Accidental Lesions of the Common Bile Duct at Cholecystectomy

Pre- and Perioperative Factors of Importance

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The 65 reports of accidental lesions of the choledochus at cholecystectomy from the records of the Patients’ Insurance Syndicate in Stockholm, Sweden, 1975–1982, were studied in order to characterize avoidable factors and/or situations at cholecystectomy. Compared with control materials, there were significantly less men (28 vs. 34%) and the patients were younger (46 vs. 54 years). The patients were without significant other diseases and former operations, and were slim or of a normal weight. The patients had a short history of known biliary tract disease and there was seldom a suspicion of common duct stone. Most of the surgeons were under training and 80% of them had done 25 to 100 cholecystectomies before, seldom assisted by a more experienced surgeon. The inflammation was never severe, the bleeding insignificant, and an anomaly was found after the lesion was done in only 16 of 55 cases. The lesion was done before cholangiography in 27 cases and after the cholangiography, but before the films were available in 32 cases. The gallbladder was excised about as often from the fundus as from the pouch. We have found it probable that most of these accidental injuries of the choledochus could have been prevented with a policy that considers cholecystectomy as a major operation that requires well-trained surgeons with a humble and concentrated approach to their task.

One of the most frequent operations in general surgery is cholecystectomy. In Sweden, almost 200 cholecystectomies/100,000 inhabitants/year are performed, which makes about 15,000 cholecystectomies annually in Sweden.1 A complication of low frequency, always very serious and with some mortality and a high morbidity, is accidental lesion of the choledochus, which has been called “the most catastrophic complication of a straightforward cholecystectomy.”2

Since 1975 all patients in Sweden have been insured regarding complications in diagnostic and therapeutic medical work to the Patients’ Insurance Syndicate (PIS).

In order to characterize avoidable factors and/or situations where the surgeon should raise his attention, we have studied the reports of accidental lesions of the choledochus at cholecystectomy reported to the Insurance Syndicate during 6 years.

Materials and Methods

Sixty-five reports of accidental lesions of the choledochus at cholecystectomy were found in the records of the PIS in Stockholm in June 1982. All written information from the hospitals where the first operations were performed were sent for. In most cases, this was completed with telephone interviews with the surgeon who performed the operation and/or the head of that surgical department concerning the circumstances of the operation, the experience of the surgeon, and related questions.

For comparison, information of age and sex of patients who were cholecystectomized in 1979 and type of hospital they attended were sent for from all 26 counties in Sweden, which gave a control material of 14,380 patients. As control material to weight and height of the studied patients, the corresponding values were taken from 128 consecutive elective cholecystectomies (42 men, 86 women) at the Department of Surgery, University of Lund, Sweden.

The statistical analyses were done with the Chi square test.

Results

The Patient

Twenty-eight per cent of the 65% patients were men (Fig. 1); this was significantly less than the 34% men of
the 14,380 control patients (p < 0.05). The patients with accidental lesions were younger (mean age 45.7 vs. 53.5) than the control group (p < 0.05) (Table 1). All but three of the patients were without other concomitant gastrointestinal disease (colon irritable 2, duodenal ulcer 1) and all but two (cardiosclerosis) without cardiopulmonary disease of significance. No one was operated on the biliary tract before, nor was anybody operated on for colonic or gastric disease or other diseases in the upper right part of the abdomen. Almost all patients were of normal weight according to their height with a not statistically significant tendency to lower weight than the control material (Table 2).

The patients had a short history of known biliary tract disease (Table 3), and only four patients had had significant pains or discomfort in the right upper part of the abdomen during the week before operation. The disease of the gallbladder was verified with x-ray or ultrasound in all cases but one (Table 4). The remaining patients were operated on acutely under the preliminary diagnosis of gangrenous cholecystitis. No patient had visible jaundice on admission for the operation; with regard to history, clinical status, x-ray and chemical laboratories, there was a suspicion (although only vague) of stone in the choledochus in only three cases. The indication for operation seems, in retrospect, adequate in all cases.

The Hospital

All operations were performed in hospitals with x-ray obtainable for perioperative cholangiography in the operation theatre. There was no preponderance of higher frequency of the lesion with regard to number of operations performed in any of the three types of Swedish hospitals (University Hospital, County Hospital, or Local Hospital) (p > 0.05) (Table 5).

The Surgeon

Most of the surgeons who were responsible for the lesions were under continual surgical training (Table 6), but no control material is obtainable. At least 66%, but

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Table 1. Age Distribution of Patients with Accidental Lesions of the Choledochus (n = 65) and a Control Group (n = 14,380)

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Patients with Choledochus Lesions (%)</th>
<th>Control Material (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-44</td>
<td>46</td>
<td>29</td>
</tr>
<tr>
<td>45-64</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>65-74</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>75-84</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>85-</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2. Comparison of Weight (kg) and Height (cm) of Patients with Accidental Lesions of the Choledochus (n = 65) and a Control Group (n = 128)*

<table>
<thead>
<tr>
<th></th>
<th>Patients with Choledochus Lesions</th>
<th>Control Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight, men</td>
<td>79.6 ± 7.9</td>
<td>83.8 ± 12.2</td>
</tr>
<tr>
<td>Height, men</td>
<td>179.2 ± 6.6</td>
<td>179.4 ± 6.3</td>
</tr>
<tr>
<td>Height, women</td>
<td>163.2 ± 7.6</td>
<td>163.2 ± 6.0</td>
</tr>
</tbody>
</table>

* Figures given are mean ± SD.

Table 3. Time Before the Operation of Discomfort and/or Pain with Probable Relation to Gallbladder Disease

<table>
<thead>
<tr>
<th>Time (Months)</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>24</td>
</tr>
<tr>
<td>1-3</td>
<td>28</td>
</tr>
<tr>
<td>3-6</td>
<td>6</td>
</tr>
<tr>
<td>6-12</td>
<td>4</td>
</tr>
<tr>
<td>&gt;12</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 4. Preoperative Verification of Gallbladder Disease*

<table>
<thead>
<tr>
<th>Verification</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peroral cholecystography: gallstone in functioning gallbladder</td>
<td>31</td>
</tr>
<tr>
<td>Radio-opaque gallstone in nonfunctioning gallbladder</td>
<td>4</td>
</tr>
<tr>
<td>No filling of gallbladder, although normal bowel and liver function</td>
<td>26</td>
</tr>
<tr>
<td>Ultrasonography: gallstone (not otherwise verified)</td>
<td>3</td>
</tr>
</tbody>
</table>

* During the investigated time, peroral cholecystography has been the routine investigation for gallstone in Sweden. Ultrasonography is being used more frequently with time; here only the results of ultrasonography are reported if the x-ray investigation was not conclusive.
not more than 82% (information not available in 10 of 65 cases), of the surgeons had not reached the end of their 4.5 years of surgical training (in Sweden the end-point of formalized training). They were seldom assisted by more experienced surgeons from the beginning to the end of the operation (7/65), but in 48 of the 55 cases where the lesion was found peroperatively, the rest of the operation was performed together with one or more more experienced other surgeon (Table 6).

The Operation

Only two of the operations were done acutely—although about 20% of cholecystectomies in Sweden today are reported to be done acutely.3 According to the report of the surgeon, there were no signs of significant ongoing acute inflammation in 58/63 operations, and in only four there was reported a severe, acute inflammation. A report of the histological examination of the gallbladder has been found in 58 of the patients; in all cases there were signs of chronic inflammation with (12) or without (46) signs of acute inflammation. All gallbladders contained one or more stones.

The anatomy was before the lesion stated by the surgeon as normal in 51/55 cases; when the lesion was obvious, an anomaly was reported in only 16/55 cases (Table 8) (the width of the cystic duct and/or the choledochus was, however, not taken in account for classification as anomaly or not). The anomalies reported were: cystic duct mainly to the left of the choledochus with crossing of the choledochus posteriorly (8 cases) and anteriorly (3), extremely short cystic duct (4), and cystic duct branching from left hepatic duct (1). In very few of the operations the blood loss was significant (8 cases bled more than 1,000 ml; however, it is not known at what time the blood loss was in respect to when the lesion was done), and none of the surgeons claimed that the lesion was due to difficulties with the haemostasis during the operation.

Peroperative cholangiography was done in all cases but three—one of these operations was done acutely. The lesion was most likely done before the cholangiography was performed in 27 cases, after the cholangiogram was done before the films were available, i.e., during the development of the films in 32 cases and after the films were available in one case (the time cannot be given in the remaining 3 cases). In all 27 cases in which the lesion was done before the cholangiogram, the lesion was observed by the roentgenologist, but in the remaining 33 cases the films—even in retrospect—were reported as normal.

No case of choledocholithiasis, or suspicion of choledocholithiasis at peroperative x-ray, was reported to the PIS nor found in the investigated file “surgical complications of gallbladder and extrahepatic bile ducts.”

The gallbladder was excised beginning from the fundus in 48% of the cases and from the pouch in 40%; for the rest of the cases (12%) the exact procedure is not known. The lesion was not likely done before the gallbladder was taken out in 45 cases, when the gallbladder was excised in four cases, and in no cases afterectomy (not known in 6).

The lesions were observed intraoperatively in 55 of the cases (85%) and in all cases but one in 96 hours. The remaining case was first obvious 8 days after surgery.

Discussion

In previous studies from Scandinavia,4–6 the incidence of common duct injuries in connection with cholecystectomies was estimated to be between one in 327 and
one in 508. It is obvious that the incidence during the last 5 years has been considerably lower. Our belief is that measures taken during the last 20 years have improved the quality of biliary surgery in Sweden.

The material presented is by no means representative of all accidental lesions of the choledochus in Sweden but should be regarded as a material of lesions done in spite of no preoperatively known aggravating factors. Therefore, these cases are of importance because they represent a selection of those patients where the lesions probably could have been prevented.

Cholecystectomy is now considered as a major operation and should not be performed at minor hospitals. In Sweden cholecystectomies are no longer performed at small hospitals—defined as hospitals without modern surgical facilities or a frequency of operations that does not give each surgeon proper training. At present, 96 major hospitals exist in Sweden for a population of 8 million people, where major operations such as cholecystectomies are performed. Other measures taken are better training of surgeons and better supervision of surgeons under training, as well as emphasis on good exposure, atraumatic surgery, and perioperative cholangiography. It has also been emphasized that the cystic duct should be dissected free and the entrance of the cystic duct into the common duct identified before any incision or division is done. The cystic artery and cystic ducts are thought to be identified and dissected individually, and perioperative cholangiography is not only done in search for bile duct stones, but also to verify that no unknown anomaly is present. The old-fashioned type of cholecystectomy, to clamp the cystic duct and the cystic artery at the same time without identifying the bifurcation between the cystic duct and hepatic duct, is no longer regarded as proper surgery. It is obvious that the steps taken in the last 20 years have reduced the incidence of iatrogenous injuries to the common bile duct. The incidence is, however, still too high as its consequences in many instances are catastrophic to the patient. Thus, it is of utmost importance to try to identify the factors of importance for development of iatrogenic injuries.

Most of the materials presented until today have had the disadvantage to be collected during a long time period, often up until 30 years. Moreover, despite a collection of patients during a very long time period, most materials are very small. In order to get a reasonable number of patients they include, in most instances, other types of injuries, such as trauma and blunt or penetrating injuries to the bile ducts. Most of the experience is reported as results of surgery, i.e., hepaticojejunostomies, and, most often, malignant lesions. A merit of the present material is that it is collected from all operating hospitals in one nation, and during a relatively short time period (7 years). As most of the operations were done rather recently, it has been possible to contact the operating surgeon for further information.

In general, the patients showed to be relatively young women (mean age 46, female 72%), slim or normal weighing persons, without any significant concomitant gastrointestinal diseases (5% had symptoms of irritable colon or duodenal ulcer) or cardiopulmonary diseases, and without any previous operation either in the upper right part of the abdomen or the whole abdomen. This means that in the investigated cases the prerequisites for surgery were good.

Less than ten per cent of the patients had pain or discomfort in the abdomen during the week before operation. No patient had jaundice, approximately five per cent of the patients had indications, although vague, of presence of common duct stones. It is obvious that the patient does not offer much explanation to the occurrence of iatrogenic common duct lesions.

As mentioned previously today only 96 fully equipped hospitals exist where operations are performed on in-patients. These hospitals are eight university hospitals (approximately 2000-bed hospitals), 26 central county hospitals (approximately 1000-bed hospitals), and 62 district or local hospitals (approximately 300-bed hospitals). All the types of hospitals were involved to approximately the same extent by accidental lesions of the common duct.

In 1983, 816 trained surgeons and 343 surgeons under training were registered in Sweden, which means that on the average, each Swedish surgeon performs 13 cholecystectomies annually.

A weak point in European health structure is the relatively low ratio of trained surgeons to surgeons under training. There is a rapid development and this old-fashioned hierarchic structure will disappear very soon. Due to the lack of senior surgeons, the surgeons under training are not looked after to the extent that would be desired. A sign of this is that between 66% and 82% of cases were performed by surgeons under continuous surgical training, but only three of the cases were done by surgeons having less experience than 25 operations. It is to be assumed that most of the young surgeons are assisted by senior surgeons during this stage of training. After his twenty-fifth cholecystectomy, the surgeon under training is usually left to do the operation with a senior surgeon present but not assisting. In only seven of our cases, they were assisted by experienced surgeons from the beginning to the end. On the other hand, at least 18 per cent but not more than 34% of the cases were done by specialists in surgery and 15% of surgeons with an extensive experience of cholecystectomies (>100 operations performed before). The fact that 80% of the cases
were done by surgeons with an experience of 25–100 operations points out that this happens at a stage when the surgeon has got some routine but might feel some overconfidence.

We look upon it as a sign of progress that the injured common duct was observed already during the operation in 48/55 cases. This is quite in contrast to previous experience in the literature. In a recent paper in World Journal of Surgery, Castrini and Pappallardo described materials of iatrogenic strictures of the bile ducts. Only 9/66 (14%) were detected during the operation. In the same material, 33 patients were observed during the first postoperative week and 26 patients during the first month. The experience by Hilles et al. is similar: The injury was recognized and repaired in 4/22 patients (18%) between 2 days and 3 weeks in 9/22 patients (41%) and later in 9/22 patients (41%). It is well-documented in the literature that the results are outstandingly better if the injury is detected and repaired immediately.

It is a common statement in the literature that an emergency operation constitutes a higher risk for common duct injury than an elective cholecystectomy. In their material, Castrini and Pappallardo observed a dominance of iatrogenic strictures following acute operations (61% vs. 42% done at elective operations). Our observations are in great contrast to this. Only two of the injuries (4%) were done during acute operations despite the fact that about 20% of cholecystectomies today are performed acutely. A report of histology was found in 58/63 patients and it showed either signs of chronic inflammations or signs of chronic and acute inflammations.

Conclusion

It has often been stated—often by Scandinavian writers—that perioperative cholangiography would help to prevent lesions to the common duct. In almost half of the cases, 27/62 (44%), where cholangiography was performed, the lesion was done already before the cholangiography. In all of these cases, the lesion was recognized by the roentgenologist. These injuries are difficult to understand as the policy is not to divide the cystic duct but to incise it for introduction of the catheter for perioperative cholangiography. Even if such a transverse incision was done in the common duct, it should not lead to any postoperative morbidity. In 33/62 (53%) cases, the cholangiography showed normal pictures. However, the surgeon did not wait for the cholangiography report; the gallbladder was taken out while waiting for the films to be developed. This must be abandoned—no surgeon is that short of time!

It has often been claimed that it is more safe to excise the gallbladder from the fundus down towards the cystic duct. This view has no support from the present material. In half of the cases (48%), the gallbladder was dissected free from the fundus, but in almost the other half (40%) from the pouch. It is likely that the lesion was done at the dissection before the gallbladder was taken out in the majority of cases, and in just a few cases at excision of the gallbladder—the dissection is obviously the most dangerous part of the operation.

We think that our study of this selected material shows that there are cases of accidental lesions of the choledochus at cholecystectomy that could be prevented. The most important step to take is to consider cholecystectomy as a major operation that requires well-trained surgeons with a humble and concentrated approach to their task.

References