Comparative analysis of biologic versus synthetic mesh outcomes in contaminated hernia repairs

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Background. *Contaminated operative fields pose significant challenges for surgeons performing ventral hernia repair. Although biologic meshes have been utilized increasingly in these fields, recent evidence suggests that synthetic meshes represent a viable option. We analyzed the outcomes of biologic and synthetic mesh utilized in patients undergoing major ventral hernia repair in clean-contaminated/contaminated fields.*

Methods. *We conducted a multicenter, retrospective review of patients undergoing open ventral hernia repair in clean-contaminated/contaminated fields using biologic or synthetic mesh. Patient and hernia details were characterized. Primary outcomes included 90-day surgical site event, surgical site infection, and hernia recurrence.*

Results. *A total of 126 patients undergoing major ventral hernia repair in clean-contaminated/contaminated fields (69 biologic and 57 synthetic meshes) were analyzed. Groups were similar in both patient and hernia characteristics. There were 13 (22.8%) surgical site events in the synthetic cohort compared to 29 (42.0%) in the biologic cohort,* P = *.024. Similarly, surgical site infections were less frequent in the synthetic group, with 7 (12.3%) vs 22 (31.9%),* P = *.01. With a mean follow-up of 20 months, there were more recurrences in the biologic group: 15 (26.3%) vs 4 (8.9%) in the synthetic group,* P = *.039.*

Conclusion. *The choice of mesh for clean-contaminated/contaminated ventral hernia repair remains debatable. We demonstrated that using synthetic sublay mesh resulted in a significantly lower wound morbidity and more durable outcomes versus a similar cohort of biologic repairs. This is likely secondary to improved bacterial clearance and faster integration of macroporous synthetics. Overall, our findings not only support suitability of synthetic mesh in contaminated settings but also challenge the purported advantage of biologics in clean-contaminated/contaminated ventral hernia repairs. (Surgery 2016;160:828-38.)*

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Mesh reinforcement has been recognized as an integral component for the vast majority of hernia repairs given its ability to reduce hernia recurrence.[1-3] With increasingly complex procedures being performed across the field of surgery, along with an expanding population with frequent comorbidities, hernia repair in contaminated fields has become a frequent challenge to surgeons. Mesh reinforcement is often utilized in complex or contaminated scenarios despite the potential for wound morbidity and/or mesh infection.

One avenue to combat these infectious complications was developed with the introduction of bioprosthetics. With a purported ability to remodel into native tissue and avoid permanent foreign body presence, biologic meshes were touted as a

preferable alternative to permanent synthetic options for contaminated operative fields. Despite the initial promise of bioprosthetic devices,[4,5] recent data call into question their "biologic" behavior and long-term efficacy in these challenging fields.[6-8] Moreover, there is mounting evidence that certain synthetic meshes may not only serve as a viable option in contaminated repairs, but may actually be better able to overcome infective complications.[7,9]

Although the pendulum appears to be swinging away from biologics, there remains widespread hesitancy to deploy synthetic implants in contaminated operative fields where the risk of mesh infective complications may outweigh their potential benefit in terms of lower recurrence rates. For this reason, practice patterns continue to vary widely, and consensus has not been reached as to the optimal solution for contaminated hernias. We have evolved from nearly routine to very limited utilization of biologic mesh in nonclean wounds.

Herein, we sought to analyze our experience with hernia repairs in clean-contaminated and contaminated operative fields during open ventral hernia repair (VHR). We hypothesized that synthetic meshes would offer more durable repair without increased wound/mesh morbidity when compared to biologic mesh in a large cohort of clean-contaminated and contaminated wounds.

METHODS

With Institutional Review Board approval, we performed a multicenter analysis on patients undergoing major open VHR in clean-contaminated and contaminated fields from prospectively maintained hernia databases. All surgeons involved in the study were part of tertiary hernia care referral centers. We included all patients who underwent elective VHRs with biologic or synthetic mesh placed in Centers for Disease Control and Prevention (CDC) wound class II or III.[10] Patients with grossly dirty wounds (CDC class IV) were excluded, along with any emergency repairs.

Pertinent data reviewed included patient demographics, such as age, sex, American Society of Anesthesiologists physical status score, body mass index, and patient comorbidities. We also characterized patient hernia history, wound classification based on CDC guidelines, and source of contamination.[11] Source of contamination was categorized as gastrointestinal (GI; including biliary sources), genitourinary/gynecologic, and/or infective. Infective sources included chronic draining sinuses and wounds, with or without underlying mesh involvement, along with chronic soft tissue infection in absence of gross purulence (representing long-term contamination or colonization). No CDC class IV wounds with active infection were considered for this study. Perioperative data reviewed included operative time, repair technique, hernia defect size, and mesh size and type.

Primary outcome measures for this study were the presence of a postoperative surgical site event (SSE), surgical site infection (SSI), and hernia recurrence. The definition of an SSE was modified from the Ventral Hernia Working Group definition of surgical site occurrences[12] to include any surgical site occurrences that were symptomatic and/or required an intervention. SSEs included any SSI, as well as symptomatic seroma/hematoma, cellulitis, soft tissue breakdown, fascial dehiscence, or enterocutaneous fistula formation (Table I). SSIs were further categorized as superficial, deep, or organ space according to CDC criteria.[10,11]

Postoperative outcomes included hernia recurrence rate, duration of stay/hospitalization, 90-day readmission rate, instance of mesh explantation, and duration of follow-up. Typical postoperative follow-up evaluation included a physical examination at 2 to 4 weeks, 3 months, 6 months, 1 year, and annually thereafter. Abdominal computed tomography scans were obtained routinely at the annual visit or at any time for evaluation of abdominal symptomology, including bulging, abdominal pain, or wound issues. Our standardized telephone survey was used to assess those who were unable to follow up in person.[13,14] Any positive answer on the questionnaire was considered a recurrence until proven otherwise by a physical exam and/or imaging. For the purposes of calculating recurrence rate, we considered only the patients who had ≥12 months of documented follow-up as well as patients with recurrences within 12 months of their repair.

RESULTS

Demographics and hernia characteristics. Between June 2009 and March 2015, 126 consecutive patients who underwent open VHR using either biologic or synthetic mesh in clean-contaminated or contaminated operative fields were analyzed. Patient demographics, comorbidities, and hernia characteristics are summarized in Table II. More than half the patients were women in both the biologic and synthetic groups, with nonsignificant preponderance of women in the biologic cohort compared to a near even distribution in the synthetic group. There was no significant difference