post-operative period and lays the foundation for future studies to assess long-term outcomes related to hernia recurrence.

Gauging the Tension: A Simple and Reliable Method to Quantify the Forces Generated on Fascial Closures in Hernia Repair and Component Separation

Presenter: Karel-Bart Celie, BA

Co-Authors: Adam S. Levy, MD; Jaime L. Bernstein, BS; Jason A. Spector, MD, FACS

Affiliation: Laboratory of Bioregenerative Medicine & Surgery, Weill Cornell Medicine, New York, NY

INTRODUCTION: Ventral hernias are a common complication after open abdominal surgery. Excessive tension on the fascial line of closure is an established and major cause of recurrence. Although hernias in the literature are most commonly characterized by area, almost no clinical literature exists that describes the actual tension experienced by the fascia at closure. Thus, small hernias surrounded by less compliant tissue may actually be at higher risk for recurrence than larger hernias with more elastic tissues. Here we aim to develop an accurate and simple technique for intra-operatively measuring the tension of the fascia on closure during hernia repair.

METHODS: A simple device (tensiometer) was created using a spring with a known recoil constant ($k$) hooked to a Kocher clamp, which was attached to a fascial defect and pulled until the fascia reached midline. By measuring the change in length of the spring, the resulting tension on the fascia could be calculated by Hooke’s Law ($F = kx$; $k =$spring constant, $x =$spring displacement). This method was applied first to a synthetic skin secured on one end to test validity over a range of forces by two independent observers. Next, the model was tested on the anterior abdominal fascia of 4 fresh cadavers (8 hemi-abdomens) over a range of simulated hernia defects from 0 to 18cm wide. When the fascia could no longer be approximated to midline, a components separation (CS) was performed and measures repeated. Measurements were taken in triplicate for each defect size by 2 observers for each hemi-abdomen at the midpoint and 1/3 from the inferior and superior most points. All measurements were plotted as force versus defect size, allowing calculations of tissue stiffness. Given our novel methodology, Pearson’s correlation was calculated to validate the reliability of our technique. P-values less than 0.05 were considered significant.

RESULTS: When the synthetic skin edge was pulled to 3, 5, and 8 cm, the spring length was increased to 8.6, 9.3, and 10.4 cm, respectively, resulting in a force of 10.44, 14.12, and 19.9 N (SD 0.1). In cadavers, defects ranged from 1 to 18 cm in diameter with average midline force prior to release 36.1 N (range 17–48) and 8.2 N (range 5–11) after CS, a mean 436% decrease (range 327 to 677). Mean $R^2$ values between defect size and tension for the synthetic and cadaver models were 0.99 ($p < 0.01$) and 0.91 ($p = 0.01$; all values significant), demonstrating the precision of this methodology in quantifying fascial tension. Inter-rater Pearson’s correlation between observers consistently found $R^2$ values $>0.95$ ($p < 0.01$) for each hemi-abdomen, showing this model to be highly reproducible.

CONCLUSION: We have developed a low cost, simple, and precise method of assessing fascial tension on the hernia suture line. This technique may be rapidly translated into the operating room, requiring only a Kocher and a spring made of medical grade stainless steel that can easily be sterilized using an autoclave. Quantifying the fascial tension at the time of hernia repair would provide significant objective data to surgeons critical for intraoperative decision-making, leading to improved outcomes and reduced incidence of recurrent hernia.

Bovine Acellular Dermal Matrix for Complex Abdominal Wall Reconstruction: A Cost Analysis and Outcomes Study

Presenter: Johanna D’Agostino, MD

Co-Authors: Catherine Sinnott, MD; Malack Hamade, MD; Michael Dobriansky, MD

Affiliation: Nassau University Medical Center, East Meadow, NY

BACKGROUND: Complex abdominal wall reconstruction with components separation and the use of acellular
dermal matrix (ADM) is required in selected patients. The most common bioprosthetic mesh used for this procedure is the porcine acellular dermal matrix (Strattice®). The use of Bovine acellular dermal matrix (SurgiMend®) has not been well defined in complex abdominal wall reconstruction. The authors set out to investigate whether the use of SurgiMend® has comparable outcomes at a significantly reduced cost when compared to Strattice®.

METHODS: We performed a retrospective chart review of all patients who underwent complex abdominal wall reconstruction at the time of ventral hernia repair with component separations using SurgiMend® mesh between January 2012 and November 2016 by the senior author. Patient demographics, surgical and clinical outcomes were reviewed and assessed. Results were then compared to published literature of similar patients who required the same procedure but with the most common acellular dermal matrix Strattice®. In addition, the hospital cost of the SurgiMend® mesh used in each case was compared to the cost of an equivalently sized piece of Strattice® mesh.

RESULTS: Fifty-eight patients were identified during this period who underwent components separation with the use of SurgiMend®. The minimum post-operative follow up time was twelve months. Seven cases of wound infections were identified (12.1%). Postoperative partial wound dehiscence without mesh exposure was seen in seven cases (12.1%). There were two cases of hematoma (3.4%) and three recurrences (5.2%). These results were compared to published literature of comparable cases in which Strattice® mesh was used for the reinforcement of the complex repair. The results of our study confirm that SurgiMend® surgical outcomes are comparable to those described in the literature for Strattice®. The cost of a centimeter squared of each of the ADMs was obtained from our institution (SurgiMend® $22 Vs. Strattice® $24). We then calculated the mean cost of SurgiMend® mesh used in all fifty-eight cases and compared it to the mean cost of equivalently sized Strattice® mesh. The cost for the SurgiMend® was calculated to be $12,342.8 ± 366.1 (SEM) which was significantly less than the cost for Strattice® at $13,425.7 ± 392.3 (SEM) (p = 0.0459).

CONCLUSION: In patients requiring complex abdominal wall reconstruction with separation of abdominal components and the use of acellular dermal matrix mesh, both SurgiMend® and Strattice® appear to have comparable surgical and clinical outcomes based on previous published literature and our study results. SurgiMend® should be considered as a safe, cost effective option for complex abdominal wall reconstruction.

Concurrent Panniculectomy and Ventral Hernia Repair in Overweight and Obese Patients: A Retrospective Assessment of Clinical Outcomes, Cost, and Quality of Life

Presenter: Catherine E. Hutchison, BA
Co-Authors: Irfan A. Rhemtulla, MD, MS; Jaclyn T. Mauch, BA; Charles A. Messa IV, BS; Robyn B. Broach, PhD; Jesse Y. Hsu, PhD; Fabiola A. Enriquez, BA; Jeffery I. Rohrbach, MSN; Noel N. Williams, MD, FRCSI; Sean P. Harbison, MD; John P. Fischer, MD, MPH
Affiliation: University of Pennsylvania, Philadelphia, PA

PURPOSE: Overweight and obese patients suffering from ventral hernias represent a unique cohort of patients, where the combination of these morbid disease processes result in a shared surgical challenge. Abdominal wall reconstruction combining ventral hernia repair (VHR) with panniculectomy (VHR-PAN) in the overweight or obese patient has been highly debated. Advantages of the combined procedure include removal of inflamed or infected soft tissue, complete abdominal wall exposure for an efficient intraoperative repair, and the avoidance of a second surgical procedure. Disadvantages include the risk of higher complication rate and unplanned reoperations. Existing literature fails to integrate clinical outcomes with cost and patient-reported outcomes from both a cosmetic and functional perspective. Due to increased prevalence of obese patients with ventral hernia, we present a comprehensive comparison between VHR-PAN and VHR alone in overweight or obese patients by examining clinical outcomes, cost, and quality of life (QoL).

METHODS: A retrospective review was conducted for eighty-three patients with body mass index (BMI) > 25.0 kg/m² who underwent VHR-PAN (n=51) or VHR alone (n=32) between September 1, 2015 and May 30, 2017 by a single surgeon at the University of Pennsylvania. QoL was assessed using the Hernia-related Quality of Life