
Chibueze A Nwaiwu, MD, Vasily E Buharin, PhD, Anderson Mach, MS, Robin Grandl, PhD, Alyson F Dechert, BA, Liam J O’Shea, MS, Steven D Schweitzberg, MD, FACS, Peter CW Kim, MD, CM, PhD, FACS

Department of Surgery, Warren Alpert Medical School of Brown University/Rhode Island Hospital, Providence, RI
Activ Surgical, Inc., Boston, MA

INTRODUCTION: Optimal tissue perfusion/blood flow affects anastomotic outcomes. Intraoperative assessment of blood flow using indocyanine green (ICG), however, remains variable due to dose, pharmacokinetics, and user interpretation. Herein, we compared laser speckle contrast imaging (LSCI, flow measurement) to ICG (fluorescence signal intensity in volume) in visualizing real-time intraoperative tissue blood flow/perfusion and extrahepatic bile ducts.

METHODS: De novo laparoscopic form-factor detecting real-time blood flow using LSCI was compared to near-infrared (NIR)-based ICG detection alone for visualizing blood flow/tissue perfusion and fluorescence in segmentally devascularized intestine, partial gastrectomy, renal hilar dissection, and extrahepatic bile duct identification in 6 porcine models. Precision and accuracy of identifying demarcating lines of ischemia/perfusion in tissues were determined in blinded subjects with varying surgical experiences.

RESULTS: Unlike ICG, LSCI perfusion detection was real-time (latency ≤150 msec; p≤0.01) and repeatable on-demand without multiple ICG injections. Operating surgeons (n=6) precisely and accurately identified concordant demarcating lines in white light, LSCI, and ICG modes immediately. Blinded subjects (n=21) demonstrated similar spatial/temporal precision and accuracy with all 3 modes ≤2 minutes after ICG injection, and discordance in ICG mode at ≥5 minutes in devascularized small intestine (p<0.01) and in partial gastrectomy (p<0.05). ICG detection and display in extrahepatic bile ducts were equivalent in sensitivity (100%) to NIR-based predicate system.

CONCLUSION: Combining LSCI (flow) with ICG detection (volume) significantly improved precision and accuracy to real-time perfusion assessment in tissue over time, in real-time, and repeatable on demand, than ICG alone. Detection and display of heptically cleared ICG in extrahepatic structures using this form-factor is equivalent to NIR-only predicate ICG systems.

Eye vs AI: Accuracy of Risk Estimation for Surgeons Risk Calculators in Emergency General Surgery Patients

Lauren V Huckaby, MD, MS, Esmaeel R Dadashzadeh, MD, Shimena Li, MD, Insiyah Campwala, BS, Lucine Gabriel, BS, Robert Handzel, MD, MS, Raquel M Forsythe, MD, FACS, Joshua Brown, MD, MS

University of Pittsburgh, Pittsburgh, PA

INTRODUCTION: The number of surgical risk calculators has expanded using increasingly sophisticated methods, and these calculators are gaining popularity as validated tools to help surgeons estimate mortality and complications after emergency general surgery (EGS). However, accuracy of risk estimates by practicing surgeons compared to these tools has not been explored.

METHODS: Acute care surgeons at a tertiary care center prospectively estimated 30-day mortality and complications (as defined by the calculators) for adult EGS patients (2019-2021). Surgeon estimates were compared to NSQIP and Predictive OpTimal Trees in Emergency Surgery Risk (POTTER) predictions. Observed-to-expected (O:E) ratios of means were calculated using actual and predicted outcomes. C-statistics for surgeon and calculator estimations were used to quantify predictive accuracy.

RESULTS: Among 148 patients (mean 58.34 years, 44.62% male), 30-day mortality was 14.86% (n=22). A total of 121 patients (81.76%) underwent intra-abdominal operations. Actual rates of mechanical ventilation >48 hours and acute renal failure were 29.25% and 10.87%, respectively. Overall, surgeons overestimated risk of mortality and acute renal failure (Table). NSQIP and POTTER calculators underestimated both mortality and acute renal failure. The c-statistic for mortality for surgeons with ≥5 years of experience was 0.876 compared to 0.825 for those with <5 years.

CONCLUSION: Acute care surgeons at a tertiary center predicted postoperative mortality and complications with a similar discrimination when compared to surgical risk calculators. Surgeon expertise should be used in conjunction with risk calculators when counseling EGS patients regarding anticipated postoperative outcomes. Surgeons should be cognizant of patterns in over- or under-estimation of complications.
RESULTS: 95% (71/75) follow-up was achieved: 33 lapIPOM and 38 rIPOM. Median follow-up time was 12 months [interquartile range (IQR) 10 to 12 months]. Patient-reported recurrence (ie positive Hernia Recurrence Inventory screening) was similar between cohorts (lapIPOM 6/33 vs rIPOM 13/38; p = 0.21, Fisher’s Exact test). Clinical assessment (ie physical examination and CT imaging) revealed 5/20 rIPOM hernia recurrences compared to 0/17 lapIPOM (p = 0.05). Composite hernia recurrence was 6% (2/33) for the lapIPOM cohort and 24% (9/38) for rIPOM (p = 0.09). Based on regression analysis adjusting for baseline patient-reported outcomes, postoperative HerQLes was expected to increase 12.0 more points after rIPOM compared to lapIPOM (95% CI 1.3-22.7; p = 0.029), with no difference in postoperative pain scores (p = 0.94) between cohorts.

CONCLUSION: We have identified differences in quality of life and repair durability after rIPOM and lapIPOM through this hypothesis-generating investigation. Determining the mechanism and significance of these differences—whether related to experience, surgical technique, or statistical variation—warrants further study.

Morbid Obesity Does Not Confer Increased Risk of Serious Complication after Outpatient Surgery

Mariana E Tumminello, MD, Matthew G Hogan, MD, Claudia Leonard, PhD, Jeffrey S Barton, MD, FACS, Michael W Cook, MD, FACS, Kurt G Davis, MD, FACS
Louisiana State Health Sciences Center School of Medicine, New Orleans, LA
Louisiana State Health Sciences Center School of Public Health, New Orleans, LA

INTRODUCTION: Class III obesity confers an American Society of Anesthesiologists class III status for severe systemic illness. As such, these patients are often excluded from surgery in ambulatory surgery centers (ASC) for anesthesia safety concerns. We hypothesize that Class III obesity is not an independent risk factor for serious postoperative complications, requiring readmission, after outpatient operations.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) general database from 2012 to 2018 was queried. Patients undergoing outpatient inguinal hernia repair (IHR) and laparoscopic cholecystectomy (LC) were examined and grouped by BMI. Baseline characteristics and 30-day outcomes were compared using univariate and multivariate analyses.

RESULTS: There were 79,916 patients who underwent IHR and 107,471 patients who underwent LC. Multivariable analysis in IHR (panel A) showed an increased odds of superficial surgical site infection (SSSI) in all classes of obesity compared to normal weight (p < 0.0001), and higher odds of readmission in both class II and IIIa obesity. Both SSI (< 1%) and readmission rates (< 3%) were low in all groups; however, in