

RESULTS OF BILIARY OPERATIONS WITHOUT OPERATIVE CHOLANGIOGRAPHY

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Summary

1. The results of biliary operations without the use of operative cholangiography are analysed.
2. The low incidence (1.2%) of residual stones following cholecystectomy only does not justify the routine use of operative cholangiography.
3. The high incidence (9.1% to 13.6%) of residual stones after choledochotomy should lead to the adoption of post-exploratory operative cholangiography in those cases where the ducts are explored.

Stones are found in the common bile ducts of about 10-20% of patients with gall stones. The success of any operation for biliary calculi depends to a great extent on whether stones in the common duct are overlooked at a first operation. Many surgeons consider that the clinical and operative indications for exploring the common bile duct in operations for calculous biliary disease are insufficiently clear. This results in missed stones in the common duct on the one hand and in the exploration of many ducts which do not contain calculi on the other. Furthermore, even when the common duct is explored and stones are found, it is not uncommon for calculi to be overlooked. Organs in contact with the extrahepatic ducts make palpation difficult and the coating of pus and mucus on the stones may

mask the sense of contact with an exploring probe.

Since the introduction of operative cholangiography by Mirizzi in 1932 the value of this procedure has been favourably reported on by several authors, both in detecting unsuspected and residual stones and in avoiding unnecessary explorations. All agree, however, that its dependability will vary with the interest and ability of the professional team, the available equipment and the frequency with which it is practised. In our hospital, for a number of reasons, we do not use routine operative cholangiography. In this review an attempt is made to analyse the results of biliary operations without its use.

Material and Results

The records of patients who underwent biliary operations for non-malignant conditions in the 5-year period between 1963 and 1967 are here reviewed. The total number of patients was 229. Of these, 18 have been excluded because their records could not be traced. This leaves for consideration 211 patients on whom a total of 214 operations were performed. The nature of these operations is shown in Table I. There were 53 males and 158 females, their ages ranging from 21 to 78 years. (Fig. 1).

Of 211 patients undergoing operations for calculous biliary disease, 44 had their common bile duct explored, 3 of them twice. This gives an incidence of exploration of 20.3%. (Table II). Stones or mud were found in 30 out of 44 primary common

TABLE I

| Type of Operation <i>Operation</i> | <i>Number</i> |
|---|---------------|
| Cholecystostomy | 6 |
| Cholecystectomy | 161 |
| Cholecystectomy & Choledochotomy | 42 |
| Choledochotomy only | 1 |
| Choledochotomy & Choledocho-duodenostomy | 1 |
| Re-exploration of the Common Duct | 3 |
| Total | 214 |

TABLE III

| Results of Primary Common Duct Exploration | |
|--|-------------------------------|
| Total number of common duct explorations | 44 |
| Stones recovered in | 26 |
| Mud removed in | 4 |
| Number of positive explorations | 30 |
| Percentage incidence of positive explorations | 68.1% of ducts explored |
| | 14.2% of total operations. |

TABLE II
Incidence of Choledochotomy at first operation

| <i>Total No. of primary operations (excluding 1 case of choledochotomy only)</i> | <i>No. of cases in which C. B. D. was explored</i> | <i>Percentage incidence</i> |
|--|--|---------------------------------|
| 210 | 43 | 20.4% |

ducts explored or 14.2% of the total. (Table III). It is generally believed that the prevalence of duct stones rises with age and this appears to be so in this series. (Fig. 2).

In the present study the follow-up periods varied from 6 months to 5½ years. During this time 20 patients were seen with persistent or recurrent symptoms at intervals varying from a week to 4 years after the original operation. These findings are analysed further in Table IV. It will be seen

that in 4 patients the presence of residual common duct stones after choledochotomy was proved: 2 demonstrated by post-operative T-tube cholangiography and 2 found and removed at re-exploration. Of the 2 diagnosed radiologically, one had ether injected down the T-tube (Pribram, 1047) on three occasions with apparent success as shown by a subsequent normal cholangiogram. The symptoms of another subsided spontaneously. Four more patients were

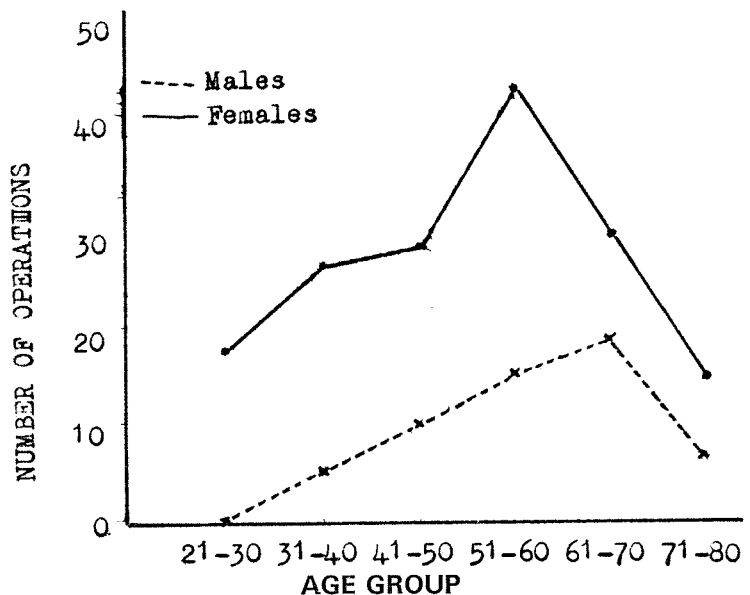


Fig. 1 — Number of Operations by Age Group.

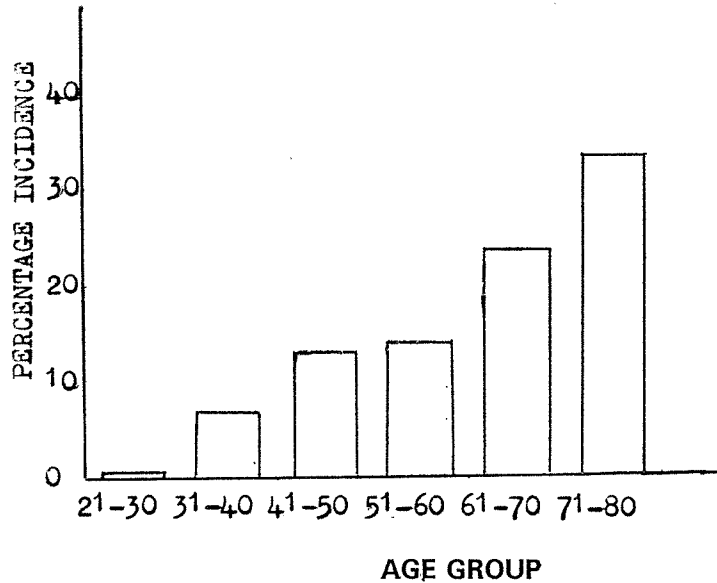


Fig. 2 — Incidence of Common Duct Stones by Age Group.

TABLE IV
Analysis of 20 Patients with Recurrent Persistent Symptoms

| | | | |
|--|-----------|--|----|
| A. Diagnosis unrelated to previous condition | Proved | Duodenal ulcer | 1 |
| | | Gastritis | 1 |
| | | Hydatid cyst of liver | 1 |
| | | At second operation | 2 |
| B. Residual common duct stones | Suspected | Radiologically | 2 |
| | | After cholecystectomy | 2 |
| | | After cholecystectomy and choledochotomy | 2 |
| C. "Post-cholecystectomy syndrome" | | | 4 |
| D. Chronic recurrent pancreatitis | | | 2 |
| E. Recurrent carcinoma of the gall bladder | | | 2 |
| F. Stricture of common bile duct | | | 1 |
| Total | | | 20 |

TABLE V
Incidence of Residual Stones

| Operation | Total No. | Residual stones | | Percentage incidence |
|--|-----------|-----------------|--------|----------------------|
| | | Suspected | Proved | |
| Cholecystectomy | 167 | 2 | — | 1.2% |
| Cholecystectomy & Choledochotomy | 44 | 2 | 4 | 9.1% to 13.6% |
| Choledochotomy only | | | | |
| Choledochotomy & Choledocho-duodenostomy | | | | |

suspected to have residual common duct stones — 2 after cholecystectomy alone and 2 after cholecystectomy and choledochotomy. This gives a possible incidence of residual stones of 1.2% after cholecystectomy alone and 9.1% to 13.6% after exploration of the common duct. (Table V).

In this series there were altogether 10 deaths in the immediate post-operative period. Four occurred after cholecystectomy, 5

after cholecystectomy and choledochotomy and 1 after re-exploration of the common duct. This gives a mortality rate of 2.4% for cholecystectomy alone, 11.3% for cholecystectomy with choledochotomy and 33.3% for re-exploration of the common duct. (Table VI). No post-mortem examinations were performed on any of these patients. The probable causes of death are shown in Table VII.

TABLE VI
Mortality according to Operation

| <i>Operation</i> | <i>Total No.</i> | <i>Deaths</i> | <i>Percentage Mortality</i> |
|--|------------------|---------------|-----------------------------|
| Cholecystostomy | 6 | — | 0% |
| Cholecystectomy | 161 | 4 | 2.4% |
| Cholecystectomy & Choledochotomy | 42 | 5 | 11.8% |
| Choledochotomy only | 1 | — | 0% |
| Choledochotomy & Choledocho-duodenostomy | 1 | — | 0% |
| Re-exploration of the Common Duct | 3 | 1 | 33.3% |
| Total | | 10 | |

TABLE VII
Analysis of causes of death

| <i>Number</i> | <i>Age</i> | <i>Sex</i> | <i>Clinical Details</i> | <i>Time post-op</i> | <i>Probable cause of death</i> |
|---------------|------------|------------|---|---------------------|--------------------------------|
| 1. | 75 | F | Very frail old woman with spinal deformity and reduced respiratory reserve. | 3 days | Respiratory failure. |
| 2. | 63 | M | Severe upper abdominal pain and collapse. | 12 days | ? Biliary peritonitis. |
| 3. | 67 | F | Massive collapse of left lung. | 5 mins. | Anoxia and cardiac arrest |
| 4. | 66 | M | Difficult choledocholithotomy in a jaundiced patient. P.H. of angina. | 4 hrs. | ? Myocardial infarction. |
| 5. | 73 | M | Chronic bronchitis and emphysema. | 6 days | Bilateral bronchopneumonia. |
| 6. | 41 | F | Severe diabetes. | 12 days | Uncontrolled diabetic ketosis. |
| 7. | 60 | F | Jaundice. Abscesses in lesser sac. | 12 days | Toxaemia and liver failure. |
| 8. | 59 | F | Post-operative deep vein thrombosis. | 6 days | Pulmonary embolism. |
| 9. | 54 | M | Jaundice. | 8 days | Renal failure. |
| 10. | 66 | M | Simple cholecystectomy. Sudden collapse. | 2 days | ? Pulmonary embolism. |

TABLE VIII
Relation of Common Duct Exploration Rate to
Positive Findings

| <i>Author</i> | <i>Percentage exploration of common duct</i> | <i>Percentage of explored ducts from which stones were recovered</i> |
|-----------------------------|--|--|
| Cattell (1942-45) | 45.7% | 36.7% |
| McLaughlin & Kleager (1951) | 31% | 34% |
| Baker & Kontsky (1951) | 40% | 50% |
| Glenn (1952) | 10.5% | 65% |
| Colcock & Liddle (1958) | 41% | 35.5% |
| Havard (1960) | 21% | 56.7% |

Discussion

It is generally agreed that, properly performed, operative cholangiography is of value both in deciding whether to explore the common duct or not and in demonstrating residual stones. (Smith, 1962; Hermann and Hoerr, 1965; Chapman *et al.* 1964). With care and experience the number of false positive and false negative results can be very small. In a series of 200 cases reported upon by Letton and Wilson (1966), operative cholangiography was more reliable than any other criterion for common duct exploration except palpation of a stone in the duct. We feel that up to now we have not had the facilities to produce operative cholangiograms of consistently good diagnostic value with negligible loss of time. We have therefore based the decision of when to explore the common bile duct on the usually accepted clinical and operative criteria (Glenn, 1952; Maingot, 1961). A wide variation is found in the frequency with which the common duct is opened in quest of stones and the incidence of calculi recovered. The exploration rate in this series (20.3%) is lower than that of most American series but very close to that of Havard (1960) (Table VIII). The incidence of positive explorations (68.1%) compares favourably with that of other series where operative cholangiography has not been employed. Thus, Bartlett and Waddle (1958) reported an exploration rate of 43% to recover stones harboured by 16%; Mixer, Hermanson and Segel (1951) stated that before they used operative cholangiography 50% of their common bile duct explorations had been unnecessary.

TABLE IX

Reported Incidence of Unsuspected Common Duct Stones after Simple Cholecystectomy

| <i>Author</i> | <i>Incidence Percent</i> |
|-----------------------|--------------------------|
| Glenn (1952) | 4% |
| Mehn (1954) | 10% |
| Ferris (1959) | 3.7% |
| Isaacs & Daves (1960) | 8% |
| Havard (1960) | 2.3% |

TABLE X

Reported Incidence of Residual Common Duct Stones after Choledochotomy

| <i>Author</i> | <i>Incidence Percent</i> |
|---------------------------------|--------------------------|
| Buxton & Burk (1934-46) | 8.9% |
| McKittrick & Wilson (1949) | 5.8% |
| Johnson, Waugh & Good (1940-50) | 8.0% |
| Glenn (1932-50) | 9.7% |
| Smith <i>et al.</i> (1957) | 10.7% |
| Thomson (1956) | 11.6% |
| Hight <i>et al.</i> (1959) | 12.7% |
| Havard (1960) | 13.5% |
| Hicken <i>et al.</i> (1964) | 11.0% |

The incidence of residual stones after cholecystectomy alone is reported to be from 2.3% to 10% (Table IX). In this series there were only two suspected cases of residual stones in the common duct following cholecystectomy and cholecystostomy, an incidence of 1.2%. Retained common duct stones are reported to occur frequently following choledochotomy and choledocholithotomy. (Table X). Buxton and Burk (1948) reported residual calculi in 8.3% of 190 choledocholithotomies. Smith *et al.* (1957) performed 224 cholecystectomies

with choledocholithotomies and found that not all stones had been removed in 24 patients, an incidence of 10.7%. Thomson (1956) found 11.6% residual stones after exploration of the common bile duct. Johnston, Waugh and Good (1954) recorded 8% overlooked common duct stones in 153 choledocholithotomies. In our series, 9.1% have definitely, and another 4.5% have possibly, had residual stones after choledochotomy. The true incidence is always slightly higher than apparent because (i) residual duct stones may remain symptomless, at least for a time, and some of our patients have been followed up only for a short period, and (ii) patients may have left the country or had subsequent operations performed abroad or in other hospitals. This last possibility has been ruled out by checking the records for the last five years at the other two main hospitals. This has revealed no patient who has had a second operation for residual stones carried out at these hospitals.

The usually quoted mortality for cholecystectomy alone is 0.5% to 1.0% (Glenn, 1952; Maingot, 1961). The rather high figure of 2.4% in this series may be accounted for by the poor general condition of some of these patients. The accepted idea that mortality for cholecystectomy with choledochotomy is about four times that of simple cholecystectomy is borne out by our figures.

The selection of patients for exploration of the common duct without operative cholangiography has resulted in such a low incidence of residual stones after cholecystectomy alone (1.2%) that it would seem to make its routine use superfluous. Conversely, the relatively high incidence of missed common duct stones after choledochotomy appears to justify fully the adoption of post-exploratory operative cholangiography whenever the ducts are explored.

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