

# CHOLECYSTECTOMY IN PATIENTS WITH CORONARY HEART DISEASE\*

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That chronic cholecystic disease and coronary heart disease frequently occur in the same person is an accepted fact, and the possibility of an aetiological relationship between the two has been the subject of wide speculation.<sup>1</sup> Many consider that the mere existence of gall-bladder disease has a deleterious effect on the heart. This opinion was strongly fostered by the writings of Babcock<sup>2</sup> at the turn of the century, and to this day many others share the view that gall-bladder disease causes 'irreparable cardiac damage'.

A survey of Babcock's cases, however, reveals the inadequate grounds on which such claims were based. Equally unsubstantiated are the claims that certain patients with angina pectoris have been completely relieved of their symptoms<sup>3, 4</sup> and that in others the coronary circulation has been improved by cholecystectomy for gall-stones as

\* A paper presented at the South African Medical Congress, Durban, September 1957.

evidenced by the disappearance of abnormalities in the electrocardiogram.<sup>5</sup> In the former instance biliary pain was mistakenly considered to be angina;<sup>6</sup> in the latter instance the changing electrocardiogram is actually a reflection of the natural life-history of disease of the coronary artery. Every clinician has repeatedly followed the evolution of an abnormal electrocardiogram resulting, for example, from a myocardial infarction through intermediate stages toward and often to normal whether cholecystic disease was present or not. But these considerations do not alter the basic problem when a patient who has both diseases presents himself. A patient with gall-stones, whether they happen to be symptomatic or not at the time, may nevertheless experience biliary colic or acute cholecystitis, which can neither be predicted nor prevented by anything short of the surgical removal of the diseased gall-bladder. These explosive complications of cholecystic disease might well cause serious embarrassment

to a patient whose coronary circulation is already compromised. Diminution in coronary blood and disturbances of cardiac rhythm have been demonstrated both in man and in animals when the biliary tract or other upper abdominal viscera have been acutely distended with a balloon.<sup>7-10</sup> The prevention, whenever, feasible, of the episodic complications of gall-bladder disease then assumes considerable importance for the patient with coronary heart disease.

Although the question of a possible aetiological relationship between coronary heart disease and cholecystic disease must remain unanswered for the present, practical lessons can be learned from the analysis of the records of patients with coronary heart disease who have undergone cholecystectomy. Such a study was undertaken in 1955,<sup>11</sup> with essentially two questions in mind: How well do patients with coronary heart disease tolerate removal of a diseased gall-bladder? Does the removal of such a diseased gall-bladder influence the subsequent clinical course of the patient with coronary heart disease?

#### MATERIAL FOR STUDY

The records of all patients who had undergone cholecystectomy at the Mayo Clinic in the 5 years from 1948 through 1952 were reviewed. Those who had been given a diagnosis of coronary heart disease before operation were selected for special study. There were 100 such patients. The period selected was recent enough to judge the surgical risk in terms of antibiotics, anticoagulants and special procedures in anaesthesiology, and sufficiently remote to gauge survival rates. Cholecystectomy was performed on 5,891 patients during this period with an over-all mortality rate of 0.9% (53 cases). These figures represent all gall-bladder procedures, whether done for primary cholecystic disease or in the course of other intra-abdominal procedures. The age distribution is indicated in Table I. There were 64 males and 36 females in this series, a ratio which is more in keeping with the incidence of coronary heart disease than of gall-bladder disease.

TABLE I. AGE OF PATIENTS

Age (years)	Total	Males	Females
40-49.. .. .	10*	5*	5
50-59.. .. .	39	26	13
60-69.. .. .	37	22	15
70-79.. .. .	14	11	3
Total .. .. .	100	64	36

\* Includes one man 38 years of age.

#### CRITERIA FOR THE DIAGNOSIS OF CORONARY HEART DISEASE

The diagnosis of coronary heart disease was made on the basis of (1) a history of thoracic distress which conformed to the characteristics of angina pectoris (80%) and (2) a history consistent with previous myocardial infarction (31%) usually supported by a subsequent history of coronary insufficiency (angina pectoris or dyspnea) or electrocardiographically by relics of such an event, or by both.

The degree of coronary insufficiency was graded in accordance with the amount of effort the patient was able to tolerate. Only one patient gave a history of angina at rest; 46 patients experienced angina on mild to moderate exercise; 36 with more strenuous exercise; and 17 were asymptomatic on the programme which they followed. All 17 patients in the last category gave a history of previous myocardial infarction and 15 of them had significant electrocardiographic relics.

No patients in the series had recently suffered from acute myocardial infarction.

The electrocardiograms of 29 patients were essentially normal; this figure corresponds closely to that reported in another series of patients with angina pectoris. For one patient no electrocardiogram was available. The electrocardiographic abnormalities of the remaining 70 patients are relics of anterior and posterior infarction, left ventricular hypertrophy, left bundle-branch block, right bundle-branch block, atrioventricular block and auricular fibrillation. Undoubtedly some of these changes were on the basis of hypertension.

#### CRITERIA FOR THE DIAGNOSIS OF GALL-BLADDER DISEASE

The diagnosis of gall-bladder disease was made on the basis of (1) a typical history of biliary colics (66%), with a history of jaundice in 19; (2) the occurrence of acute cholecystitis (6%), and (3) abdominal complaints ranging from mild dyspepsia to severe abdominal pain of atypical location or character in association with abnormal cholecystographic findings. In this series a non-functioning gall-bladder or a poorly functioning gall-bladder was as significant as the actual visualization of stones when the history was in keeping with a diagnosis of chronic cholecystic disease. Only one patient in the entire series was found to have no stones at operation.

The accuracy of the clinical appraisal of the gall-bladder status is reflected in the pathologic findings at the time of operation. As implied elsewhere, stones were present in 99 of these patients; common-duct stones were encountered in 20, and stones were found in the cystic duct in 10 other patients. The commonest finding in association with gall-stones was chronic cholecystitis, but in 6 cases the gall-bladder was acutely inflamed and was the cause of emergency admission to the hospital. In 10 other patients the gall-bladder was described as subacutely inflamed. Hydrops of the gall-bladder occurred twice in the series.

#### OPERATIVE AND POST-OPERATIVE COURSE

The usual routine operative precautions consisted of alerting the anaesthesiologist and the surgeon to the diagnosis of coronary disease. This simple expedient assisted in the choice of anaesthetic, usually a mixture containing a high percentage of oxygen, suggested that fluid should be administered cautiously, and warned the operating-room team to be more than ordinarily prepared to meet cardiac emergencies. Early ambulation was encouraged, and in some cases anticoagulants were employed.

**Morbidity.** The majority of patients experienced no difficulty at the time of operation; a mild to moderate drop in blood pressure was noted in 33 patients but this did not affect the operative or post-operative course. One patient in frank shock recovered uneventfully.

Auricular fibrillation developed at the time of operation in one case and 'an irregular pulse' in another. Frequent extrasystoles occurred in 2 patients. All subsided spontaneously.

The greatest single post-operative complication was thrombophlebitis; it occurred in 7% of patients. Wound infections, unexplained fevers and pneumonia each accounted for morbidity in 4%. There was one non-fatal myocardial infarction in the post-operative period. Two other patients experienced thoracic pain and showed electrocardiographic

evidence of temporary myocardial ischaemia; both recovered. In two patients non-fatal pulmonary embolism occurred and 3 had cerebral vascular accidents. Of the last, one died in hospital (case 3), one died a month after operation, and the third recovered.

**Mortality:** 3 patients died in the hospital after operation; all were males. A review of these three cases is enlightening.

#### Reports of the Fatal Cases

**Case 1.** The patient, a man 63 years of age, was obese and had mild hypertension. He gave a history, which was supported by electrocardiographic evidence, of myocardial infarction 5 months before admission. He had had no further angina, and the current electrocardiogram was normal. The patient had been subject to biliary colics without jaundice. The cholecystogram revealed a poorly functioning gall-bladder with stones. At operation a sub-mucous leiomyoma of the stomach was found; it was removed along with the chronically inflamed gall-bladder containing stones. The operative course was uneventful but post-operatively the patient became oliguric and complained of pain in the right side of the chest. A gradual fall in blood pressure was accompanied by a rise in urea. The patient died on the 4th post-operative day. On post-mortem examination haemorrhagic pancreatitis was found and there was questionable early myocardial infarction.

**Case 2.** The patient, a man 72 years old, was admitted to the Clinic with the diagnosis of acute cholecystitis accompanied by jaundice. The patient had had angina with moderate exertion, and although he gave no history of previous infarction, the electrocardiogram showed right bundle-branch block and probably relic in the posterior part of the myocardium. During operation an irregular pulse developed and then subsided spontaneously. A stone was found and removed from the common duct. The pathologist reported subacute cholecystitis on chronic cholecystitis. The patient did well post-operatively until the 7th day, when a pulmonary embolus developed. On the next day he vomited blood. Thereafter his course was satisfactory until the 21st hospital day, when he complained of pain in the right side of the chest. He then had a convulsion and died suddenly. At post-mortem examination the patient was found to have pancreatic necrosis and an old posterior myocardial scar.

**Case 3.** A man, 79 years old, was admitted to the Clinic because of acute cholecystitis accompanied by jaundice. He had experienced angina on moderate exertion and gave a history of acute myocardial infarction 8 years previously. The electrocardiogram showed the relic of previous infarction. During operation the blood pressure decreased minimally. Acute ulcerative cholecystitis and a common-duct stone were found. Two days after operation, mild left-heart failure developed which responded to digitalis and the routine measures. On the 3rd post-operative day the patient had a cerebrovascular accident but seemed to be progressing satisfactorily until a low-grade fever developed which failed to respond to antibiotics. He died on the 17th post-operative day. Permission for post-mortem examination was not granted.

Of the 3 patients 2 were acutely ill on admission as the direct result of the complications of gall-bladder disease; 2 of the 3 patients died as a direct result of pancreatitis, which again must be regarded as a complication of the biliary disease. In one patient coronary insufficiency was a possible contributory cause of death. This is clearly a demonstration of the hazards inherent in chronic cholecystic disease regardless of whether it has been silent or whether it has been symptomatic.

#### FOLLOW-UP STUDIES

At the completion of this study, information regarding 95 patients was available. The survival curve for these patients as compared to the survival curve for the normal population of similar age and sex constitution was computed by actuarial methods. The 6-year survival rate was 70.7% as compared with 83.9% in the normal population. A direct comparison of the survival rate in this group of patients with the survival

rate of the run-of-the-mill patients with coronary heart disease is of interest. In an earlier study<sup>12</sup> it was found that the 5-year survival rate among 6,882 patients with angina pectoris was 58.4%, a figure considerably lower than for the present series of patients; however, it is obvious that a direct comparison of these two groups cannot be valid inasmuch as the present series of patients constitutes a selected group of patients with coronary heart disease from which those with advanced degrees of coronary heart disease, those with congestive heart failure, and those with the more severe degrees of hypertension, were excluded. Certainly if some of these patients did live out their normal life expectancy, it might well be because they were spared the serious complications of chronic cholecystic disease.

As far as could be ascertained from the follow-up studies 6 patients died of subsequent myocardial infarction, 2 of cerebrovascular accidents, and 1 of hepatic coma; in 5 the cause of death was not known.

Information was available concerning the clinical course of 64 patients who were alive at the last inquiry. Of these, 36 reported no change in their cardiac symptoms; 17 were definitely improved and 11 were worse. The patient who had had angina decubitus pre-operatively was among the 17 patients who were definitely improved. From these data it is hardly justifiable to claim that cholecystectomy cures coronary heart disease.

#### SUMMARY

A study was undertaken to determine (1) the operative risk of cholecystectomy for patients with coronary heart disease and (2) whether removal of a diseased gall-bladder influenced the subsequent course of the patient with coronary heart disease. There were 100 patients in the series. The actual surgical procedure was well tolerated and there were no deaths or other serious complications on the operating table. Of these, 3 patients died in the hospital; one from acute pancreatitis on the 4th post-operative day, another from pancreatic necrosis on the 21st post-operative day after surviving a pulmonary embolus on the 7th post-operative day, and the third on the 17th post-operative day. The last-mentioned had cardiac failure and suffered from a cerebrovascular accident earlier in the post-operative course, neither of which seemed directly responsible for his death. Necropsy was not permitted in this case. The post-operative morbidity rate was not unusual for intra-abdominal procedures in patients of the age of these patients. One patient had an acute myocardial infarction after operation from which he recovered and 2 other patients showed clinical and electrocardiographic evidence of acute coronary insufficiency during their hospital stay.

The survival rate of this group of patients 6 years after operation was 70.6%, as compared with 83.9% in the normal population of similar sex and age constitution. This study establishes the relatively low risk of cholecystectomy in patients with symptomatic coronary heart disease and emphasizes the dangers inherent in the complications of chronic biliary disease itself. Such complications must be considered even more serious in patients with coronary heart disease. It is doubtful whether removal of a diseased gall-bladder influences the course of coronary artery disease directly but it is likely that life may be prolonged by preventing the serious complications of biliary disease by performance

of cholecystectomy, preferably during the quiescent phases of gall-bladder disease.

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