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Article 1: Patient Safety; General Surgery

Nonalcoholic fatty liver disease as a high-value predictor of postoperative hyperglycemia and its associated complications in major abdominal surgery. Ssentongo P, Ssentongo AE, Dykes T, et al. *J Am Coll Surg* 2018;227:419–429

Article 2: Colon/Rectal; Hernia; General Surgery

Patients undergoing parastomal hernia repair using the Americas Hernia Society Quality Collaborative: a prospective cohort study. Gavigan T, Stewart T, Matthews B, Reinke C. *J Am Coll Surg* 2018;227:393–403

Objectives: After reading the featured articles published in this issue of the *Journal of the American College of Surgeons* (JACS), participants in this journal-based CME activity should be able to demonstrate increased understanding of the material specific to the article featured and be able to apply relevant information to clinical practice.

A score of 75% is required to receive CME and Self-Assessment credit. The JACS Editor-in-Chief does not assign a manuscript for review to any person who discloses a conflict of interest with the content of the manuscript. Two articles are available each month in the print version, and usually **4 are available online for each monthly issue, going back 24 months.**

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Article 3: Pediatric Surgery

Remnant small bowel length in pediatric short bowel syndrome and the correlation with intestinal dysbiosis and linear growth. Engelstad HJ, Barron L, Moen J, et al. *J Am Coll Surg* 2018;227:439–449

ARTICLE 1

(Please consider how the content of this article may be applied to your practice.)

Nonalcoholic fatty liver disease as a high-value predictor of postoperative hyperglycemia and its associated complications in major abdominal surgery

Ssentongo P, Ssentongo AE, Dykes T, et al
J Am Coll Surg 2018;227:419–429

Learning Objectives: After studying this article, surgeons should be able to identify clinical risk factors and attributes on CT imaging that can predict an increased risk of developing early postoperative hyperglycemia and adverse postoperative outcomes.

Question 1

A 45-year-old known woman with type 2 diabetes, with a BMI of 37 kg/m², presents with a complex abdominal ventral wall hernia. Her previous medical conditions include hypertension, hyperlipidemia, and COPD. From her abdominal CT scan, she has hepatic steatosis and a waist-circumference-to-height ratio of 0.71. Among the attributes that are independently associated with an increased risk of early postoperative hyperglycemia, the 2 most influential are:

- Increased waist-circumference-to-height ratio \geq 0.65 and type 2 diabetes
- Bowel resection and BMI
- Increased operation time and type 2 diabetes
- Hepatic steatosis and type 2 diabetes
- Hypertension and type 2 diabetes

Critique: Our study found gut resection, increased operation time, increased waist-circumference-to-height ratio \geq 0.65, hepatic steatosis, type 2 diabetes, and glycated hemoglobin (HbA1C) \geq 6.5% to be associated with an increased risk of early postoperative hyperglycemia. However, only hepatic steatosis and type 2 diabetes

were independent predictors of postoperative hyperglycemia. Based on the predictive model performance test, we can identify 76% of patients with postoperative hyperglycemia by knowing the hepatic steatosis and type 2 diabetes status. Patients with a preoperative diagnosis of type 2 diabetes and hepatic steatosis have approximately 16- and 3-fold increases in their risk of developing postoperative hyperglycemia, respectively.

Question 2

Causal mediation analysis permits assessment of a predictor like hepatic steatosis on a final outcome such as surgical site occurrence (SSO), through mediators such as early postoperative hyperglycemia (POHG), which may also have their own independent effects on the outcome. In this study, for the total causal effect of hepatic steatosis on SSO, what proportion was mediated by POHG?

- a) 8%
- b) 15%
- c) 30%
- d) 50%
- e) 60%

Critique: Causal mediation analysis helps to identify intermediate variables (mediators) that lie in the causal pathway between the treatment or predictor and the outcome. In this analysis, total treatment effects are distilled into indirect causal effects and direct causal effects. With respect to surgical site occurrence (SSO), hepatic steatosis had independent effects, but about 15% of its effects were attributed to its influence on postoperative hyperglycemia (POHG). An increased waist-circumference-to-height ratio (≥ 0.65) also had independent effects on the likelihood of SSO, but 28% of its influence on the outcome were attributed to POHG as a mediator. These effects were statistically significant. The results suggest that hepatic steatosis may have increased the probability of patients developing postoperative hyperglycemia, which in turn, made patients more likely to develop SSOs.

Question 3

Hepatic steatosis can be detected by noncontrast enhanced CT (NECT) of the abdomen by systematically determining the difference in attenuation signals of the liver and spleen. With NECT, the diagnosis of steatosis is defined as a differential liver-spleen attenuation of:

- a) ≤ 10 Hounsfield units
- b) ≤ 40 Hounsfield units
- c) ≤ 50 Hounsfield units
- d) ≥ 35 Hounsfield units
- e) ≥ 65 Hounsfield units

Critique: The criteria for diagnosing hepatic steatosis using CT scans images depend on whether or not the CT scan images are contrast enhanced (CECT) or noncontrast enhanced (NECT). The CECT is less reliable than NECT, which has high sensitivity (88% to 95%) and specificity (90% to 99%); CECT has a low sensitivity (53%) but very high specificity (100%), positive predictive value (100%), and negative predictive value (96%). In NECT, normal liver attenuation is 50 to 65 Hounsfield units and is 10 Hounsfield units more than spleen. Hepatic attenuation is inversely proportional to degree of steatosis. The diagnosis of hepatic steatosis is made when the differential liver-spleen attenuation is ≤ 10 Hounsfield units. In a CECT, a liver with steatosis is usually >35 Hounsfield units less dense than spleen or has absolute attenuation <40 Hounsfield units.

Question 4

A 55-year-old obese (BMI 34 kg/m^2) male patient underwent a retromuscular repair of a complex ventral hernia, with polypropylene mesh placed in the sublay position. His previous medical conditions include type 2 diabetes, sleep apnea, hypertension, and hyperlipidemia. His preoperative abdominal CT scan revealed hepatic steatosis, visceral fat percentage of 35%, and a waist-circumference-to-height ratio (WCHR) of 0.66. He developed postoperative hyperglycemia 12 hours after operation. Which combination of attributes most fully accounts for his increased risk of a surgical site occurrence?

- a) Type 2 diabetes, hepatic steatosis, WCHR ≥ 0.65
- b) Hepatic steatosis, postoperative hyperglycemia, type 2 diabetes
- c) Hepatic steatosis, type 2 diabetes, BMI
- d) Hepatic steatosis, postoperative hyperglycemia, WCHR ≥ 0.65
- e) BMI, hyperlipidemia, coronary artery disease

Critique: In this study, univariate logistic regression identified early postoperative hyperglycemia, hepatic steatosis, preoperative diagnosis of type 2 diabetes mellitus, coronary artery disease, and hyperlipidemia to be significantly associated with surgical site occurrence

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