Study Comparing the Efficacy, Safety, and Cost of a Permanent, Synthetic Prosthetic Versus a Biologic Prosthetic in the One-stage Repair of Ventral Hernias in Clean and Contaminated Wounds.

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STATISTICAL ANALYSIS PLAN

Data Analysis. The primary efficacy endpoint is the ventral hernia recurrence rate between the two treatment groups. Secondary endpoints will consist of comparisons of wound occurrences, perioperative complications, hospital length of stay, total hospital charges, pain, and quality of life. Continuous endpoints of hospital length of stay, total hospital charges, pain, and quality of life will be compared by the Mann-Whitney *U* test. The binary variables—wound infection, and perioperative complications—will be compared using Fisher's exact test. The cumulative percentages of patients with recurrences over time will be calculated and compared by using Kaplan-Meier curves and log-rank tests. We will investigate subgroup effects by comparing the size of the fascial defect (area in cm^2), patient co-morbidities, and clean versus contaminated wounds. All statistical tests will be two-sided. The primary analysis will be performed on an intention-to-treat basis for which patients will remain in their assigned group, even if during the procedure the surgeon judged the patient not to be suitable for the prosthetic or technique assigned. In addition a per-protocol analysis will also be performed for which patients with major protocol violations will be excluded.

Power Analysis: Overall, ventral hernia repairs recur with an estimated frequency of approximately 40%. However, conventional wisdom recognizes that wound contamination potentially doubles the risk of hernia recurrence. Therefore, we performed separate power analyses for hernia repairs under clean versus contaminated wound conditions that were informed by the medical literature and clinical studies we have conducted at UCSF.

Clean wounds. Published data from our medical center noted an overall hernia recurrence rate of about 20% in predominantly clean wounds [43]. Similarly, our most recent retrospective analysis indicated hernia recurrence rates of 20%-30% and 50%-60% using synthetic versus biologic mesh, respectively, regardless of wound contamination (submitted for publication). Consequently, the power analysis for ventral hernia repairs under clean conditions indicates the need for 80 patients in each group, assuming a two-sided 0.05 level test and 80% power, and hernia recurrence rates of 40% versus 20% for patients receiving biologic versus synthetic prosthetics, respectively. The estimated recurrence rate of 40% with biologic mesh is consistent with estimates from the current medical literature [32].

Contaminated wounds. If we continue to assume a two-sided 0.05 level test and 80% power, and increase the estimated hernia recurrence rate from 40% to 60% for biologic prosthetics and from 20% to 30% for synthetic prosthetics used under contaminated conditions, then we will need to enroll a total of 40 patients in each group.

In total, we plan to enroll 250 patients to account for an anticipated drop out rate of <5% (**Table 2**). It is anticipated that approximately 40-45 patients will enroll in each of the study's next two (2) years. The nine active clinicians participating the trial perform approximately 175-200 open ventral hernia repairs per year. This enrollment target should guarantee that our study is adequately powered to demonstrate a significant difference in hernia recurrence rates, if present. Importantly, we have already demonstrated the ability to randomize ventral hernia repair patients to either treatment arm, a challenge that has effectively stymied other active studies (NCT02451176).

	Assumed recurrence rate for synthetic-mesh repairs	**Assumed recurrence rate for biologic-mesh repairs**	**Required Sample Size for both groups (N_T)**
Clean wounds	20%	40%	160
Contaminated wounds	30%	60%	80

Table 2. Power analysis.