

concerns about the surrogacy of ductal visualization for BDI. Importantly, the GDG noted that relying on NIR must not be a substitute for good dissection and identification technique.

Recommendations for future studies: Near-infrared cholangiography should be assessed in large trials compared to white light alone and to IOC with risk stratification and risk adjustment. Because BDI is unlikely to be captured in such trials, we additionally suggest these trials focus on proxy outcomes such as visualization of ductal structures, ability to obtain the critical view of safety, and complications including conversion to open cholecystectomy. In particular, this technology should be studied in difficult cholecystectomy patient populations that include those with acute cholecystitis or a history of acute cholecystitis, severe chronic cholecystitis, and obese patients.

Question 6: Should surgical (complexity) risk stratification versus alternative or no risk stratification be used for mitigating the risk of BDI associated with laparoscopic cholecystectomy?

Recommendations:

A1: For patients with acute cholecystitis, we suggest that surgeons may use the Tokyo Guidelines 18 (TG18), American Association of Surgery for Trauma (AAST) classification, or another effective risk stratification model for grading for severity of cholecystitis and for patient management (expert opinion).

A2: During operative planning of laparoscopic cholecystectomy and intraoperative decision-making, we suggest that surgeons consider factors that potentially increase the difficulty of laparoscopic cholecystectomy such as male sex, increased age, chronic cholecystitis, obesity, liver cirrhosis, adhesions from previous abdominal surgery, emergency cholecystectomy, cystic duct stones, enlarged liver, cancer of gallbladder and/or biliary tract, anatomic variation, bilio-digestive fistula, and limited surgical experience (expert opinion).

Summary of evidence: No articles directly compared the incidence of BDI when a risk stratification system was used versus when a risk stratification system was not used. There are many prognostic risk association studies, but these do not evaluate the effectiveness of using this prognostic information to alter management and mitigate the risk of BDI. There is, however, evidence to indicate that the presence of acute cholecystitis (AC) increases the risk of mortality as well as BDI. In addition, grading/risk stratification systems for the severity of AC exist, including the Tokyo Guidelines (TG) 2013 and 2018^{94,123,124} and the American Association of Surgery for Trauma (AAST) severity grading.¹²⁵ Furthermore, there is evidence that demonstrates that the risk of BDI increases with the severity of inflammation as proposed by the TG 13/18.

Narrative synthesis: The association between TG13 severity of cholecystitis and BDI was best demonstrated in a 2016 a case-control study by Tornqvist et al.¹²⁶ In this study, the TG13 risk stratification model was applied retrospectively to 158 patients who suffered a BDI during laparoscopic cholecystectomy and 623 matched controls who underwent