Is Percent Body Fat a Better Predictor of Surgical Site Infection Risk than Body Mass Index?

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Purpose: Body mass index (BMI) is commonly used to define obesity, and studies suggest that obesity is an independent predictor of surgical site infection (SSI). We hypothesized that percent body fat (%BF) provides a better definition of obesity and is a better predictor of SSI risk than BMI. Its incorporation into preoperative patient assessment may improve clinical outcome.

Methods: Elective surgical patients at the Brigham and Women's Hospital were evaluated in a prospective cohort study. Excluded were immunosuppressed, pregnant, transplant, trauma, or burn patients, for a cohort of 194 patients. BMI was measured using the standard formula (weight [kg] divided by height [m^2]), and %BF was measured using bioelectrical impedance analysis. Preoperative, operative, and 30-day postoperative outcome variables were obtained using interviews, questionnaires, and medical record analyses. The primary outcome variable was SSI.

Results: Mean age was 48.9 ± 10.2 years. Mean %BF and BMI were 33.8 ± 10.6 and 29.5 ± 7.5, respectively. Using body fat measurements, 130 (67%) patients were obese (males > 25% BF, females > 31% BF). Using BMI criteria, only 74 (38%) were obese (BMI > 30 kg/m^2). The overall incidence of SSI was 13.9% (n = 27). Using BMI criteria, 14.2% of nonobese and 13.5% of obese patients developed SSI (P = .898). Using %BF criteria, 4.7% of nonobese and 18.5% of obese patients developed SSI (P = .008). Obesity, defined by %BF, captured 24 of the 27 patients (88.9%) with SSI, but only 10 (37%) patients were captured using BMI criteria. Patients with SSI had significantly higher %BF than those without SSI (38.5 vs 33.1, P = .01). However, BMI was not statistically significantly different between the groups (P = .1). %BF (P = .01), pedal edema (P = .05), recent surgery (P = .05), National Nosocomial Infection Surveillance (NNIS) score (P = .048), and wounds with class 2 (clean-contaminated) or higher (P = .038) were univariate predictors of SSI.

Conclusions: %BF defines obesity better than BMI, and is a better predictor of SSI risk than BMI.