Richard E. Scammon

Biliary Fistula

Volume VII | Thursday, October 31, 1935 | Number 5

University of Minnesota Hospitals
Vol. VII October 31st, 1935 Number 5

INDEX

C O U R T E S Y O F C I T I Z E N S A I D S O C I E T Y

I. ABSTRACT

SPONTANEOUS INTERNAL BILIARY FISTULA

C. N. Borman

(I) Incidence

The incidence of spontaneous internal biliary fistula, according to operative and postmortem reports, is rare. The frequency of reported cases (diagnosis by x-ray examination), has markedly increased since 1928, at which time only 3 cases had been reported. By 1934, over 50 reports had appeared in the literature (roentgenologic). The ability to recognize by means of x-rays preoperatively and antemortem, both the true internal fistulous connection between the biliary system and the gastro-intestinal tract, and the fistulous dilatation of the common duct, has resulted in such a rapid accumulation of reports that the occurrence appears to be greater than was previously expected.

Authors	No. Cases Examined	Positive Findings	%
Roth, Schroeder & Schloth	10,866 (autopsies)	43	0.39
U. of Minn. Hosp.	19,474 (autopsies)	24	0.12
Kehr	2,000 (cholecystectomies)	100	5.0

(II) Pathology

A. Location

Anatomically, the path taken by a biliary fistula is by no means limited. Gallstones have been vomited from the stomach, coughed up from the bronchial tree, voided in the urine and frequently passed per rectum. Fistulous tracts have been found between the gallbladder and the stomach, duodenum, jejunum, ileum, colon and appendix; between the gallbladder, the common and hepatic ducts and the liver. They have been traced to the pelvis of the kidney, the urachus, the urinary bladder and the sex organs. Extreme rarities are connections with the pericardial cavity, the pregnant uterus and an ovarian cyst. The most frequent tract is, without doubt, between the gallbladder and the first portion of the duodenum (cholecystoduodenal).

	Maunyn and Courvoisier	%	Roth	%	Judd	%	U of M	%	Cases reported by x-ray	%
Total Cases	184		43		153		24		71	
Cholecystoduodenal	95	51.0	19	44.0	117	76.0	17	70.0	26	35.0
Choledochoduodenal	13	7.0	5	11.0	5	3.2	1	4.0	16	22.0
Cholecystocolic	50	27.0	16	30.0	26	16.0	6	25.0	8	11.0
Cholecystogastric	12	6.5	--	--	6	3.9	--	--	3	4.2
Regurgitation through ampulla of Vater and common duct sphincter	--	--	--	--	--	--	--	--	16	22.0

Cholecystoduodenal fistula has always been reported as the most frequent variety. The majority connect the gallbladder directly to the upper part of the first portion of the duodenum. The occurrence of a fixtula between the bile ducts and the duodenum (choledochoduodenal), according to reports, forms only a small percentage of this group. Moynihan has stated, however, that the choledochoduodenal type probably occurs with a greater frequency than has been reported. According to the cases reported in the x-ray literature, those fistula involving the bile ducts and duodenum form a greater percentage of the total than autopsy statistics indicate.

B. Etiology

The usual cause of an internal biliary fistula is a biliary concrement forcing its way into the gastro-intestinal tract. Less frequent causes are duodenal or gastric ulcers perforating into the biliary system and more rarely perforations by malignant growths. Twenty-three of 24 cases (U. of M. autopsies) were associated with cholecystitis and cholelithiasis. Judd stressed the frequency of biliary lithiasis as the basis for internal fistula. Only 23 of the 153 cases reported by him show no evidence of lithiasis. In a recent resume of roentgenologically demonstrated cases, Sickels and Hudson estimated 50 per cent as being associated with gallbladder disease, 25 per cent with duodenal ulcer and a very few with neoplasm.

As indicated by Beutil, carcinoma is notably rare as a cause of gallbladder-duodenal fistula. The basis for a fistula between the common bile duct and the duodenum is frequently duodenal ulcer. Sixteen cases have been reported in the roentgenologic literature as choledochoduodenal fistula. In 14 of these cases, the clinical history strongly indicates duodenal ulcer or they have been proved at operation to be due to ulcer. Cholecystocolic fistula are more often associated with carcinoma than are the cholecystoduodenal type. Murchison found carcinoma as the cause in 6 of 9 cases. Most of the cases reported and recognized by x-ray examination, however, have been due to gallstones. In the University of Minnesota records, 1 of the 6 cases of cholecystocolic type was associated with carcinoma of the gallbladder.

Common duct obstruction, usually by stone, together with a patent cystic duct constitutes the usual associated picture. These findings may not necessarily be substantiated at operation, although evidence of its previous existence is usually found. The fundus of the gallbladder is the usual site of origin of cholecystoduodenal fistula. The anatomical position of the gallbladder, no doubt, accounts for this. Likewise the proximity of the common duct to the first portion of the duodenum as it courses in the hepatoduodenal ligament may account for the frequency of duodenal ulcer as the basis of most choledochoduodenal fistula.

There is general agreement as to the usual pathological process concerned in the formation of the fistula. The process probably begins as an ulceration in the wall of the gallbladder or duct or duodenum due either to pressure from a stone, from an ordinary duodenal ulcer, or possibly from a malignant growth. In the case of those originating in the gallbladder, there is always a preceding cholecystitis. The next step is inflammation of the outer wall with formation of a fibrinous exudate. This produces a connection to a neighboring organ. Adhesions gradually form a firm union and, as the ulceration continues through a tract is gradually set up. Finally, perforation occurs within the adhesions. The process may require years. Regurgitation from the intestinal tract into the biliary system is free to occur, and consequently intestinal contents and gas are regularly found in the biliary system. Gas under definite pressure has been found in a number of cases in which the common duct has been explored at operation.

The fistulous tract, once established, is by no means permanent. Judd and Burden have stressed the fact that in internal biliary fistula the tract is patent only as long as the common duct is obstructed and the cystic duct patent. Robson, in 1909, pointed out that an

internal fistula often heals spontaneously, leaving only firm visceral adhesions between the organs involved. For this reason, he states, they are found comparatively seldom even at post-mortem examination. This fact combined with Courvoisier's statement that there are 3 times as many cases of gallstone obstruction reported as cases of gallbladder intestinal fistula indicates that internal biliary fistula is more frequent than statistics reveal.

The great majority of stones pass through the common duct and into the duodenum rather than from a fistulous tract to the intestine. The propensities of the common duct in regard to passage of stones are surprising. Judd mentions that large openings of the common duct into the duodenum have been said to mean a fistula. A consideration of the frequency of common duct stones indicates the cases presenting pathological incompetency of the sphincter of the common duct are not rare. Courvoisier stated that 3.9% of cases of gallstone disease had common duct stones. Roentgen evidence of regurgitation of barium or the presence of gas in the ducts should be a relatively common finding in studies of cases of chronic cholelithiasis since these findings will be present in cases of incompetency of the sphincter from passage of a stone, as well as in cases of true spontaneous fistula. On pathologic examination, we may suspect the presence of either of these conditions in a greater number of cases than have been reported in autopsy statistics. Particularly, this is true of incompetency of the common duct sphincter since a simple dilation of the sphincter may be overlooked at the postmortem table.

The trend of x-ray reports in the literature has already indicated that incompetency of the common duct sphincter is being diagnosed with increasing frequency. Passage of common duct stones is admittedly of frequent occurrence. In a high percentage of cases, incompetency must result. Courvoisier found 17% of cases of common duct stone resulted in a dilated and wide open ampulla. From this viewpoint, incompetency of the common duct sphincter will be more frequent than will true biliary fistula.

(III) Clinical findings

A. Age - Sex:

In 24 cases in the University of Minnesota records, 18 (75%) were females. The average age was 64.

The clinical history in cases of internal biliary fistula is usually striking. The usual case is one of chronic gallbladder disease manifested by recurrent attacks of colics, jaundice, chills and fever. Following a particularly severe or unusually lengthy attack of pain, the patient enjoys freedom from recurrence of gallbladder symptoms for a longer interval than has been previously noted. The long history of gallbladder disease with sudden relief of pain for a relatively long period has been pointed out by numerous writers as being strongly suggestive of spontaneous biliary fistula. It constitutes the chief clinical finding. This peculiar clinical story owes its origin to the drainage of the gallbladder established by the fistula. With the drainage established, clinical jaundice also will subside and this creates a second clinical feature of internal biliary fistula; namely, gallbladder attacks without the jaundice noted in previous attacks. Jaundice may persist, however, in the presence of a secondary cholangitis. Rarely, a fistula may be present with relative absence of symptoms. Histories of duodenal disease may be obtained. In cases recently reported by Sickels and Hudson and by Lonnerblad, no history typical of any disease was obtained. In spite of the avenues of disease opened up by internal biliary fistula, the patients are often reported as being well. Complete relief for a long period of time is not the usual finding, however. Epigastric pain, nausea, occasional vomiting and weight loss usually flow in the wake of the fistula.

Clinical absence of infection does not preclude the possibility of pathological changes occurring in the biliary tract and liver, as has been pointed out by Beaver. In speaking of the internal fistula as nature's cure, Judd states

that the "cure is worse than the disease." The usual gastric hypo-acidity or anacidity of chronic gallbladder disease permits the production of various bacterial flora and the resulting infectious chyme associated with it may set up a cholangitis or parenchymal disease of the liver following regurgitation through the fistula. The absence of clinical evidence of infection in roentgenographically demonstrated cases may be ascribed to the wide open stoma, in these cases, permitting satisfactory drainage of the biliary system. The x-ray diagnosis depends upon an open stoma. In these cases, however, the chance for disease of the biliary tract is greatly increased. The chronic cholecystitis is kept active by repeated reflux of infected gastro-intestinal content. The cholecystograms following dye consistently indicate a pathological non-functioning gallbladder. A normal cholecystographic study would militate strongly against the presence of a biliary fistula.

Infrequently, an atypical syndrome of digestive disturbance may be present on the basis of duodenal stasis. Varying degrees of duodenal stasis may be present due to inflammation and fibrosis secondary to the fistulous stoma in the duodenum and to the inflow of infectious bile. Vomiting of stones or passage per rectum may occur. Symptoms suggesting obstruction in varying degrees occur in approximately one-half the cases. Diarrhea and emaciation in association with a history typical of biliary fistula indicates a cholecystocolic type of fistula. The few cases reported of the cholecystocolic type indicate that clinical evidence of cholangitis is not a predominating feature, although it may be suspected in this type since reflux of fecal material into the biliary system may occur.

REVIEW OF LITERATURE

Cases Diagnosied by X-ray Examination

Type	No. Cases Reported	(%)	Usual Etiology
Cholecysto-duodenal	26	35%	Chronic Cholecystitis and Lithiasis
Choledocho-duodenal	16	22%	Peptic Ulcer
Cholecysto-colic	8	11%	Chronic Cholecystitis and Lithiasis
Cholecysto-gastric	3	4.2%	" "
Cholecysto-jejunal	1	1.4%	" "
Cholecysto-duodenocolic	1	1.4%	" "
	55		
Regurgitation thru papilla of vater and common duct sphincter	16	22%	Chronic Cholecystitis and Lithiasis, common duct stone, pancreatic abscess, tumor of pancreas, carcinoma of stomach
Total	71		

(IV) Roentgenologic Diagnosis

Previous to the era of Roentgen diagnosis, the preoperative or antemortem diagnosis of internal biliary fistula was seldom, if ever, made. Emesis of a gallstone or passage per rectum constituted practically the sole diagnostic sign. At the present time, certain roentgenologic criteria indicate the presence of internal fistula almost with positive certainty and with relative ease.

In 1915, Hunt and Herbst reported a case in which the barium meal study showed an apparent duodenal diverticulum. At operation, subsequently, a cholecystoduodenal fistula was found. Carman, in 1917, observed filling of the biliary tree with barium and at operation a cholecystoduodenal fistula was present. Busi, in 1919, observed both gas and barium in the bile ducts, assumed a fistulous connection with the intestinal tract to be the cause, and the diagnosis was substantiated at operation. In 1925, Judd reported 153 cases of spontaneous biliary fistula (Mayo Clinic), only one of which had been diagnosied by x-ray examination. In 24 cases found in the University of Minnesota postmortem records from 1925 to 1935, 1 case had been so diagnosed. By 1928, only three cases had been reported diagnosed successfully by x-ray examination. Since 1929, numerous reports have appeared, there being well over 50 cases reported at present. Sixteen cases of incompetency of the common duct sphincter have been reported. It appears that a long recognized rarity of medicine will be shown by the x-ray, to be of sufficient frequency to require greater consideration in future diagnosis.

Roentgenologic Signs of Internal Biliary Fistula

(1) Direct

(a) Barium or gas in gallbladder or biliary tree.

(b) Mucous membrane changes at stoma of the fistula.

(2) Indirect

(a) Pathologic gallbladder (cholecystogram)

The finding of gas or barium in any part of the biliary system requires the consideration of two possible causes.

(a) Spontaneous or operative fistulous connection between some part of the biliary system and the gastro-intestinal tract.

(b) Regurgitation through the sphincter of Oddi via the ampulla of Vater.

Sixteen cases have been reported as spontaneous filling of the bile ducts via the ampulla of Vater. No cases have been reported, however, in the absence of associated disease. It does not appear that regurgitation of duodenal contents into the common duct can occur normally. Akerlund suggested its finding as an accompaniment of chronic pancreatitis. Williams and Bush cited anatomical and experimental evidence to prove that the passage of a common duct stone through the ampulla of Vater results in dilation of the sphincter of Oddi and, therefore, incompetency of that valve. Beall and Jogda were able to fill the gallbladder and bile ducts through the ampulla of Vater at necropsy, but only at a pressure that resulted in a rupture of the gallbladder. Davis concluded that reflux occurs only when the intraduodenal pressure exceeds that of the common duct; and when there is dilatation of the common duct and the sphincter of Oddi becomes dilated and thickened from the impingement of a stone. Venables and Briggs' case has been interpreted by Groaberger as regurgitation due to increased intra-duodenal pressure secondary to carcinomatous invasion from an associated carcinoma of the colon. Reese's case showed at laparotomy a duodenocolic fistula with traction on the sphincter of Oddi by an adhesion which held the sphincter open permitting regurgitation. A review of all the cases reported as regurgitation through the ampulla of Vater shows in every case associated pathology accounting for the retrograde filling by one of the above mentioned explanations. The passage of a common duct stone with a stretching of the sphincter is the most frequent cause of incompetency. Barium or air in the ducts, therefore, indicate either a true fistula between the biliary tree and the intestinal tract or a stretched sphincter which roentgenologically may be considered a fistulous tract within the common duct.

Barium in Biliary System Following a Barium Meal

The usual finding is a right paraduodenal accumulation of contrast media which represents filling of the gallbladder. The gallbladder alone may fill or, in addition, the cystic and hepatic ducts may be visualized. Extensive filling of the biliary tree is unusual, however, More often only the lowermost portion will be seen.

Certain procedures greatly facilitate filling of the biliary system with contrast media.

(1) Examination in the prone position with the patient lying on the right side. Filling is most apt to occur following a wave of peristalsis in the duodenum.

(2) Re-examination one-half hour after ingestion of the barium meal during which time the patient has been recumbent and turned on his right side.

Gas in the Ducts

This is an equally important sign. If gas is present, it is usually revealed in a flat plate of the liver area. It has often been demonstrated when attempts to fill the fistula with barium have failed. Occasionally, the vascular markings of the liver may be confusing, but the branching ducts are usually characteristic. This procedure is the most simple and very probably the most effective means of establishing the diagnosis of a fistula. It has no value for establishing the exact type of fistula, however.

Mucous Membrane Changes Around the Stoma

Changes in the contour of the mucous membrane of the gastro-intestinal tract around the stoma are regularly present. The folds of the mucous membrane are irregular and indistinct and show a loss of elasticity. The findings often simulate the mucous membrane change seen in carcinoma. The duodenal bulb shows a constant irregular defect in contour, probably secondary to the mucous membrane changes. The colon in the cholecystocolic type of fistula shows irregular spastic contraction at the site of the stoma.

Pathologic Gall-Bladder

The cholecystographic study always shows a pathological non-functioning gallbladder. Since cholecystitis is always present due either to the original inflammatory condition or to persistence of the infection from regurgitation, the above finding is a constant accompaniment of biliary fistula. Negative cholecystograms constitute strong evidence against the presence of gallbladder fistula.

Findings in Different Types of Fistula

(1) Cholecystoduodenal

(a) Right paraduodenal accumulation of barium.

(b) Possible visualization of cystic and hepatic ducts (air or barium).

(c) Deformed bulb with local mucous membrane changes in the upper portion of the second part of the duodenum.

(d) Pathologic gallbladder (Cholecystogram).

The paraduodenal pocket of barium represents the gallbladder. It may easily be confused with a duodenal diverticulum and the differentiation is difficult at times. Diverticulae are usually on the mesenteric border of the duodenum, whereas the barium pocket of a fistula is in a right paraduodenal location. Occasionally, folds of mucous membrane can be demonstrated in the neck of a true diverticulum.

(2) Choledochoduodenal fistulae and regurgitation through a dilated ampulla of Vater.

(a) Filling first of the upper portion of the common duct followed by the cystic and hepatic ducts and possibly the gallbladder itself (true fistula).

(b) Filling of the common duct, lower portion first, with normal site of the ampulla of Vater in the duodenal wall (regurgitation).

It is extremely difficult to definitely demonstrate a true fistula between the common duct and the duodenum. Several authors have commented on this fact. Only rarely can one differentiate this type of fistula from regurgitation through a widened ampulla. A regurgitation characteristically shows barium filling the common duct with the origin of the ampulla of Vater at its normal site, medially in the midportion of the second part of the duodenum 10 cm. from the pylorus. Filling of the upper part of the common duct directly after filling of the duodenal bulb is the usual sequence in true fistula. When a true fistula enters the second part of the duodenum near the normal site of the ampulla of Vater, however, the difficulties become apparent. Three possibilities must be considered:

1. Dilated ampulla of Vater, secondary to impingement of a stone.

2. Fistula between the lowermost portion of the common duct and duodenum.

3. Duodenal diverticulae, which are very frequently found near the ampulla of Vater.

The forking of the common and pancreatic ducts with rapid emptying after filling has been obtained may be observed if there is a dilated ampulla of Vater. A diverticulum does not have a forking of its neck and quite characteristically there is retention of barium in the pocket for a considerable period of time. The true fistula extending from the lowermost portion of the common duct into the duodenum may simulate a normal ampulla of Vater and common duct to such a degree that the exact diagnosis cannot be made by x-ray. Surgical inspection is required for an exact diagnosis.

(3) Cholecystocolic

(a) Demonstration of fistulous tract above right hepatic flexure during barium enema examination.

(b) Local constriction, irregularity and mucous membrane changes in hepatic flexure.

The fistula practically always joints the colon at the right hepatic flexure. Reports of cases diagnosed by x-ray are unusually rare. Only 8 cases have been reported. Since the barium enema is always administered in the recumbent position, the hepatic flexure of the colon will move sufficiently high into the right upper quadrant to obscure the view of the fistula or gallbladder. This has been pointed out as one factor in failure of diagnosis. Examination under the fluoroscope during administration of the enema should always include the right and left anterior oblique views. Inflation of the colon with air following a barium meal is a valuable adjunct to examination. Barium meal by mouth with observation of the colon later may reveal a fistula.

Mucous membrane changes are of most value in this type of fistula. The hepatic flexure is usually spastic and irregular in outline and there is a loss of normal configuration. The folds of the mucous membrane will be indistinct, irregular and often simulate carcinoma. The changes are ascribed to the inflow of infected bile.

(4) Cholecystogastric

(a) Barium filled fistula usually extending from the prepyloric area to the gallbladder region.

(b) Mucous membrane changes with spasm, contraction and constriction of the prepyloric portion of the stomach.

Cholecystogastric fistula are extremely rare. Rankin in 1932, found no reports of this type of fistula in the preceding ten years. His case was discovered when a follow-up plate, 24 hours after the barium meal, showed a localized residue in the gallbladder region. Pohlandt's case became evident when air was visualized in the bile ducts following the administration of fye for a gallbladder study.

The reported cases of this type have been direct fistulous connections between the gallbladder and the prepyloric region of the stomach. The exact type of fistula becomes apparent when the fistula can be filled with contrast media. Examination one-half to one hour after ingestion of a meal is again important since, at this time, the fistula may contain barium while the stomach has emptied. Mucous membrane changes in the stomach associated with pylorospasm are the chief secondary signs.

Bronchobiliary fistula are infrequently met with. Oliani, in 1923, summarized 63 cases. Three cases have been reported diagnosed by x-ray. The fistulous tract usually leads from a liver abscess through the right diaphragm and into a branch of the right bronchial tree. Bile in the sputum constitutes that chief clinical finding. Gallstones and hydated cysts are the usual causative factors. Lipiodol filling occasionally outlines the fistulous tract. The tract may become obliterated if the stone can be removed.

(V) Gallstone Obstruction - A Complication of Biliary Fistula.

Incidence

	No. Cases Found in Literature	Cases of Intestinal Obstruction Studied	No. Due to Gall-Stones	%
Edward (1910	250			
Wagner (1914)	334			
Moore (1925)	400			
Bennet		3,064	28	0.9
Henry		163	5	3.0
Powers		179	4	2.5

Estimated Occurrences in Cases of Intestinal Obstruction

Fitz	1 in 15
Gibson	1 in 17
Henry	1 in 33
Bernard	1 in 45
Bloodgood	1 in 280

Estimated Occurrences in Number of Cases Coming to Operation

16 in 500,000 (Martin)

1 in 31,200

University of Minnesota Postmortem Statistics 1925-1935

	Gallstone Obstruction	%
19,474 autopsies	11	.056

Gallstone obstruction is, according to reported cases, a rare finding. It occurs much less frequently than does internal biliary fistula. Since over one-half of the gallstones entering the intestinal tract are passed spontaneously per rectum, the disassociation of fistula and obstruction is not surprising. Martin estimated that over 50 per cent of stones were passed spontaneously while Judd stated that most stones are passed per rectum. In Judd's series of 153 operated cases of internal biliary fistula, only one case of intestinal obstruction due to stones was encountered. Eleven of the 24 cases of internal biliary fistula in the University of Minnesota autopsies resulted in gallstone obstruction. The stone

usually enters the bowel thru a cholecystoduodenal fistula. 10 of the 11 cases in the University autopsies (90%) showed evidence of this type of fistula, while in 69% of Courvoisier's cases, entrance was gained thru a cholecystoduodenal fistula. It may be further pointed out that the finding of gallstone obstruction does not necessarily imply the presence of a true fistula. The following facts account for those cases in which the two conditions are apparently unassociated:

(1) Variation in the time of onset of obstruction following entrance of the stone into the intestine.

Frequently the length of time permits the fistulous tract to heal and only adhesions remain uniting the gallbladder and intestine. Angle recently reported one case in which he estimated the stone had been present in the bowel for one year, and in two other cases the obstruction became acute after the stone had been present four months. Treves reported a case in which the gallstone remained in the bowel ten years.

(2) Passage of stones through the common duct into the bowel, resulting in a stretched sphincter but in no true fistula.

Courvoisier stated that a stone large enough to cause intestinal obstruction occasionally passes thru the common duct. In 7 of 35 cases of intestinal obstruction due to gallstones, cited by him, the route taken by the stone was that of the common duct. In 1 of these 7 cases, the common duct was dilated to the size of the gallbladder, in another, a stone 4 inches in circumference had passed thru the common duct, resulting in intestinal obstruction. It follows that although the surgeon may be unable to find a true fistulous tract between the biliary system and the intestinal tract, a dilated common duct may reveal the route taken by the stone. It is probable that most small stones enter the intestine thru the common duct. Stones large enough to cause obstruction, however, usually enter the bowel thru a cholecystoduodenal fistula.

Size of Stone

The physical characteristics of the stone have a greater importance than the size of the stone in determining the probability of obstruction. A relatively small stone, if sharp and angular, may cause a local spasm of the bowel wall and result in local construction. This accounts for the cases of gallstone obstruction terminating fatally in which small stones have been found free in the lumen. Sharp, irregular stones are the most likely to cause local changes in the mucous membrane resulting in ulceration and perforation of the bowel. Smooth rounded stones, however, even if of considerable size, may pass through the intestinal tract with relatively meagre evidence of obstruction, In one of the cases of gallstone obstruction in the University of Minnesota postmortem records, a faceted stone, 2.8 x 1.8 mm. had resulted in obstruction terminating fatally. In a case of cholecystoduodenal fistula, two stones, measuring 4 cm. in diameter, were found in the small intestine which, however, had not given fise to intestinal obstruction. Stones entering directly into the colon are nearly always passed per rectum, regardless of size. Rolleston stated that stones over 1 inch in diameter are usually impacted at or near the ileocecal valve.

Site of Impaction

Gallstone obstruction is usually due to impaction by the stones. Occasionally obstruction results with the stones free in the lumen. Obstruction is then secondary to ulceration of the bowel wall by a sharp angular stone. In 8 of 10 cases of gallstone obstruction found in our autopsies, impaction of the stone had occurred.

Site	U of M	Herman	Courvoisier
Total Cases	11	145	52
Ileum			
upper	3		
middle	2		
terminal	3	93	33
Jejunum	2	30	8
Duodenum	-	9	-
Ileocecal valve	-	-	9
Colon	1 (sigmoid)	13	2 (sigmoid)

Crane has commented on the infrequency of duodenal obstruction by gallstones. He found only four cases reported from 1923 to 1931. Thompson found only twelve such cases reported up to the year 1912.

Age - Sex

Gallstone obstruction occurs most frequently in females. Courvoisier studied 102 cases, 71 (69%) of which were females. 82% of his cases were over 50 years of age. 61% over 60 years. In the 11 cases of gallstone obstruction in the University of Minnesota autopsies, all were females. The average age was 66.

Symptoms

The diagnosis in cases of gallstone obstruction is nearly always not clear from the beginning. Clinically, these cases exhibit a tendency to subchronic or chronic symptoms of obstruction with periods of more or less obscure abdominal discomfort alternating with relative freedom of symptoms. The pain is ascribed to spasm of the bowel around the stone and the slow passage of the stone produces a clinical course of intestinal colic with unusual variations. Symptoms may not become sufficient to cause unusual concern until a few days after the actual passage into the bowel occurs. Definite signs may be delayed even longer. When impaction finally occurs, persistent vomiting with intermittent colicky pain, characteristic of intestinal obstruction become prominent features. The obscure clinical course often results in delay on the patient's part in seeking medical consultation. Achele has commented on the unusual period of time elapsing from the onset of symptoms to the admission of the patient to the hospital. The relation of this time factor to the mortality rate is self apparent. Gallstone obstruction should be considered in any cases in which there is a major abdominal catastrophy preceded by a history of previous attacks of biliary colic.

(VII) Mortality

Author	Estimated Mortality
Schuller	56%
Martin	69
Henry	75
Moore	75
Moller	82
Naunyn	92

The mortality of intestinal obstruction due to gallstones is even higher than in cases of obstruction due to other causes. Delay in both diagnosis and surgical treatment accounts for the appalling lethal rate.

(VIII) Roentgenologic Diagnosis

The preoperative roentgenologic diagnosis of intestinal obstruction due to gallstones has been made in a very few cases. Only 7 such reports appear in the literature. Failure of consideration of the possibility of biliary calculi is the cause of obstruction results in the rarity of roentgen diagnosis. Likewise, the justifiable reluctance in the use of a barium meal by mouth in cases in which obstruction is a possibility, results in the radiologist's failure in diagnosis. There can be little doubt that a number of the more obscure cases of ileus are traceable to the presence of a stone in the intestinal tract.

From 10 to 20 per cent of the adult population have gallstones. They frequently enter the intestinal tract. In the past, however, only those cases with stones causing a complete intestinal obstruction requiring surgery have been brought to the surgeon's and

radiologist's attention. Over 50% of stones do not cause a high grade obstruction but give rise to an obstruction of varying degree, finally being passed spontaneously per rectum. In this group x-ray diagnosis of stones in the intestinal tract may be expected to be made with greater frequency in the future.

Chief Roentgen Findings in Gallstone Obstructions

(1) Visualization of gallstone on the flat plate of the abdomen, usually right lower quadrant.

(2) Varying partial obstruction, beginning high -- gradually localizing in terminal ileum.

When the etiology of an intestinal obstruction is in doubt and when the clinical story implicates the gallbladder, a flat plate of the abdomen should be made. If the gallstone is of the opaque type, it may be readily demonstrated. Since 75% of stones are not visualized, complete reliance cannot be placed upon the flat plate of the abdomen. In the early stages, the obstruction is high in the intestinal tract and repeated flat plates will show a gradual change to a lower site of obstruction. Variations in the degree of intestinal distention with gas may be noted. All cases reported in the literature have had a barium meal by mouth, later showing a circular filling defect due to displacement of the contrast media by the stone. Barium meal studies probably should not constitute a routine procedure in cases of obscure obstruction.

(IX) Summary

1. Internal biliary fistula, although a rare finding in autopsy statistics, probably occurs with greater frequency than indicated, as shown by the large number of cases reported by roentgen examination.

2. Cholecystoduodenal fistula are by far the most frequent (60%); cholecystocolic, next in frequency (24%); choledochoduodenal (6.3%); cholecystogastric (5.2%). In cases reported diagnosed by x-ray examination the percentages are: Cholecystoduodenal 35%; choledochoduodenal 22%; regurgitation through incompetent common duct sphincter 22%; cholecystocolic 11%; cholecystogastric 4.2%.

3. The choledochoduodenal type and regurgitations into the common duct form a greater percentage of biliary fistula in cases diagnosied by x-ray examination than those reported from autopsy statistics.

4. The usual cause of internal biliary fistula is ulceration produced by a gallstone associated with common duct obstruction; duodenal ulcer and malignancy are rarer causes.

5. Regurgitation through the sphincter of Oddi is probably of frequent occurrence clinically. It results from passage of a stone through the common duct. It probably occurs more frequently than the true biliary fistula. It often gives the same x-ray findings as true internal fistula.

6. Internal biliary fistula may heal spontaneously and therefore may not be discovered at the postmortem table, indicating a probability of greater frequency clinically than autopsy statistics indicate.

7. Internal biliary fistula occur more frequently in females (75%), and the average age is over 60.

8. Clinically, a long history of gallstone colic, jaundice, chills and fever, followed by sudden relief of symptoms following a severe attack, suggest fistula formation. If vomiting and toxicity follows, gallstone obstruction should be suspected.

9. Usually, "The cure is worse than the disease." Digestive disturbance, pain, weight loss and diarrhea often follow fistula. Occasional freedom from symptoms is noted. Diarrhea and weight loss indicate the cholecystocolic type.

10. Since 1929, the x-ray diagnosis has been made in a rapidly increasing number of cases, indicating a greater

frequency of the condition than has been anticipated.

11. The roentgen demonstration of barium or gas in the biliary system is diagnostic of either a fistulous connection between the biliary system and intestinal tract, or incompetency of the common duct sphincter. A right paraduodenal accumulation of barium represents usually the barium filled gallbladder. Filling of the ducts with barium may not occur during the gastro-intestinal examination. Gas fills the ducts more readily than does barium. A flat plate often reveals gas filled ducts even when barium filling of the ducts during the gastro-intestinal examination has been impossible.

12. Mucous membrane changes around the stoma regularly occur. The cholecystogram always indicates a pathological and non-functioning gallbladder.

13. Duodenal diverticulae may offer a confusing picture in the cholecysto- and choledochoduodenal types.

14. Cholecystocolic fistula is diagnosed by barium filling of the fistula after barium enema. The fistula always extends from the right hepacit flexure thru the fistula into the gallbladder region.

15. About 400 cases of gallstone obstruction have been reported. Approximately 2% of the reported cases of intestinal obstruction are due to gallstones. The incidence in 19,474 autopsies at the University of Minnesota was .056%. Average age at time of obstruction is 66 - with females predominating.

16. Most internal biliary fistula do not result in obstruction by gallstones.

17. Internal biliary fistula and gallstone obstruction need not be associated due first to variation in the time of onset of obstruction following perforation of the stone through the fistula, and secondly to the frequency of passage of the stone into the intestine via the common duct.

18. The size of stone is less important than the physical characteristics. Sharp angular stones are more prone to ulceration and obstruction, than smooth rounded stones. Obstruction is usually the result of impaction but may be secondary to ulceration of the bowel wall.

19. The usual site of impaction is the terminal ileum; less frequently, the jejunum; very infrequently, the duodenum or colon.

20. Gallstone ileus is characterized by a subchronic type of obstruction with periods of relative freedom of symptoms. Slow passage of the stone accounts for the peculiar course. Classical intestinal obstruction finally results.

21. Mortality is higher than intestinal obstruction due to other causes; 75% is a conservative estimate.

22. X-ray diagnosis of gallstone obstruction can occasionally be made. Visualization of stone is possible in less than one-half the cases. An obstruction beginning high, changing daily, gradually localizing in the right lower quadrant is the usual x-ray finding. A barium meal by mouth, if expedient, may result in a defect in the barium shadow produced by the stone.

BIBLIOGRAPHY

1. Courvoisier, L. G.
Casiustisch - Statistische Beitrage zur Patholgie und Chirurgie der Gollenwege
Leipzig, verlagoon, F.C.W. Vogel, 1890.

2. Ake Akerlund
Duodenaldivertikel und gleichzeitige erweiterung des Vaterschen divertikels bei cinem Fall von Pankreatitis.
Fortsch. a.d. Geb. d. Rontgenstrahl 25: 540-550, 1917.

3. Robson, A. W. M.
Fistula between the stomach and bile passages.
Brit.Med.J.I, 1050-1054 (May) 1909

4. Rees, Clarence E.
Duodenocolic fistula with incompetent sphincter of Oddi.
J. Amer. Med. Assoc. 100: 496-497, (Feb. 18) 1933.

5. Kantor, J.L. and Jaffin, A.E.
Roentgen visualization of bile ducts with special reference to internal biliary fistula.
Radiology 10: 10-15, 1928.

6. Hunt and Herbst (quoted by Privot, R.)
Roentgenpraxis 3: 177-182 (Mar.) 1933.

Busi (quoted by Privot, R.)
3: 177-182, (Mar.) 1933.

7. Meldolesi, G.
Zull' iniezione della vie biliari con pasto opaco nei casi di fistola coledocoduodenale.
Riv. di radiol. e fis. med. 3:55-73, 1931.
Abs. in Zentralbl. f. Radiol. 10: 618, 1931.

8. Beall, F. C. and Jagoda, S.
Injection of bile ducts with barium.
J. Am. Med. Assoc. 76: 1483, 1921.

9. Lenk, R.
Uever die rontgenologische Darstellung des Gallengang systems.
Wien. Med. Wchnschr. 75: 1594, 1925.

10. Reimann
Spontane Darstellung des Choledochus.
Fortschoitte a.d. Geb. d. Rontgenstoablen 41: 802, 1930.

11. Arntzen, Leif.
Penetration of contrast meal substance from the duodenum into the bile passages via the Ductus Choledochus.
Acta Radiol. 13: 202-205, 1932.

12. Ohnell, H. and Lindblom, K.
Air filled bile ducts in a case of fistula between duodenum and common bile duct.
Acta. Radiol 10: 121-126, (Apr. 30) 1929.

13. Judd, E. S. and Burden, V. G.
Internal biliary fistula.
Ann. of Surg. 81: 305-312, 1925.

14. Graberger, G.
Beitrag zur Rontgendiagnose innerer Gallenfistelos
Acta. Radiol. 12: 164-173, 1931.

15. Crane, A. W.
Gallstone obstruction of the duodenum.
Am. J. Rontgenol. 26: 92-95, (July), 1931.

16. Moore, G. A.
Gallstone ileus
Boston M & S Journ. 192: 1051-1055, (May 28) 1925.

17. McWhorter, G.L.
Acute obstruction of the small intestine due to a gallstone.
Arch. Surg. 19:915-921, (November) 1929.

18. Martin, F.
Intestinal obstruction due to gallstones.
Ann. of Surg. 55: 725-743 (May)1912.

19. Friedrich, L. V.
Luft in den Gallenwegin als diagnostisches Merkmal
Fortschr a. d. Geb. d. Ront.
39: 616-619 (Apr.) 1929.

20. Prevot, R.
Uber innere Gallenwegfistela.
Rontgenpraxis, 177-182 (Mar.) 1933.

21. Karzinomatose Gallenblasenduodenalfistel.
Beutel, A.
Rontgenpraxis 4: 326-331, 1932.

22. Lonnerblad, Lars
Falle von spontauer innerer Gallenfistel
Acta Radiol. 13: 551-565, 1932.

23. Uber den Luft befund in der Gallenblase und seine diagnostische Bedeutung.
S. Odischaria
Rontgenpraxis 1: 809-810, 1929.

24. Davis, L.
Reflux of duodenal contents through the common bile duct.
New Eng. J. Med. 200: 313-320 (Feb.) 1929.

25. Rybak, A. M.
Uber das Eindringen von Kontrastmasse ano dem Magen in die Gallenblase.
Rontgenpraxis 3: 844-848, 1931.

26. Lewin, Erna
Beitrag zur Lehre der Perforation des duodenum.
Rontgenpraxis 4: 222-226, 1932.

27. Lamarque, Guibal and Reynes
Visibilitie des voies biliaries ancours d'un examen du tube digistif.
Arch. Electr. Med. 40: 90-91, 1933.

28. Amorosi, Osvaldo
Fistola coledoco-duodenale O duodenocolecystica osservazione clinico-radiolgica.
Riv. Radiol. e Fisica Med. 6:657-670, 1931.

29. Kohler, Bjorn.
Uber Duodenal divertikel und ihre Bedeutung fur de Eusteburg von Gallenwegsleiden.
Acta Chir. Scand. 70:59-77, 1932.

30. Sickels, T. N. and Hudson, C. L.
Demonstration of a spontaneous internal biliary fistula by Rontgen examination, report of a case.
Amer. J. Rontgenol. 31: 31-36 (Jan.) 1934.

31. Razemon, P., Bizard, G. and Lambret, M.
Les Fistulaes Broncho-biliares Consecurives a 'la Lithiase.
Rev. de Chir. 52: 485-505, 1933.

32. Vorhaus, Martin G. and Rogers, A.E.T.
Cholecystocolic fistula with x-ray demonstration.
Amer. J. Dig. Dis. and Nutrition, 2: 133-134, (Apr.) 1934.

II. UNIVERSITY OF MINNESOTA HOSPITALS CASE REPORTS ROENTGENOLOGICALLY OBSERVED

1. ., Female, 62 years.

7- -31.- Admitted to University of Minnesota Hospitals with following history: (1) right upper quadrant pain, radiating to right scapula, (2) vomiting and food distress, (3) jaundice. Has had periodic attacks for the past 31 years

Cholecystogram (July 1931) - shows multiple gall stones. (Slide #1)

Operation advised which patient refused. Attacks continued periodically.

7-15-31 - Particularly severe attack differing from previous attacks in the persistence of vomiting and absence of jaundice. Pain at first very severe, gradually lessened but toxicity developed. Patient unable to eat, vomiting almost continuously.

8-11-32 - Readmitted. Markedly dehydrated, toxic, fever 102°. Icteric index 12. Stool - bilirubin +.

8-12-32 - Gastro-intestinal examination - essentially negative.

8-13-32 - Examination - shadow of gallbladder fossa in right upper quadrant, also a diverticulum of duodenum. Gas visible in bile ducts. (Slide #2).

8-16-32 - Nasal suction instituted.

8-18-32 - Light feeding by mouth induced vomiting.

Flat plate of abdomen - mass of stones in left lower quadrant. (Slides #3 and #4). Flat plate made following oral administration of barium. Diagnosis: Cholecystoduodenal fistula and obstruction due to stones. Nasal suction continued. X-ray later shows shifting of stones. (Slide #5).

8-28-32 - Nasal suction continued and practically no gas present in intestines. Patient feels better.

10-2-32 - Severe right lower quadrant pain, nausea, vomiting, tenderness 4+, rigidity 3+.

10-4-32 - Expired.

Duration of stone in intestine 7-15-32 to 1002-32 ($2\frac{1}{2}$ months).

Post-mortem

Diffuse peritonitis.

Liver - no dilation of biliary passages.

Gallbladder - attached to duodenum on ventral surface near fundus. Fistula present, opening of which is 2 cm. in diameter. Food particles in gallbladder. Cystic duct patent. Large number soft, yellowish, concretions found onstructing common duct. Common duct is thicker than normal, lower half being filled with concretions.

Intestines - mass of gallstones found in lower ileum, firmly filling lumen. Mass immovable. Two sharp projections present which have caused performation of bowel. Stones are firmly matted together by some form of calcareous material. They could not be broken apart by moderate manipulation.

Comment

The diagnosis first became apparent with the visualization of gas in the bile ducts. It is interesting to note that a filling of the fistula could not be obtained following a barium meal. A flat plate on the following day showed residual barium, outlining the bed of gallstones (gallbladder fossa) and faintly outlining the fistula extending into the duodenum. Failure to visualize the stones previously present in the gallbladder resulted in a search for the mass of stones in the intestinal tract. They were visualized on the flat plate of the abdomen.

A review of the x-ray findings explains satisfactorily a rather unusual case of chronic gallbladder disease and intestinal obstruction of unknown etiology. The sudden onset of a particularly severe attack following attacks of a uniform nature for 30 years suggests the movement of stones. The absence of jaundice suggests relief of obstruction to the flow of bile and therefore suggests the establishment of a fistula. Relief of pain following the attack would be expected in an uncomplicated fistula, since a gallbladder drainage has occurred. The rapid onset of toxicity, vomiting and abdominal colic suggest obstruction. The combined symptoms are typical of gallstone obstruction following entrance of stones in the intestinal tract.

The fistula between the gallbladder and duodenum resulted from the obstruction in the common duct. This is the usual course of events. Sloughing of gallstones, en masse, is unusual. The obstruction resulting, an unusual type varying in degree and changing daily is quite characteristic of gallstone obstruction. Sharp, angular stones are apt to cause perforation,-- rounded stones seldom injure the bowel wall to the point of perforation.

A single flat plate of the liver area in this case offered sufficient evidence (gas in the ducts) to account for the entire picture.

2. , Female, 54 years.

5-4-34 - Admission with following history: (1) pain in epigastrium, (2) vomiting, (3) chills, (4) fever. Patient had had similar attacks, occurring about every six months, for the past 6 years. The first attack differed from the subsequent attacks in that the patient was clinically jaundiced.

Past History

4-26-34 - (O.P.D.) - Cholecystogram - gas in hepatic and common ducts. Pathological non-functioning gallbladder.

5-2-34 - Cholecystogram - same findings as above.

5-7-34 - Gastro-intestinal examination - irregularity of contour of duodenal bulb. Barium extends into fistulous tract extending from duodenum into region of gallbladder. Barium in gallbladder. Diagnosis: cholecystoduodenal fistula.

Comment

The first attack, 6 years ago, which was associated with jaundice suggests chronic cholecystitis and cholelithiasis, with obstruction in the biliary system. Absence of jaundice subsequently indi-

cates relief of obstruction to bile flow. This has been accomplished by the establishment of a spontaneous cholecystoduodenal fistula. Duodenal irregularity may be considered secondary to the mucous membrane changes, secondary to the stoma of the fistula, and infected bile. Recurrence of attacks are due to persistence of the cholecystitis which is kept active by reflux of intestinal content into the biliary system.

3. , Female, 68 years of age.

Out-Patient Department

6-11-35 - History: 1930 - Sudden onset chills with nausea and vomiting and severe abdominal pain following ingestion of a fatty meal.

1932 - During past 2 years, 5 attacks of nausea, vomiting and abdominal pain.

1935 - No attacks during past 3 years, until:

4- -35 - Another attack similar to previous but symptoms persisted and were of a particularly severe nature. Weight loss of 30 lbs. since onset in April.

6-14-35 - Cholecystogram - No filling of gallbladder. Conclusions: Pathological gallbladder.

6-17-35 - Gastro-intestinal Examination:
(1) Regurgitation of barium through sphincter of Oddi into common and hepatic ducts.

(2) Diverticulum of second part of duodenum lying anterior to the duodenum.

Discussion

The historh suggests chronic cholecystitis and chronic cholelithiasis with common duct obstruction. Probable passage of stone through common duct occurred in April 1935, resulting in a stretched, incompetent sphincter. Regurgitation was free to occur thereafter, resulting probably in persistence of chronic cholecystitis and cholangitis. No relief would be expected until the gallbladder is removed and the common duct explored for stones. Patient refused. The duodenal diverticulum may be considered an unusual coincidence. The anterior position of the diverticula prevents confusion with a filling of the gallbladder by means of a true cholecystoduodenal fistula. Those diverticulae lying to the right of the duodenum may be confused with a cholecystoduodenal fistula, those on the left side with a regurgitation into the common duct. This is a typical case of regurgitation through the sphincter of Oddi, into the common duct, occasioned by the passage of a common duct stone. Diagnosis made both by findings of air in the bile ducts and by filling of the common duct after a barium meal.

4. , Female, 67 years of age.

7-11-28 - Cholecystogram: Pathological non-functioning gallbladder.

Admitted

9-28-28 - Gastro-intestinal examination - negative. Cholecystogram - large gallstone in the gallbladder. No dye present in gallbladder. Symptoms typical of chronic gallbladder disease. Pelvic repair.

Discharged

11-9-28 - No gallbladder surgery attempted. Patient visited Out-patient Department on 2-19-29, 3-37-29, and 5-13-29 with same type of complaints. Placed on diet.

Readmitted

5-13-29 - Abdominal pain of varying degree, sometimes colicky, occasionally dull. Pain radiated to scapular region and occasionally down course of descending colon. This was most marked about 1 or 2 hours after eating. Fatty food distress. Occasional constipation. Weight loss - 48 lbs. in past 2 years. Passage of stone - Patient reported passage of stone per rectum. This was brought in by the patient and admitting doctor reported it to be a cholesterin stone.

8-1-29 - Cholecystogram - Gas in bile ducts. No stone in the gallbladder. Diagnosis: Fistula between biliary system and intestinal tract.

Gastro-intestinal examination: Barium in the common duct. Probable regurgitation.

Comment

The exact type of fistula cannot be determined by x-ray when only gas filled ducts are visualized. The gastro-intestinal study demonstrates the exact type of fistula in this case. The most probable diagnosis is: Incompetent sphincter of Oddi from passage of the stone via the common duct. The size of the stone and the marked weight loss favor a diagnosis of the cholecystocolic type. Most large stones which are passed spontaneously per rectum enter the gastro-intestinal tract through a cholecystocolic fistula. Stones over 1 cm. in diameter usually become impacted at the ileocecal valve or in the terminal ileum. Weight loss in the cholecystocolic type of fistula is due to abnormal fat metabolism and to dehydration secondary to diarrhea.

5. , female, age 51 years.

6- -35 - Admission history:

(1) Began with attack of fever, chills, headache and qualitative food distress (1933).

(2) Foamy diarrhea, 2 years. (Whitish-grey, "foamy" stools).

(3) Marked weight loss, over 100 lbs. in 2 years.

Physical Examination:

(1) Jaundice.
(2) Epigastric tenderness.

8-15-35 - Laboratory data: Proctoscopic-small polyp, 10 cm. from anal orifice. Stools negative for bacteria; blood present. Blood agglutination - positive 1: 200 for B. dysenteriae. Flexner.

X-rays

6-18-35 - Gallbladder - air in biliary tree, probable cholecystoduodenal fistula.

6-21-35 - Gastro-intestinal - no barium in ducts.

8-7-35 - Barium enema - negative for cholecystocolic fistula.

Comment

The onset of the condition in 1933 suggests gallbladder disease. The persistent foamy diarrhea suggests cholecystocolic fistula rather than the more usual cholecystoduodenal type. This diagnosis could not be made by x-ray. The laboratory findings suggest B. dysenteriae. The presence of a fistula between the biliary tract and the intestinal tract is unquestioned -- its exact location is, as yet, indeterminate. This case shows that frequently gas will be present in the bile ducts, yet they cannot be filled with barium. In the absence of a cholecystocolic fistula, that of a cholecystoduodenal fistula is the most probable. Closure of the fistula with removal of the gallbladder, the proper surgical procedure, has been advised the patient.

6. , female, 55 years.

12-31-28 - Admitted with following history:

1. Right upper quadrant pain, 6 years.
2. Belching.
3. Nausea, vomiting.
4. Qualitative food distress.

Pains radiated to scapula, right; attacks of severe stabbing pains which always required morphine for relief. After these attacks would get dark colored urine and noticed yellow-tinged sclerae.

1929 - X-ray:

1. Pathological gallbladder.
2. Emphysema of gallbladder.
3. Negative colon for cholecystocolic fistula.
4. Possible gallstones.

1-10-29 - Gallbladder entirely surrounded by adherent omentum and colon in the region of the fundus. Easily separated leaving a thick walled subacutely inflamed gallbladder. Duodenum firmly adherent to ampulla of gallbladder. Common duct could not be definitely defined.

Gallbladder opened near fundus, 1.5 oz. purulent dark colored exudate with gas evacuated. This exudate surrounded the mucosa of the gallbladder beweeen mucosa and muscularis. Mucosa was entirely free from muscularis and contained in it an oval gallstone, 3 x 5 cm.; mucosa partly necrosed. Mucosa and gallstone removed. Thorough search for fistulous connection with duodenum searched for -- none found. Cultures — staphylococcus. Drainage tube inserted inside the remains of the gallbladder which was drained by bringing the tube through a stab wound lateral to the incision. Recovery uneventful.

Gertrude Gunn
Librarian

III. MOVIE

The Community Chest Fund

IV. LAST WEEK

Date: October 24, 1955

Place: Recreation Room, Nurses' Hall

Time: 12:30 - 1:45

Program: Movie (Spain's Romantic Isle)
Announcements
Appendicitis

Present: 185

Discussion: R. W. Koucky
L. Sperling
O. H. Wangensteen
Morris Fishbein
Haynes Fowler
A. A. Zierold