

# Insufficient safety measures reported in operation notes of complicated laparoscopic cholecystectomies

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**Background.** In 2007, a Dutch guideline for laparoscopic cholecystectomy (LC) was composed that advocates the critical view of safety (CVS) to prevent bile duct injury (BDI). Conversion to open cholecystectomy is recommended in complicated cholecystectomy, but young surgeons are hardly trained in this procedure. The aim of this study was to analyze the accuracy of dictated operation notes, the use of CVS before and after guideline implementation, and the severity of injury after conversion.

**Methods.** Between 1990 and 2012, 800 patients were referred for treatment of BDI. All available operation notes ( $n = 528$ ; 66%) were scored for procedural conditions, reasons for conversion, the use of safety measures, and postoperative care in BDI patients.

**Results.** Patient demographics, indication for cholecystectomy, conversion rates, and injury type were comparable to the total cohort of BDI patients. LC ( $n = 479$ ; 91%) was converted in 180 patients (34%). The CVS technique or dissection of Calot's triangle were reported in 33 patients (6.3%) and 87 patients (16.5%), respectively. Guideline implementation increased the reporting of CVS from 4% (16/425) to 17% (17/103;  $P < .001$ ), and the consultation of a hepatic-pancreatic-biliary (HPB) colleague from 3% (14/425) to 8% (8/103;  $P < .01$ ). Conversion to open surgery leads to more complex injury (Bismuth III–V injury rate of 34% [24/64] vs 65% [46/116];  $P = .013$ ).

**Conclusion.** The insufficient use of safety measures to prevent BDI during LC in this selected patient group is of concern. Although guideline implementation significantly improved the use of CVS during LC, further improvement is necessary. Conversion cannot simply be used as an “escape” procedure, because this may lead to more complex injury. (Surgery 2014;155:384-9.)

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SAFETY MEASURES to prevent bile duct injury (BDI) caused during laparoscopic cholecystectomy (LC) are extensively described and scrutinized.<sup>1-6</sup> Several groups advocate the use of intraoperative cholangiography (IOC) as large cohort and population based studies showed this reduces BDI by 25–40%.<sup>7-10</sup> However, the interpretation of IOC might be difficult during LC.<sup>7-11</sup>

Complete dissection of Calot's triangle and reaching the critical view of safety (CVS) is the most practical way to be sure the common bile duct is safe before transecting the cystic duct and artery.<sup>12,13</sup> The Dutch Society of Surgery implemented a guideline for LC in 2007, in which

documentation of CVS is required and conversion to open surgery is advised if CVS is not achieved. However, young residents are scarcely experienced in this open “rescue” procedure.<sup>14,15</sup> Conversion seems, in that sense, to be an arbitrary safety measure in difficult LC patients.

The conventional way to document the operational procedure and measures taken to prevent BDI have been the postoperative dictated operation report. Despite an adequate description of the procedure in this report, several studies showed poor or limited assessment of CVS compared with a photograph or video made during the same procedure.<sup>4,16-18</sup> In medical litigation after BDI, experts are therefore generally confronted with the operation report as the only documented description of the procedure.

A national survey in 2011, 4 years after the implementation of the guideline, reported the use of CVS by 98% of Dutch surgeons.<sup>3</sup> Although CVS is advocated by the Dutch Society of Surgeons and seems to be embraced by their members, the number of BDI patients referred for to a tertiary center

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did not decline in the last decade.<sup>19</sup> It is of interest to analyze whether the implementation of the national guideline changed the use of CVS and measures taken to prevent BDI.

The purpose of this study was to analyze the accuracy of dictated operation notes and the use of CVS during LC in BDI patients before and after guideline implementation, and to describe the outcome in terms of injury classification after conversion.

## METHODS

**Patients and operative report.** Between January 1990 and January 2012, 800 consecutive patients referred to the Academic Medical Centre in Amsterdam for management of BDI were included in a prospective database. Clinical data obtained from the referring centers included indication for cholecystectomy, type of operation, and type of injury. The type of injury was classified according the Amsterdam Classification, Strasberg classification, and Bismuth classification.<sup>20-22</sup> For the present study, all available copies of operation reports of the cholecystectomy were analyzed in detail. According to a list of 30 items 2 authors (PR and BN) independently scored the reports. The presence or absence of conditions were scored (eg, inflammation, adhesions, bleeding, bile leakage, or bad equipment), identification of anatomic structures (eg, cystic duct, cystic artery, common bile duct, right hepatic duct and artery), safety measurements (CVS, IOC, consultation of a colleague), and perioperative proceedings (detection of BDI, conversion, treatment of bile leakage, etc). Suspicion of BDI was noted if injury was diagnosed during surgery or the operation report describes doubt about possible injury. The outcome in terms of injury classification was compared between BDI patients in whom BDI occurred before conversion to open surgery and patients in whom the injury occurred after conversion.

**Statistical analysis.** Data from patient characteristics, operation report characteristics and type of injury are represented in numbers and percentages. Mean values with standard deviations or median values with minimum and maximum values are presented as appropriate. Comparison between groups was performed with a Chi-square test, *t* test and Mann-Whitney U test, when appropriate. Data analyses were performed using SPSS software (SPSS, Chicago, IL).

## RESULTS

**Patient characteristics and conditions.** Patient characteristics, indication for cholecystectomy, and type of injury are summarized in [Table I](#). The

present series of patients is representative for the total cohort of 800 BDI patients referred to our center; age ( $P = .58$ ), gender ( $P = .45$ ), indication for surgery ( $P = .96$ ), type of initial procedure ( $P = .33$ ), and type of injury ( $P = .53$ ) did not differ. The majority of patients ( $n = 303$ ; 57.4%) were referred from nonteaching hospitals, and the primary indication for surgery was symptomatic cholelithiasis ( $n = 382$ ; 72.3%). [Table II](#) summarizes the details of the surgical procedure. In 57%, the aspect of the gallbladder is documented ( $n = 304$ ). The procedure was complicated owing inflammation in 261 patients (49.4%), limited view in 94 (17.8%), and instrumental problems in 14 (2.7%).

**Anatomic structures.** The operation report mentions identification of the cystic duct and artery in 79.5% of the procedures ( $n = 420$ ). The common bile duct is reported to be identified in 39.2% and the right hepatic duct and artery in 7.2% and 9.7% respectively. Anatomic variations are reported in 81 (15.3%) operation reports. Generally unspecified aberrant structures are reported; less frequently, an aberrant right hepatic duct is identified or the anatomy is reported to be aberrant owing to a very short or missing cystic duct.

**Safety measures and injury classification.** The CVS technique is documented in 33 patients (6.3%) and a complete dissection of Calot's triangle is reported in 87 patients (16.5%). IOC was performed in 59 procedures (11.2%), but generally after conversion to open surgery ( $n = 37$ ), if BDI was suspected ( $n = 38$ ) and after repair of common BDI with the use of a T-drain ( $n = 21$ ).

[Table III](#) shows the postoperative diagnosed injuries according to the Amsterdam, Strasberg, and Bismuth classifications. The use of the CVS technique or the reported dissection of Calot's triangle was not associated with the Amsterdam injury classification ( $P = .47$  and  $P = .50$ , respectively). IOC was more often performed in patients with type D injury ( $P = .01$ ), but generally only to conform the suspected injury or to locate the position of an inserted T-drain instead of a preventive measure during surgery.

**Conversion and suspected BDI.** A laparoscopic procedure was started in 479 patients (91%), and conversion to open surgery was indicated in 180 patients. The reported indication for conversion was limited view or adhesions in 52.8% of the patients (95/180), perioperative detected BDI in 64 (35.6%), and bleeding in 21 (11.6%). Suspicion of BDI is described in 141 of the operation reports (26.7%). Interventions taken after this suspicion are summarized in [Table II](#). If BDI was diagnosed,

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