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Management of gallstone disease at Norwegian hospitals providing acute care surgery

ORIGINAL ARTICLE

AIRAZAT M. KAZARYAN

kazaryan@gmail.com
Department of Surgery
Østfold Hospital Trust
and
Department of Gastrointestinal and Paediatric Surgery
Oslo University Hospital
and
Department of Surgery
Mkhitar Hetatsi Jerevan State Medical University
Jerevan, Armenia
and
Department of Faculty Surgery N2
Sechenov University
Moscow, Russia
Author contribution: literature search, structure/design, collection, analysis and interpretation of data, first draft of the manuscript, and drafting, revision and approval of the submitted version
Airazat M. Kazaryan PhD, specialist in general surgery and gastrointestinal surgery, senior consultant
The author has completed the ICMJE form and declares no conflicts of interest.

MAGNUS FASTING

Department of Gastrointestinal and Paediatric Surgery
Oslo University Hospital
Author contribution: structure/design, interpretation of data and drafting, revision and approval of the submitted manuscript

Magnus Fasting PhD, specialist in general surgery and gastrointestinal surgery, senior consultant
The author has completed the ICMJE form and declares no conflicts of interest.

TOM GLOMSAKER

Department of Gastrointestinal and Paediatric Surgery
Oslo University Hospital
Author contribution: structure/design, interpretation of data and drafting, revision and approval of the submitted manuscript
Tom Glomsaker PhD, specialist in general surgery and gastrointestinal surgery, head of section
The author has completed the ICMJE form and declares no conflicts of interest.

TORGEIR THORSON SØVIK

Department of Gastrointestinal and Paediatric Surgery
Oslo University Hospital
Author contribution: structure/design, interpretation of data and drafting, revision and approval of the submitted manuscript
Torgeir Thorson Søvik PhD, specialist in general surgery and gastrointestinal surgery, senior consultant
The author has completed the ICMJE form and declares no conflicts of interest.

TOM MALA

Department of Gastrointestinal and Paediatric Surgery
Oslo University Hospital
and
Institute of Clinical Medicine
University of Oslo
Author contribution: concept, structure/design, interpretation of data, supervision and drafting, revision and approval of the submitted manuscript
Tom Mala PhD, specialist in general surgery and gastrointestinal surgery, medical director for upper gastrointestinal surgery and professor II
The author has completed the ICMJE form and declares no conflicts of interest.

THOMAS JOHAN FYHN

Department of Surgery
Ringerike Hospital
and
Department of Gastrointestinal and Paediatric Surgery
Oslo University Hospital
Author contribution: concept, structure/design, collection, analysis and interpretation of data, first draft of the manuscript, and drafting, revision and approval of the submitted version

Thomas Johan Fyhn PhD, specialty registrar in general surgery and paediatric surgery
The author has completed the ICMJE form and declares no conflicts of interest.

Background

The aim of the study was to map current practices in the management of gallstone disease at Norwegian hospitals providing acute care surgery.

Material and method

A questionnaire was distributed to all surgical departments in Norway providing acute care for cholecystectomy.

Results

A total of 41 hospitals met the inclusion criteria and 40 responded to the questionnaire. Institutions were categorised as low, medium or high-volume hospitals (< 50, 50–200 and > 200 cholecystectomies annually, respectively). Six, 20 and 14 hospitals were classified as low, medium and high-volume centres, respectively. Acute cholecystitis and acute biliary pancreatitis were indications for acute cholecystectomy at 31 and 16 hospitals, respectively. Intraoperative cholangiography was performed during elective cholecystectomy at six hospitals and during acute cholecystectomy at eight hospitals. Antibiotic therapy was continued after cholecystectomy for cholecystitis at 37 hospitals. The management of concomitant common bile duct stones was relatively similar across low, medium and high-volume hospitals. Preoperative endoscopic retrograde cholangiopancreatography (ERCP) was the preferred treatment for common bile duct stones in both elective and acute cholecystectomy at 31 and 32 hospitals, respectively. Intraoperative ERCP was performed in elective and acute cases at three and six hospitals, respectively, while intraoperative transcystic stone clearance was performed in elective and acute cases at two and four hospitals, respectively.

Interpretation

The management of gallstone disease at Norwegian hospitals varies in terms of indications for acute cholecystectomy, management of common bile duct stones, use of intraoperative cholangiography and antibiotic prophylaxis.

Main findings

Indications for acute cholecystectomy varied across the 40 Norwegian hospitals providing acute care surgery. Most hospitals continued antibiotic therapy following cholecystectomy for cholecystitis.

Routine intraoperative cholangiography was performed during elective surgery at six hospitals and during acute surgery at eight hospitals.

Management of common bile duct stones varied. Only a few of the hospitals used intraoperative transcystic stone clearance, and none routinely performed choledochotomy.

Gallstone disease includes conditions such as biliary colic, cholecystitis, gallstone-induced pancreatitis and common bile duct stones. Although more than 6500 cholecystectomies were performed at Norwegian hospitals in 2022, little is known about local variations in treatment strategies for gallstone disease (1). Patient volume, availability of resources, collaboration with other specialties, geography and local traditions can all impact on the variation in treatment strategies.

The recommendations for the diagnosis and management of gallstone disease in the Tokyo Guidelines have broad international acceptance (2). They provide diagnostic criteria and severity grading for conditions such as cholecystitis and are used both in clinical practice and in research settings.

The aim of our study was to map treatment strategies for gallstone disease at hospitals providing acute care surgery and to assess whether these were in accordance with the Tokyo Guidelines.

Material and method

A working group at the Department of Gastrointestinal Surgery, Oslo University Hospital, Ullevål, developed a questionnaire tailored to Norwegian hospitals. Surgical departments in Norway that provide acute care surgery and perform cholecystectomy for gallstone disease were invited to participate in the survey. Invitations were sent by email in June 2023 to the consultant responsible for the specialty, or a designated deputy, at the relevant gastrointestinal or general surgical department/section. Non-responding departments were followed up with reminders by email or telephone.

Gallstone disease was defined as cholecystitis, gallstone-induced pancreatitis, common bile duct stones and/or biliary colic. The questionnaire (Appendix 1) was created using the nettskjema.no platform, and all responses and free-text comments were collected via this service.

Data were exported from nettskjema.no to SPSS version 29.0 (IBM Corp., Armonk, NY, USA) for analysis. Data are presented as absolute figures or percentages (rounded to whole numbers when ≥ 10 %) for categorical variables and as median (range) for continuous variables.

Results

A total of 41 hospitals met the inclusion criteria and 40 responded to the questionnaire (Figure 1). Institutions were categorised as low, medium or high-volume hospitals based on the number of self-reported cholecystectomies performed annually: < 50, 50–200 and > 200, respectively. Six hospitals were classified as low-volume, 20 as medium-volume and 14 as high-volume.

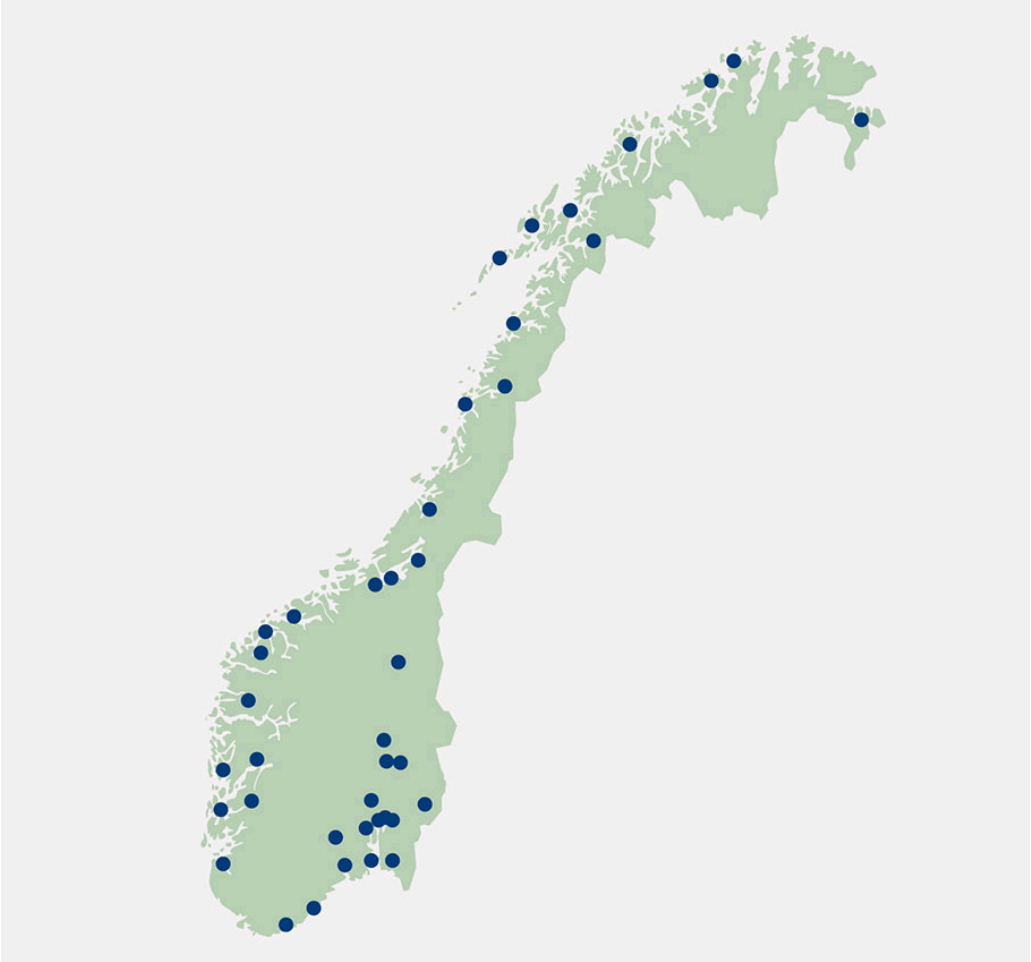

Figure 1 Map of Norway showing the 40 hospitals providing acute care surgery and management of gallstone disease that responded to the survey.

Cholecystectomy

Acute cholecystitis and acute biliary pancreatitis were routinely considered indications for acute cholecystectomy at 31 and 16 hospitals, respectively (Table 1). Failure of conservative management of acute cholecystitis and biliary colic was an indication for acute cholecystectomy at eight and seven hospitals, respectively. Several hospitals providing acute care surgery did not routinely perform acute cholecystectomy as a first-line approach to the management of acute cholecystitis, citing limited emergency operating capacity as the reason. A disease duration of five days was reported by most hospitals as the routine upper limit for performing acute cholecystectomy. No clear association was found between surgical volume and the maximum allowed interval from symptom onset to surgery (data not shown).

All respondents reported laparoscopy as the standard surgical approach for elective cholecystectomy. For acute cholecystectomy, three hospitals indicated that a proportion of operations were performed via laparotomy. Intraoperative cholangiography (IOC) was performed routinely during elective cholecystectomy at six hospitals and during acute cholecystectomy at eight hospitals (Table 2).

Only one hospital used routine antibiotic prophylaxis for elective cholecystectomy. Short-course (< 5 days) and long-course antibiotic therapy after acute cholecystectomy were routine at three and 28 hospitals, respectively. For acute cholecystitis, antibiotics were routinely administered preoperatively. Three hospitals did not routinely give antibiotics after acute cholecystectomy.

For complex procedures where anatomical visualisation was inadequate, subtotal cholecystectomy (leaving part of the gallbladder in situ), conversion to open surgery and aborted procedures were the first-line approaches at 22, 7 and 3 hospitals, respectively (Table 3). At 17 hospitals, the gallbladder remnant after subtotal cholecystectomy was routinely left open (fenestration), while at six hospitals the remnant was routinely closed (reconstruction). The remaining hospitals reported no standard approach for subtotal cholecystectomy. In complex cases, no hospitals routinely used the 'fundus-first' technique, in which dissection begins at the gallbladder fundus.

For acute biliary pancreatitis, 24 hospitals preferred to perform cholecystectomy during the initial admission or within one week. The remaining hospitals were more or less equally split between performing surgery one week after discharge or later. For patients with biliary pancreatitis deemed inoperable, endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy and, if needed, stent placement was the preferred approach at 32 hospitals. Three hospitals reported an alternative standard approach for these patients, and five hospitals reported no treatment.

Percutaneous drainage of the gallbladder was used in less than 50 % of cases of acute cholecystitis at most hospitals.

Common bile duct stones

Common bile duct stones with a simultaneous indication for cholecystectomy were managed similarly across low, medium and high-volume hospitals, with 32 and 31 hospitals routinely performing preoperative ERCP and cholecystectomy in acute and elective cases, respectively (Table 4). For stone clearance, intraoperative and postoperative ERCP were performed at three and one hospital in elective cases, and at six and five hospitals in acute cases, respectively. Intraoperative transcystic clearance of common bile duct stones was used in elective cholecystectomy at two hospitals and in acute cholecystectomy at four hospitals. Five hospitals reported that they only performed ERCP and did not routinely perform acute cholecystectomy for common bile duct stones.

Discussion

Management of gallstone disease is performed at a number of Norwegian hospitals. Nevertheless, until now there has been no comprehensive overview of practices across institutions. An analysis of data from the Norwegian Patient Registry showed that laparoscopic access for cholecystectomy was already established as the standard treatment method during the period 1990–2000 (3). The Norwegian Directorate of Health's guideline for the management of cholecystitis addresses the use of antibiotics. There are no national recommendations for the surgical management of gallstone disease, and hospitals have developed local protocols (4). For the management of cholecystitis, cholangitis and biliary pancreatitis, the Tokyo Guidelines are frequently cited in studies and reports (2). The survey suggests that routines at Norwegian hospitals only partially follow these international recommendations for the management of gallstone disease.

International studies recommend that cholecystectomy should be performed during the initial hospital stay in cases of isolated, mild biliary pancreatitis (2). Cholecystectomy within 48 hours of admission for acute biliary pancreatitis is supported by several randomised clinical trials (5). However, surgery should be postponed in cases of moderate or severe biliary pancreatitis due to an increased risk of complications (5). Acute biliary pancreatitis was an indication for acute cholecystectomy at only 40 % of hospitals in Norway. The optimal timing of cholecystectomy after biliary pancreatitis remains unclear (5). Consequently, there is no general consensus for routine cholecystectomy in biliary pancreatitis, particularly in relation to older patients presenting with a first episode of acute biliary pancreatitis.

Most Norwegian hospitals perform acute cholecystectomy for cholecystitis in accordance with international recommendations, such as the Tokyo Guidelines (2). However, five hospitals did not use cholecystectomy as standard treatment for acute cholecystitis, with several citing limited capacity as the reason. This factor is known to impact on patient care, both in terms of timing and indications for surgery (6). Studies have shown that 10 % of patients with acute cholecystitis who are not operated on experience a relapse within six weeks, which can be more severe than the first episode (7).

Research indicates that high volume and surgical expertise can improve outcomes in cholecystectomy, particularly in complicated cases (8, 9), and that low-volume hospitals can achieve good results with a structured approach (10, 11). Definitions of high, medium and low-volume hospitals vary, and multiple factors beyond volume are crucial for treatment quality. A robust specialist team is an important determinant of the quality of surgical care (12, 13). In our study, we found no major differences in patient care between low, medium and high-volume hospitals. Variations may reflect local traditions and differences in round-the-clock access to supporting services such as ERCP.

In our survey, acute cholecystectomy for cholecystitis was generally performed within five days of symptom onset. Previously, a three-day symptom duration was considered a 'limit', based on studies showing poorer outcomes with longer symptom duration (2, 14). More recent studies suggest that cholecystectomy can be beneficial when performed up to seven days after symptom onset (2, 15). However, there is no general consensus on an upper limit of symptom duration for cholecystectomy in acute cholecystitis (16). Extending the interval between symptom onset and surgery would allow more patients to be treated during a single hospital stay (2). The Tokyo Guidelines take into account the severity of cholecystitis, associated comorbidities, anaesthetic risk and surgical expertise when determining the indication for acute cholecystectomy.

The survey showed that open cholecystectomy is no longer performed for elective management of gallstone disease in Norway. For acute cholecystectomy, only three of 40 hospitals reported using open surgery to some extent.

In cases of challenging dissection or uncertain anatomy, subtotal cholecystectomy is considered an alternative approach. Half of the hospitals in the survey performed this procedure, usually leaving the gallbladder remnant open (fenestration). None reported routinely using the 'fundus-first' technique in complex cases, which is consistent with the Tokyo Guidelines (2).

Over recent decades, a dissection method with a critical view of safety has been widely accepted as the preferred technique for laparoscopic cholecystectomy. This approach ensures that only two tubular structures enter the gallbladder from the liver hilum before the cystic artery and duct are divided (17). Free-text comments from the survey, however, indicate that this method is not standard practice in several Norwegian hospitals, despite its inclusion in the Tokyo Guidelines as a recommended technique for safe laparoscopic cholecystectomy (2).

One-fifth of hospital departments routinely performed IOC during cholecystectomy. Its benefit remains debated, and selective use is recommended by several authors (18). Globally, there is a trend towards reduced use of IOC, possibly due to new non-interventional pre- and intraoperative imaging methods (19). Nevertheless, proficiency in cholangiography as an intraoperative tool is considered important, particularly in cases of unclear anatomy and as a basis for intraoperative bile duct clearance (20).

Percutaneous drainage of the gallbladder in acute cholecystitis carries a higher risk of complications and a lower therapeutic success rate compared with cholecystectomy. This approach is only recommended for patients with moderate to severe acute cholecystitis (grade II or III according to the Tokyo Guidelines) who are not candidates for surgery (2).

The survey shows that a broad range of methods was used to manage common bile duct stones in patients indicated for cholecystectomy. In Norway, preoperative ERCP with stone clearance was the most common approach in both acute and elective settings. This is in line with international recommendations, which allow for several alternative strategies (2). A small number of hospitals used intraoperative transcystic stone clearance for the management of common bile duct stones. This technique is increasingly used internationally. It is less costly than ERCP and may be particularly useful in patients with altered anatomy, such as after gastrectomy or bariatric surgery, where the bile ducts are not accessible via conventional ERCP (21, 22). However, further studies are needed to establish the value of this method in routine practice. No hospital reported routine use of choledochotomy.

International recommendations advise against routine use of antibiotic prophylaxis for elective cholecystectomy (2). Only one hospital in the survey reported routinely using antibiotic prophylaxis for elective cholecystectomy. However, it was common practice to continue antibiotics for up to five days after acute cholecystectomy. This practice is controversial, and the Tokyo Guidelines advise against postoperative antibiotics for mild or moderate acute cholecystitis (Tokyo grades I and II). For Tokyo grade III acute cholecystitis, antibiotics are recommended for 4–7 days postoperatively (2), which aligns with the practice observed in Norwegian hospitals according to the survey. A meta-analysis found no benefit of extended antibiotic therapy for mild or moderate acute cholecystitis (23). Although the Tokyo Guidelines suggest perioperative antibiotic prophylaxis for acute cholecystitis of all grades (2), a recent meta-analysis of randomised trials found no benefit of such treatment in Tokyo grades I and II acute cholecystitis (24).

Our survey has limitations. The questionnaire sent to Norwegian hospitals had not been validated. Variations between individual surgeons within hospitals were not considered, and the survey was not based on prospective registration of treatment. The survey did not account for the severity of cholecystitis, comorbidities, anaesthetic risk or surgical expertise. Consequently, it was not possible to draw direct conclusions regarding

adherence to the Tokyo Guidelines in practice at Norwegian hospitals. The option to select multiple responses for some questions may also have complicated interpretation of the feedback.

Nevertheless, the high response rate: 40 of 41 hospitals identified as relevant, provides a good overview of current practices at Norwegian hospitals.

Summary

Management of gallstone disease in Norwegian hospitals varies in terms of indications for acute cholecystectomy, management of common bile duct stones and the use of intraoperative cholangiography and antibiotic prophylaxis.

The article has been peer-reviewed.

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