPWT-i and wet to dry gauze. We present six case outcomes in patients aged from 32 months to 75 years. The injuries include a gunshot wound, blast injury, motorcycle

crash, crush injury, motor vehicle crash, and an industrial pressure washer injury. The NPWT-i settings ranged from pressures of -50 to -150 mmHg, soak phases ranging from 5 to 10 minutes, and instillation cycles of either 2 or 3 ½ hours. The HAPWOC gauze soaks were changed twice daily. Of the 6 patients presented, 5 have complete closure. Four closures were by split thickness skin grafting, one closed by secondary intention, and one will receive a rotational flap. Four of these patients have discharged to home.

#### **Conclusions:**

In our experience, abdominal trauma wounds benefit from the use of HAPWOC. We find this therapy effective in healing complex wounds when used in conjunction with NPWT-i and when HAPWOC is used in wet to dry gauze dressings.

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## **Preoperative Weight Loss Associated with Decreased Surgical Site Infections Following Ventral Hernia Repair with Component Separation**

*Yewande Alimi, MD; Parag Bhanot, MD, FACS; Romina Deldar, MD; Zoe Haffner; Brian Truong*

#### **Background:**

Obesity has been established as a predictor of post-operative morbidity, including hernia recurrence. When evaluating patients for abdominal wall reconstruction, pre-operative body mass index (BMI) must be considered to counsel patients appropriately. The purpose of this study was to determine if weight loss prior to complex ventral hernia repair (VHR) with component separation is associated with decreased postoperative complications and hernia recurrence.

#### **Methods:**

A retrospective review of patients who underwent VHR with component separation from 2013-2021 was conducted. Patients were divided into cohorts based on preoperative weight loss, defined as total BMI lost greater than 0 kg/m<sup>2</sup>. Primary outcomes included postoperative complications and hernia recurrence.

#### **Results:**

A total of 186 patients were identified. Average BMI was 32.2 kg/m<sup>2</sup>. 131 patients (70.4%) lost weight prior to surgery, and 55 patients (29.6%) did not lose any weight or gained weight. Mean weight loss was 2.4 kg/m<sup>2</sup> (range, 0.02 - 27.4 kg/m<sup>2</sup>). The mean weight gain in those unable to lose weight preoperatively was 1.1 kg/m<sup>2</sup> (range, 0.01-5.9 kg/m<sup>2</sup>). Patient comorbidities were similar among cohorts, except there was a higher prevalence of immunosuppression in patients who did not lose weight preoperatively (18.2% vs. 3.8%, p=0.002). Postoperative surgical site infection was significantly higher in patients without preoperative weight loss (9.1% vs. 2.3%, p=0.037). Hernia recurrence occurred in 2.7% (n=5) of the study population, and did not significantly differ between groups.

#### **Conclusions:**

We demonstrate that successful preoperative weight loss is associated with decreased postoperative surgical site infection formation following VHR with component separation.

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## **Does Advanced Age Influence Postoperative Morbidity Following Ventral Hernia Repair with Component Separation?**

*Yewande Alimi, MD; Parag Bhanot, MD, FACS; Romina Deldar, MD, Julian Marable; Adaah Sayyed*

#### **Background:**

Ventral hernia repair (VHR) with component separation has become increasingly being performed. Few studies report postoperative outcomes in patients with advanced age. The aim of this study is to determine if advanced aged patients (>65 years) is associated with greater postoperative morbidity compared to younger patients (< 65 years) following elective VHR.

#### **Methods:**

A retrospective review of patients who underwent with component separation by a single surgeon from 2008 to 2021 was conducted. Patients were divided into cohorts based on age on date of surgery. Primary outcomes included postoperative complications and hernia recurrence. Univariate analysis was performed with statistical significance set at values of p<0.05.

#### **Results:**

A total of 219 patients were identified. There were 72 patients (32.9%) who were 65 years or younger, and 147 patients (67.1%) who were older than 65 years. Body mass index was significantly higher in younger patients compared to the older cohort (33.5 vs. 30.6 kg/m<sup>2</sup>, p=0.002). There were no significant differences in comorbidities or intraoperative factors between the two age cohorts. There were no significant differences in complications, readmissions, or hernia recurrence, between patients younger or older than age 65.

#### **Conclusions:**

Age is a common risk factor for postoperative morbidity. We demonstrate that VHR with component separation is not associated with increased postoperative complications in elderly patients. Advanced age should not be a deterrent to complex abdominal wall reconstruction.

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## **Outcomes of Immediate Multi-Stage Abdominal Wall Reconstruction of Infected Mesh: Predictors of Surgical Site Complications and Hernia Recurrence**

*Yewande Alimi, MD; Parag Bhanot, MD; Romina Deldar, MD; Kenneth Fan, MD; Kieranjeet Nijhar, MD*

#### **Background:**

Mesh infection is one of the most devastating complications following ventral hernia repair (VHR) and occurs

in up to 10% of patients. Operative treatment goals include infection control, restoration of bowel continuity (if necessary), and definitive abdominal wall reconstruction (AWR) given the likelihood of hernia recurrence that follows mesh explantation. To date, no clear consensus exists on the optimal timing of definitive AWR following excision of infected mesh. The purpose of this study is to evaluate outcomes of immediate multi-staged AWR using biologic mesh in patients who presented with mesh infection.

#### **Methods:**

We performed a retrospective review of patients with mesh infection who underwent immediate, multi-staged AWR, which consisted of exploratory laparotomy with debridement and mesh explantation, followed by definitive AWR with porcine acellular dermal matrix (PADM) biologic mesh a few days later. Primary outcomes included postoperative surgical site occurrences and hernia recurrence. Univariate analyses were performed to identify variables associated with primary outcomes.

#### **Results:**

A total of 47 patients with infected mesh underwent immediate multi-staged AWR. Average age and body mass index (BMI) were 57.7 years and 35.0 kg/m<sup>2</sup>, respectively. Median time from original VHR to mesh infection 26.9 months. Comorbidities included diabetes (n= 14, 29.8%) and chronic steroid use (n=2, 4.3%). The most common type of mesh explanted was synthetic (n=43, 91.5%). Postoperative surgical site infection occurred in 10 patients (21.3%). At a mean follow-up of 9.5 months (range 0.4 to 93.6 months), 5 patients (10.6%) experienced hernia recurrence. Younger age (48.6 vs. 58.7 years, p=0.041), higher BMI (52.4 vs. 34.1 kg/m<sup>2</sup>, p=0.006), bridge repair (failure of fascial apposition) (60% vs. 16.7%, p=0.035), and postoperative surgical site infection (80% vs. 14.3%, p=0.005) were all significantly associated with hernia recurrence.

#### **Conclusions:**

Management of infected mesh can be a reconstructive challenge for surgeons. This study demonstrates that immediate, multi-staged AWR is an effective surgical approach in patients who present with infected mesh. Larger multi-institutional studies are warranted to aid in future development of clear management guidelines in this challenging patient population.

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## **Clinical and Economic Outcomes of Stratifix™ Symmetric Versus Other Conventional Sutures for Abdominal Midline Closure in Patients Undergoing Open Hernia Repairs**

*Frederik Berrevoet, MD, MPH; Walter Danker III, PhD; Najmuddin Gunja, PhD; Jorg Tomaszewski, MD*

#### **Background:**

STRATAFIX™ Symmetric is a barbed suture providing strong, secure closure for fascia in high-tension areas. We assessed clinical and economic outcomes of patients undergoing open hernia repair using STRATAFIX™ Symmetric versus PDS conventional suture for abdominal wall closure.

#### **Methods:**

This retrospective cohort study identified patients undergoing hernia repair at a single center between 2013 and 2020. Fixed follow-up of 30, 60, and 90 days were used to assess outcomes (peri-operative complications, and resource utilization). Multivariate analyses for selected outcomes and Cox Proportional Hazards models for time to readmission and complications were conducted.

#### **Results:**

Of 821 hernia repairs, 446 used STRATAFIX™ Symmetric and 375 used conventional PDS suture. Baseline characteristics were largely similar between the groups. Surgical site infections (SSI) were significantly less frequent with STRATAFIX™ Symmetric (60-day, 5.9% vs. 11.4%; P=0.0083; 90-day, 5.9% vs. 11.7%; P=0.006) and remained consistent after multivariate adjustment (60-day, OR [95% CI]: 0.52 [0.29 - 0.92]; 90-day, 0.51 [0.28 - 0.90]). Among patients with SSI, deep SSI were less frequent with STRATAFIX™ Symmetric (60-day, 9.1% vs. 35.7%; P=0.022; 90-day, 9.1% vs. 34.9%; P=0.0252). STRATAFIX™ Symmetric significantly reduced the risk of peri-operative complications over time (HR 0.57 [95% CI 0.36-0.92]; P=0.0203). Hospital length of stay was, on average, 2.74 days longer in PDS patients (mean [95% CI] 8.75 [7.83-9.78] vs. 6.01 [5.16-6.99] days; P<.0001).

#### **Conclusions:**

Significant differences between sutures were seen with peri-operative infections, which occurred less frequently with STRATAFIX™ Symmetric and less severe. Peri-operative complications and length of stay were significantly reduced with STRATAFIX™ Symmetric.

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## **Definitive Closure Using Ovitex Ovine Reinforced Tissue Matrix in The Complex Open Abdomen After Penetrating Abdominal Trauma**

*Luis Fernandez, MD*

#### **Background:**

Penetrating abdominal trauma occurs in 35% of patients admitted to urban trauma centers and 12% of patients admitted to suburban/rural centers in the US. These cases often involve damage to multiple organ systems with contamination of the abdominal cavity, are complex, and may require multiple repairs before definitive closure of the abdominal wall. When closing the abdominal fascia, synthetic meshes, or biologic matrices may be chosen to offer additional reinforcement.

#### **Methods:**

Two cases involving penetrating thoraco-abdominal trauma are presented, one due to a stab wound (SW) and one due to a farm equipment accident (FA). An ovine reinforced tissue matrix (RTM) was chosen to achieve definitive closure in these two cases. In the SW case, an 8-layer RTM with resorbable polymer reinforcement was used as an overlay in conjunction with a myocutaneous flap advancement to achieve abdominal wall closure. In the FA case, a 6-layer RTM with resorbable polymer reinforcement was used as a sublay to repair

a large upper abdominal wall traumatic hernia.

**Results:**

The SW patient had no post-operative infections and was discharged home on hospital day (HD) 15. The FA patient also did not suffer any post-operative infection and was discharged home on HD13.

**Conclusions:**

The use of RTM in two contaminated and complex penetrating thoraco-abdominal trauma cases, was effective in promoting fascial healing, and had no reported incisional hernias at 2 years post repair. In a cost comparison to other available biologic matrices, the use of ovine RTM saved our institution between \$1,874-10,473 per case. The two cases presented suggest that ovine RTM may be a safe and cost-effective option in achieving fascial closure in penetrating, and complex thoraco-abdominal wall traumatic injury.

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## **Incidence and Pattern of Dystrophic Calcification in Patients Undergoing Abdominal Wall Reconstruction with Biologic Mesh and Calcium Sulfate Antibiotic Beads**

*Jonny Doucett, MD; Marius Hoogerboord, MD; Samuel Minor, MD, FACS*

**Background:**

Complex ventral hernia repair in the setting of contamination is associated with high rates of wound complication rates and consequently, strategies to prevent SSI in this setting are of great interest. The use of Stimulan® (Biocomposites Ltd, Wilmington, NC) absorbable, calcium sulfate antibiotic beads (CSAB) in patients at high risk for infection undergoing abdominal wall reconstruction with reinforcement of the repair with porcine submucosal hernia graft to decrease the rate of wound infection has previously been described. The rare (<2%) development of calcium deposits in soft tissue, known as dystrophic calcification (DC), has been described in the use of CSAB implanted into soft tissue in the setting of orthopedic surgery but its occurrence in hernia repair has not been reported.

**Methods:**

This was a retrospective review of a case series from a single surgeon in patients undergoing single stage abdominal wall reconstruction in contaminated settings using biologic mesh with CSAB.

**Results:**

In the 23 patients undergoing incisional hernia repair with porcine submucosa hernia graft and CSAB, 7 of the 12 patients (58%) who had a post operative CT had evidence of DC. In the 19 patients who had the same operation without CSAB, only 2 of 11 (9%) had evidence of DC. The pattern of the DC in patients with CSAB was also distinctly different, occurring horizontally along the hernia graft insertion plane as a linear line, where as those without CSAB had DC as single punctate deposits.

**Conclusions:**

This novel radiographic finding is common in this patient population and is important as it can be misinterpreted as an enteric fistula.

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## **Collagen Remodeling of Strattice Firm in A Non-Human Primate Model of Abdominal Wall Repair**

*Jared Lombardi; Nimesh Kabaria, MS; Maryellen Sandor, PhD; Eric Stec*

**Background:**

Collagen remodeling of Strattice™ porcine acellular dermal matrix was characterized in a non-human primate model of abdominal wall repair by evaluating host biologic response kinetics during wound healing.

**Methods:**

Strattice Firm (n=6 lots/time point) was implanted in a full-thickness abdominal wall bridging defect in African Green monkeys (N=24). Histological, immunohistochemical, and biochemical assessments were conducted at various time points.

**Results:**

Pro-inflammatory tissue cytokine levels peaked 1-month post-implantation and then subsided to baseline by 6 months. Similarly, Strattice-specific serum IgG antibodies showed a peak of 213-fold increase on average from baseline at 1 month, subsiding to a <10-fold increase from baseline by 6 months (Figure 1). The percentage of tissue area staining positively by immunohistochemistry for MMP-1 (collagenase) and its inhibitor TIMP-1 plateaued at 40.3%±4.1% and 39.0%±3.4%, respectively, between 1 and 3 months, with both decreasing to 17.4%±1.9% and 13.0%±2.1%, respectively, by 9 months. Hematoxylin and eosin histology demonstrated a peak in host tissue deposition with diffuse expansion throughout the implant, concomitant with 75%-100% Strattice collagen turnover between 3-6 months, with significant fibroblast infiltration and neovascularization during this time period. Similarly, picrosirius red staining revealed that the predominantly red-staining mature and thick Strattice collagen was notably replaced by yellow/orange/green-staining and thin host-associated neo-collagen by 6 months (Figure 2).

**Conclusions:**

In the context of normal wound healing, collagen remodeling of Strattice indicated a mild inflammatory phase lasting 1-3 months, with a period of matrix-to-host collagen turnover that plateaued by 3-6 months.

Figure 1. Serum IgG antibody titer. Serum was collected at multiple time points from animals implanted with Strattice (n=6 per cohort) and was probed against Strattice acellular dermal matrix using an enzyme-linked immunosorbent assay (ELISA). The average fold increase of serum IgG antibodies was calculated and plotted. The average IgG antibody induction increased sharply and peaked at 1 month before returning to near baseline levels by 6 months.

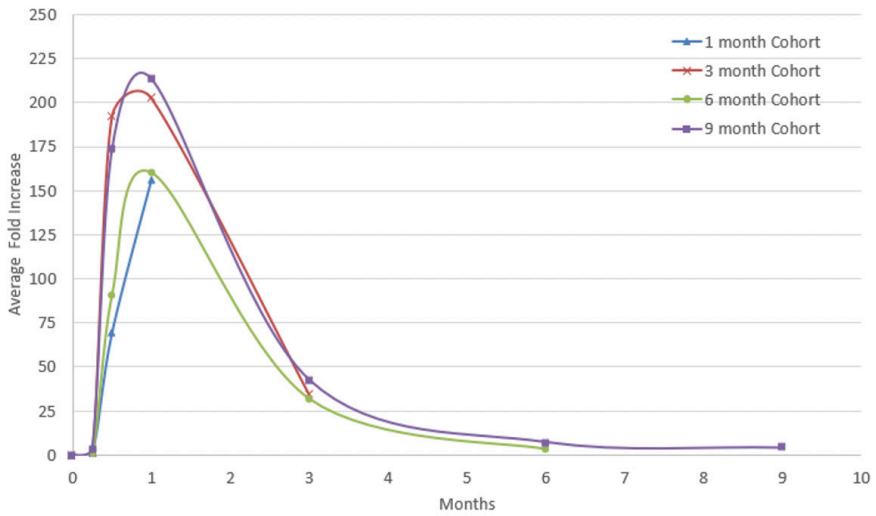


Figure 2. Representative images of Strattice acellular dermal matrix stained with picosirius red and viewed under polarized light at 20× magnification. (A) Strattice pre-implant with a birefringent lattice-like dermal structure. (B) A 1-month Strattice explant with majority birefringent dermal structure and non-birefringent surrounding host primate tissue. (C) A 3-month Strattice explant with majority of dermal tissue remodeled to non-birefringent host primate tissue. (D) A 6-month and (E) a 9-month Strattice explant with no evidence of birefringent dermal structure.

