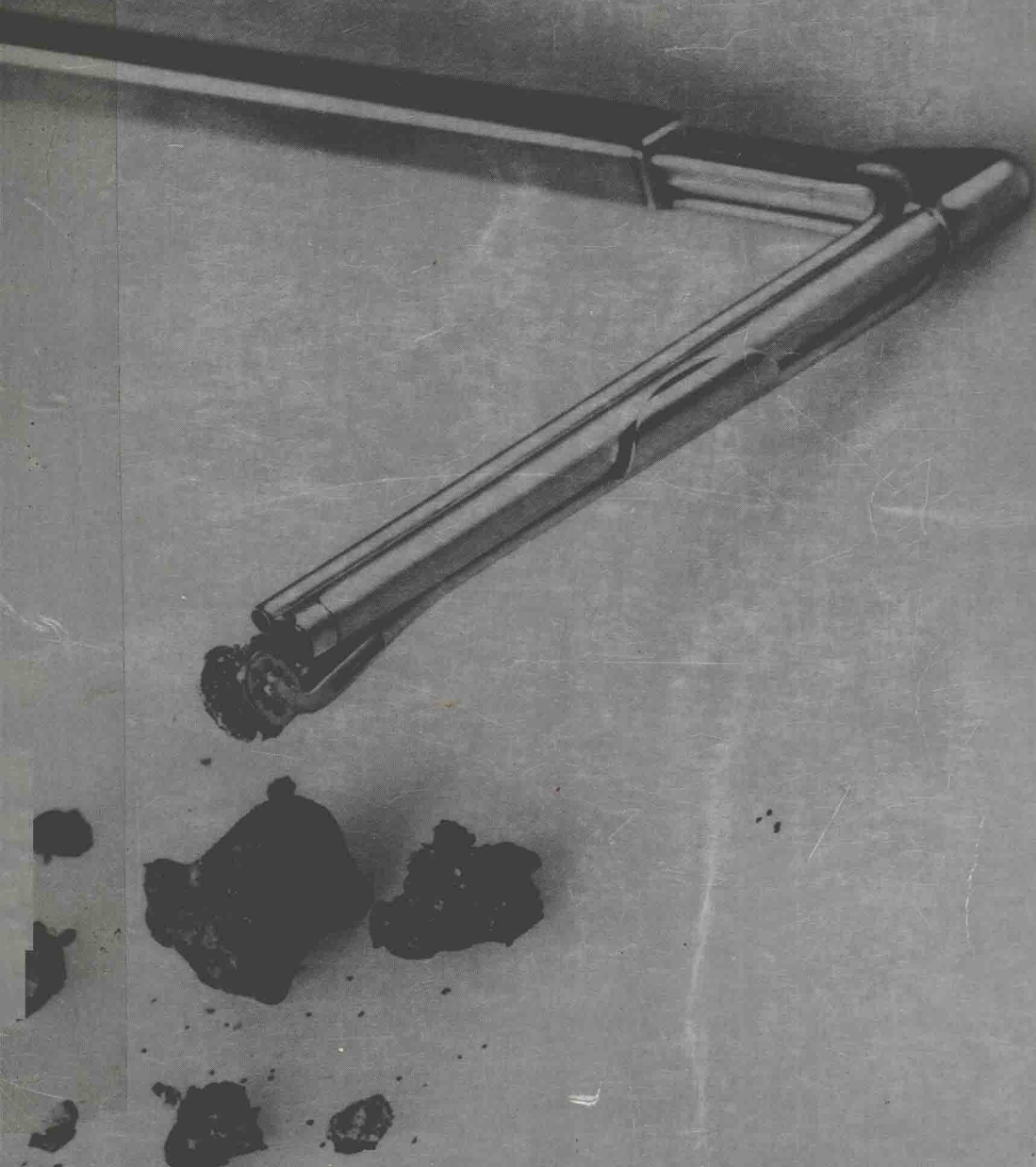


Common Duct Stones

An appraisal of etiology and surgical management
with special emphasis on operative biliary endoscopy

B.J. Reitsma



In memory of Clarence J. Schein, a most dedicated teacher in biliary surgery.

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Tongersestraat 53 door

Bertus Johannes Reitsma

geboren te 's-Gravenhage

to my parents

Ineke

Bas, Simone, Liesbeth and Annemieke.

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Part I

Gallstone disease

Chapter 1

Cholelithiasis: a true gallbladder disease?

Cholesterol gallstone disease is one of the most common gastro-intestinal disorders encountered in the western world. Prevalence of the disease is increasing and is somehow related to the type of food consumed. Diet is supposed to be still the most important factor in stone disease (37, 38).

No other primary gastro-intestinal or metabolic disorder can be considered etiologically of more importance (361).

The female prevalence of the disease is well established and most pronounced in the reproductive years of the female adult. This high female preponderance in cholelithiasis however has never been convincingly correlated to a significant difference in bile composition in the normal male and female adults. The only physiologic difference between male and female is an increase in total Bile Acid which may enhance gallstone formation although this total Bile Acid Pool Size has been convincingly demonstrated to be rather a secondary than a primary event in cholelithiasis.

The female sex hormones seem to play an important role in cholelithogenesis. Hyperoestrogenaemia especially may promote gallstone formation by reducing Bile Acid secretion which favors a rise in cholesterol concentration in bile. These data are supported by clinical evidence showing an increased risk for gallstones in patients which are or have been pregnant and in woman taking contraceptive medication even on a short term regimen. Moreover progesterone has synergic action inducing delayed gallbladder emptying as noted during pregnancy and in the second half time of menstrual cycle. These low flow states may easily facilitate growth of incipient gallstones. But also the intestinal phase of Bile Acids during the progesterone phase is increased resulting in an extended Small Bowel Transit Time which may be of additional etiological importance in cholelithogenesis.

These low flow states in the gallbladder are also encountered in patients following vagotomy, single or in combination with gastric resections, significantly increasing the risk for gallstone disease.

The role of the gallbladder in stone disease is still debated (74). Advances in research on Bile Acid biochemistry and kinetics have contributed to a better understanding of gallstone pathophysiology (chapter 2). Supersaturated bile (cholesterol) seems to be of major importance in stone disease (63,288). Underlying hepatic disturbances resulting in bile supersaturated with cholesterol are defined and are responsible for the production of lithogenic bile.

Different studies have established lower lithogenic indices in cholecystectomized patients (419), although contrasting data on postoperative bile composition following cholecystectomy have been published (70, 242, 346, 349). The gallbladder itself may thus be suspected influencing hepatic bile lipid synthesis and/or secretion by feedback mechanism(s), resulting in a decrease in BA and/or an increase in the production of cholesterol leading to lithogenic bile. This hypothetical mechanism may thus supposed to be eliminated after cholecystectomy in studies showing a lessened lithogenicity in postcholecystectomy patients.

Hepatic lithogenic bile production as the primary event in gallstone disease has probably been overemphasised. This can be substantiated additionally by the disappointing results of medical stone dissolving therapy by oral administration of Bile Acids namely Urso and Cheno Acid which influence hepatic bile production. A reappraisal of the importance of the gallbladder itself in the genesis of cholesterol cholelithiasis should be warranted. The overwhelming number of symptom free patients after cholecystectomy show at least indirect evidence the gallbladder remains the epicenter of this disease.

Different factors of the gallbladder function may play a role as well. The concentrating activity of the gallbladder seems to differ considerably for each bile lipid component. The presence of a selective absorption process in the gallbladder may enhance stratification of bile initiating stone formation (95, 232). This selective process further strengthens the essential role of the gallbladder in cholesterol stone disease.

If cholelithiasis is thus regarded primarily a disease of the gallbladder, biliary stones are a secondary manifestation. The confused issue that biliary stones can be discovered after cholecystectomy in a time span from 3 months to 30 years, has encouraged the hypothesis of reformed biliary stones. Furthermore, a clear distinction between recurrent (=reformed) and retained stones cannot be properly assessed on clinical grounds. This is the main reason why there is no uniform understanding on the precise indication for a bilio-enteric bypass procedure in stone disease. Migration of stones in the biliary ducts can no doubt lead to infection in the biliary system. Often the inflammation is not limited to the gallbladder alone. Both liver and pancreas and the entire biliary system as well are often involved (13), especially when cholangitis develops.

In general, it is evident from the literature that the indication for surgery should be broad in view of the natural history of the disease. Early surgical treatment eliminates sequelae that can cause complications which will take their toll in life at a later stage (267, 326). Primary operations are likely to carry a lower mortality rate than the nonoperative approach in gallstone disease. Effective treatment of biliary

disease has in the last decades been constantly improved by intraoperative cholangiography in combination with other refinements in technique and / or instrumentation. The cure-rate of Common Duct Stones (CDS) is primarily determined by the incidence of complications being retained stones and iatrogenic lesions in the biliary system, necessitating reoperation.

Although progress has been acknowledged, the vexing problem of retained stones remained one of the most serious complications in biliary surgery (7). Precise indications for surgical procedures especially for adjunctive surgical measures are of paramount importance. An originally benign disease like cholelithiasis can be followed by a clinically "malignant" course because of the necessity of repeated explorations which are accompanied by a higher complication and mortality rate (76).

Prevention of retained and recurrent bile duct calculi is the primary goal of biliary surgery. The majority of these sequelae can be prevented by acceptance of routine operative biliary radiology and biliary endoscopy as well.

The aim of this study is to define the etiology of Common Duct Stones by a clinical investigation and to improve the results of surgery by:

1: Protocolising the surgical treatment towards a standard procedure for Common Duct Exploration,

2: Including a permanent position for cholangiography and biliary endoscopy during operation.

3: Investigating hepatic bile biochemically in search for changes in bile lipid composition in patients with common duct stones before and after appropriate surgical treatment.

If a considerable reduction in the total score of retained stones can be accomplished by a complete surgical approach (1 and 2), and the hepatic bile composition in the postoperative period in the treated patients does not give any substantial evidence for a continued lithogenicity (3), the hypothesis on both reformed and recurrent (cholesterol) biliary stones should be redefined:

All biliary stones in the early and late postoperative phase following cholecystectomy (+/- CDE) should thus be regarded as "ordinary" retained stones unless otherwise proven.

In the first part of this study a critical analysis on all aspects of cholelithiasis is presented focusing on the precise role of both hepatic bile lipid formation and the