



## Review

Simultaneous cholecystectomy during gastric and oesophageal resection: A retrospective analysis and critical review of literature<sup>☆</sup>

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## HIGHLIGHTS

- The increased surgical mortality was significant higher correlated with an intervention at a later stage point.
- Prophylactic cholecystectomy can be safely performed during a major intervention.
- Histopathological results showed an increased amount of acute and/or chronic cholecystitis.

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## ABSTRACT

The higher incidence of gallstone formation after gastrectomy for cancer has been reported as a common complication in many studies but the management strategies are still controversial and need further evaluation. We retrospectively analysed between 2007 and 2013, 206 patients who underwent gastric and/or oesophageal resection. In 29/93 patients receiving an oesophagectomy a simultaneous cholecystectomy was performed, respectively 31 from 111 patients who underwent a gastrectomy received an incidental cholecystectomy. In 2 patients with an extended gastrectomy, the gallbladder removing was performed simultaneously in one case. A subsequent cholecystectomy was performed in 11 cases. The increased surgical mortality was significant higher correlated with an intervention at a later stage point. That suggest that the prophylactic cholecystectomy can be safely performed during a major intervention in order to reduce complication and a reoperation.

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## 1. Introduction

Safety and need of prophylactic cholecystectomy during gastrectomy for cancer remains a controversial debate. The incidence of gallstone formation is known to be a common complication in patients after gastrectomy for cancer and its prevalence is reported to be higher with a 15–25% than for the general population [1,3,5].

The main pathophysiological mechanism responsible for gallstone formation after gastrectomy is to be considered the interrupting of the anterior hepatic branch of the vagal nerve which leads to a stagnation of bile juice. The hypocontractility of the

gallbladder due to biliary stasis and accumulation of biliary sludge contributes to lithogenesis and also to an early postoperative complication presenting as an acute postoperative cholecystitis [2].

Other mechanisms such as the type of gastric resection, exclusion of the duodenum during the anatomical gastrointestinal reconstruction and infection of the biliary system are considered risk factors, however, the aetiology is not entirely known. Under these circumstances diverse studies tried to establish if concomitant cholecystectomy during gastrectomy for cancer can be a benefit for postoperative morbidity and mortality.

## 2. Methods and material

We collected and evaluated data of patients undergoing gastric and/or oesophageal resection in our university hospital for general – and visceral surgery between 2007 and 2013. In addition, we examined whether the patient received a cholecystectomy simultaneously or at a later point during the hospital stay. Moreover, parameters such as neoadjuvant therapy, histopathological result of

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the cholecystectomy (acute, chronic, acute on chronic, no pathology) and pre-existing cholecystolithiasis were examined.

In total, there were 206 patients who underwent gastric and/or oesophageal resection at our university hospital. To complete our collective, we cross-examined surgical reports, histopathological results and discharge letters.

### 3. Results

Between 2007 and 2013 206 patients received an oesophagectomy, gastrectomy or an extended gastrectomy. In  $n = 111$  patients a gastrectomy was performed, in  $n = 93$  an oesophagectomy and in  $n = 2$  patients an extended gastrectomy.

In 29/93 patients receiving an oesophagectomy a simultaneous cholecystectomy was performed, in  $n = 5$  patients it was performed at a later point during their hospital stay. 59 of patients receiving an oesophagectomy no cholecystectomy was performed.

Similar results were seen in the patient group receiving a gastrectomy. 31/111 patients received a simultaneous cholecystectomy. In  $n = 6$  a cholecystectomy was performed at a later stage. 74 out of 111 patients did not receive a cholecystectomy. Regarding  $n = 2$  patients who underwent an extended gastrectomy, a cholecystectomy was performed simultaneously in one case (see Table 1).

In total,  $n = 11$  patients received a cholecystectomy at a later stage.  $N = 5$  received a later cholecystectomy in the group receiving an oesophagectomy while  $n = 6$  received a later cholecystectomy in the group receiving a gastrectomy. The variance for later cholecystectomy was between 7 days and 42 days postoperative. The median length for later stage cholecystectomy was 14 days. 4/11 patients received later stage cholecystectomy during a revision surgery. 7/11 patients developed clinical signs (right upper quadrant pain, acute abdomen, septic parameters). The mortality in the later stage cholecystectomy was significantly higher with 63.63% (7/11) compared to the group receiving simultaneous cholecystectomy with 4.91% (3/61).  $N = 2$  patients receiving later stage cholecystectomy had documented gallstones prior to the initial surgery.

In total, 72/206 patients received a cholecystectomy.  $N = 61$  received it simultaneously. The reason for simultaneous cholecystectomy was based on the operating surgeon and the macroscopic appearance of the gallbladder.  $N = 1$  out of the patients receiving simultaneous cholecystectomy had documented gallstones prior to surgery.  $N = 11$  were operated at a later stage. In  $n = 3$  a pre-existing cholecystolithiasis was known. In the analysis of histopathological results it was shown that  $n = 59$  were a chronic cholecystitis,  $n = 5$  an acute cholecystitis and in  $n = 5$  no pathology was found (see Table 2). 10/72 patients who received a cholecystectomy simultaneously or at a later stage passed away.  $N = 3$  in the group receiving a simultaneous cholecystectomy and  $n = 7$  in the group receiving a cholecystectomy died at a later stage.

### 4. Discussion

A quarter of patients receiving gastrectomy develop a cholecystolithiasis. Most of them do so within the first year after primary surgery. A various surgical factors seem responsible [3].

**Table 1**  
Patients data.

Procedure	Cases	Simultaneous CCE	Subsequent CCE	No CCE
Oesophagectomy	93	29	5	59
Gastrectomy	111	31	6	74
Ext. Gastrectomy	2	1	/	1

According to a systematic analysis performed for retrospective/prospective studies regarding the risk to develop gallstones in patients who underwent upper gastrointestinal (GI) surgery, the extent of resection seems to play a major role.

The incidence is considered to be higher in patients with total gastrectomy with dissection of the oesophagus compared to distal resection by complete interruption of the vagal trunk. This results in a decreased contractile function of the gallbladder [4,5]. Other hypotheses involved in lithogenesis include the greater weight loss after cholecystectomy resulting in a mobilisation of cholesterol stores, supersaturation of biliary cholesterol in absence of the agitation of gallbladder bile, the biliary stasis through inflammation of the bile ducts and suppression of entero-endocrine secretion by parenteral nutrition [1,4].

According to a Japanese study [1] developing gallstones dependent on the type of reconstruction in total gastrectomy, Roux-Y or jejunal interposition, was not statistically relevant. Also, the prevalence of gallstone formation in patients who underwent distal gastrectomy with Billroth I anastomosis, Billroth II, or Roux-Y no differences were registered regarding the type of intestinal reconstruction. But the majority of surgical data reported a higher incidence in cases with duodenum exclusion (Roux-Y, Billroth II).

Majority of carried out studies confirmed that a pylorus preserving approach correlated to a reduced lithogenic risk, however, the number of cases were not statistically significant [5]. Several studies suggested that the extent of lymph node dissection has an influence on gallstone formation. Some reported that there is a higher incidence of cholecystolithiasis and acute cholecystitis in patients who underwent a radical gastrectomy with extended lymph node dissection compared to limited or standard dissection performing concomitant cholecystectomy [6]. D3 and D2 lymph node dissection, which includes the dissection along the hepatoduodenal ligament, contribute to cholecystolithiasis by affecting the motility of the gallbladder [4]. A routinely performed prophylactic or concomitant cholecystectomy in cases of D2 lymph node dissection remains questionable, however, lymphadenectomy along the common hepatic artery and celiac trunk increase the formation of gallstones secondary to interruption of the vagal branches [4,7].

In summary, the type of intestinal reconstruction and type of resection with systemic lymph node dissections are prognostic factors regarding gallstone formation [3,5]. According to the data from the available published literature, the incidence of gallstone formation is nearly 4 times higher after gastrectomy during follow-up compared to the matched sex/age population [1,3,4].

A crucial factor was to estimate the number of patients developing a symptomatic cholecystolithiasis with the need of surgery. On the other hand, one must estimate the perioperative complication following concomitant cholecystectomy and the created costs for a 5 year-follow-up assuming the overall survival probability for 5 years is 50% [8,9].

Some data suggested that only 6% of patients who underwent gastrectomy for gastric cancer required further surgery for symptomatic cholecystolithiasis [1,3,10]. Although simultaneous cholecystectomy has a low morbidity rate, studies revealed that the perioperative complication rate is higher than in the case of subsequent cholecystectomy [3]. The recently published preliminary results of the CHOLEGAS study are encouraging. Patients who underwent a prophylactic cholecystectomy experienced no additional complications. There were also no differences noted regarding non-surgical complications [8]. In addition, duration of surgery, time under anaesthesia and hospital costs were not increased. Other authors also mention that radical gastrectomy with concomitant cholecystectomy is a feasible and safe procedure [11,12]. In conclusion, concomitant cholecystectomy during gastric and/or

**Table 2**  
Time of cholecystectomy and histology.

Cholecystectomy	Simultaneous	Subsequent	Pathology	AC	CC	N	Cholecystolithiasis
72	61	11		8	59	5	3

oesophageal resection should be considered, as morbidity and mortality do not increase.

## 5. Conclusion

We performed concomitant cholecystectomy in a significant number of patients and we have achieved a low adverse post-operative outcome in the patient collective who underwent a simultaneous cholecystectomy compared to the patient collective receiving subsequent cholecystectomy. Increased surgical mortality was seen in the cases of late cholecystectomy. Incidental cholecystectomy can be safely performed during an oesophageal or gastric resection and thus avoiding complications at a later stage. Our retrospective analysis showed that in the absence of symptoms, histopathological results showed an increased amount of acute and or chronic cholecystitis. In order to prevent a complication due to acute or acute on chronic cholecystitis and or cholecystolithiasis the indication of simultaneous cholecystectomy should be evaluated.

## Ethical approval

None required.

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None.

## Author contributions

AT, SVM and NES designed the idea, did the data sample and wrote the manuscript. NES participated in the design of the study and did the language check. DA participated in the design of the study and helped to draft the manuscript. HRR conceived of the study and participate in its design and coordination. All authors read and approved the manuscript.

## Competing interests

None.

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