

COMBINED SUPRADUODENAL AND TRANSDUODENAL EXPLORATION OF THE COMMON BILE DUCT*

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THE OBJECTIVES of this presentation are to discuss the advisability of opening the duodenum at the time the common bile duct is explored; to present as evidence a group of cases to show that combined supraduodenal and transduodenal exploration of the duct at the same time offers certain distinct advantages over and above those obtained by only supraduodenal exploration of the common duct; and to show advantages gained by extending the T-tube draining the common duct into the duodenum.

A brief recapitulation of the important steps in the development of surgery for benign lesions affecting the common bile duct may be interesting. The operation of opening the common duct above the duodenum for the removal of stone was first performed by Kümmell,¹¹ who described the procedure in 1890, and by Thornton¹⁷ who first successfully performed the operation in 1889 and reported it in 1891. The procedure of removal of stones by incising the duct in its retroduodenal portion has been credited to Haasler,⁹ who described it in 1898. McBurney¹⁴ performed a transduodenal operation first in 1892. McBurney opened the duodenum, severed the ampulla and removed the stone, but he did not open the common duct above the duodenum. In 1898, he reported six cases with five recoveries. Kocher first performed a transduodenal operation in 1894. He cut through the duodenal mucosa into the common duct but did not sever the sphincter. The common duct and duodenal walls were approximated with sutures.

It is difficult to find in the literature the basis for the frequently expressed extreme aversion to opening the duodenum to obviate obstructions of the common bile duct. Undoubtedly it may be attributed to fear surgeons have of duodenal fistula and of the danger of infection and peritonitis. Another factor in their attitude may be the feeling that duodenal reflux or regurgitation of duodenal contents into the biliary tract can set up cholangitis and fatal infection in a high percentage of cases.

However, it is time for a new evaluation of the dangers of opening the duodenum with present technical methods and under modern chemotherapeutic measures. When the duodenum is opened for the exploration it should be carefully mobilized; the superior leaf of the transverse mesocolon should be cut and pushed back. A longitudinal incision in the descending portion of the duodenum should be closed transversely, securely and carefully. I prefer running fine chromic catgut for an inner suture and interrupted silk for the outer.

* Read before the Southern Surgical Association, White Sulphur Springs, W. Va., December 8, 1948.

If the duodenum has been mobilized, secure closure more readily may be effected.

Duodenal reflux may not be so dangerous as it has been regarded. Whether it often causes symptoms may be debatable. I have left tubes in the common duct anastomosed to the jejunum after pancreatectomy for months before removing them and cholangitis did not result. Moreover, in those patients in whom we have pulled the end of the T-tube through the papilla into the duodenum after choledochotomy, no symptoms of cholangitis resulted.

The almost universally accepted method of releasing benign obstructions of the common duct is to open the common duct above the duodenum, and

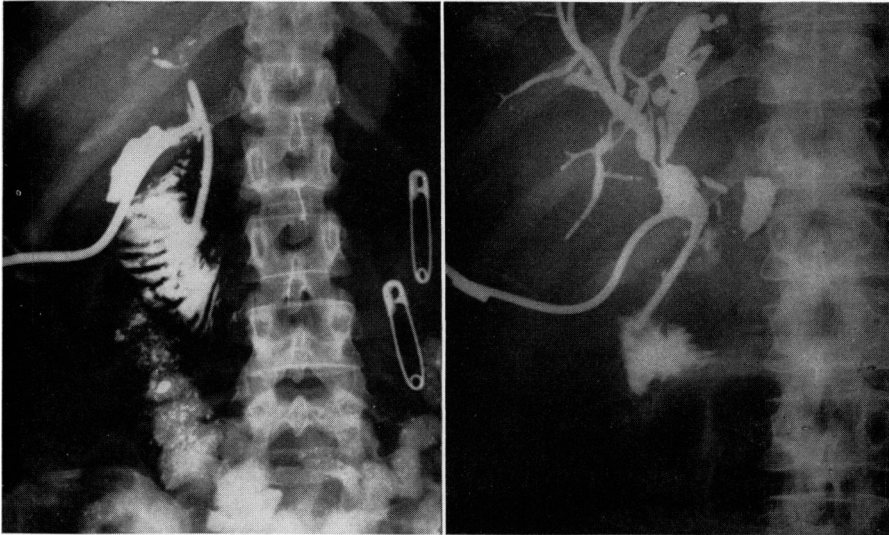


FIG. 1.—Examples of extension of common duct drainage tubes into the duodenum as illustrated by postoperative cholangiograms. The transvaterian extension of the tube prevents the recurrence of stenosis at the duodenal opening of the common duct.

remove such stones as may be engaged with forceps or scoops, by aspiration and lavage of the ducts and by passing graded dilators (Bakês dilators) through the ampulla of Vater into the duodenum. Some surgeons question the advisability of forcefully dilating the lower end of the common duct and the ampulla with Bakês dilators.

Practically all surgeons in this country apparently feel that the best method of managing the common duct after it has been opened is to place a T-tube in it with short transverse limbs, so that "it can be easily removed" and so that the tube does not extend into the duodenum. Apparently one of the objections to passing the tube into the duodenum is the fear of permitting duodenal contents to regurgitate into the biliary system. To this attitude, and I believe to his credit, there is one man who has taken exception, and that is Richard Cattell, who has devised a long transverse limb common duct tube with the expressed intention of having one arm of the tube extend through the

common duct into the duodenum and even into the jejunum. Apparently the advantages to be gained by this have not been readily seen and accepted by surgeons in general. For there yet fails to be one authoritative article endorsing his tube and the idea, and many surgeons continue to show in postoperative cholangiograms short-arm T-tubes inserted in the common duct with definite or questionable filling defects.

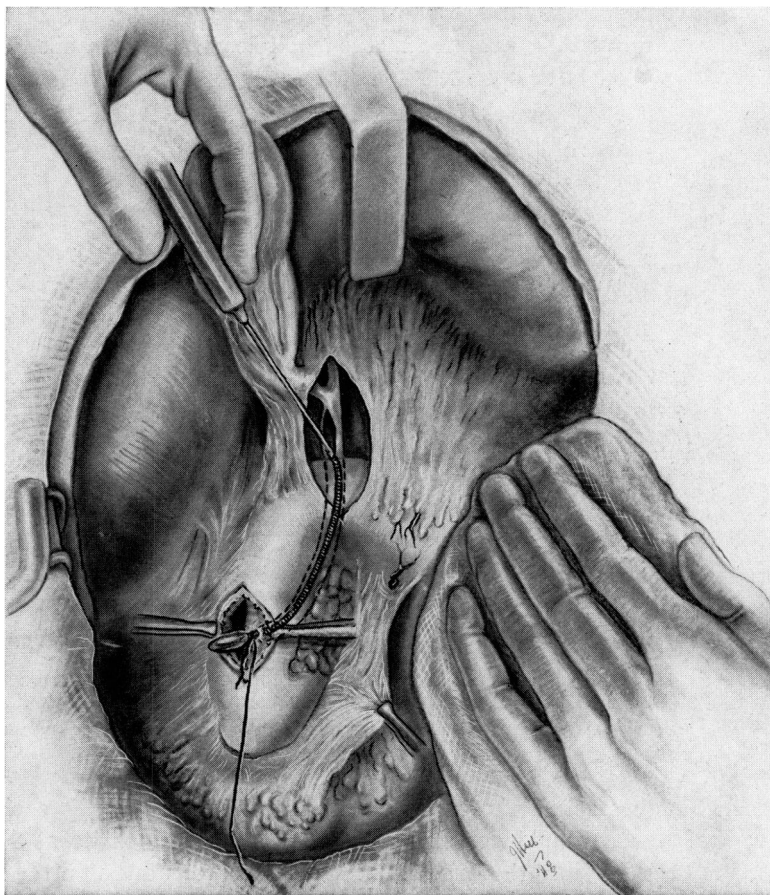


FIG. 2.—Illustrating method described in text of combined supraduodenal and transduodenal exploration of the common duct. In order to facilitate the introduction of the common duct T-tube and insure the passage of its lower arm into the duodenum a piece of silk is tied onto the Bakès dilator and is withdrawn through the common duct.

On my private services I have opened the duodenum and the supraduodenal portion of the common duct in 16 cases when exploring the common duct. This is admittedly a relatively small group of patients. Even in this small number information has been obtained which has really surprised us. No death resulted in this group of patients. Instead of using shortened transverse T-tube arms which would remain in the vicinity of the opening to drain the

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supraduodenal portion of the duct I have left one arm long and have deliberately pulled it into the duodenum, having the T-tube jut beyond the ampullà of Vater. Usually an ordinary T-tube is employed. Occasionally these are too short and a Cattell tube is used. This will prevent the recurrence of stenosis if the tube is left in for a sufficient length of time.

Stones were found in 11 cases and stenosis of the ampulla of Vater, or the lower end of the common duct, was found in four. A false impression was

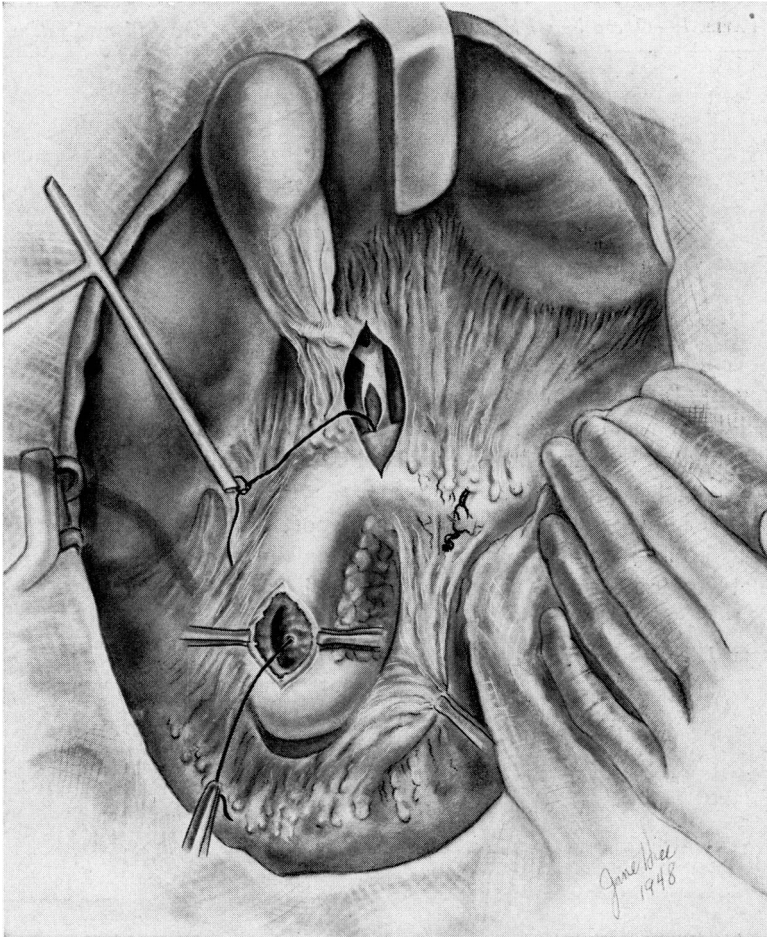


FIG. 3.—After the Bakès dilator is withdrawn the silk threaded thus through the common duct is attached to the uncut horizontal limb of the common duct T-tube and the tube is drawn into the duodenum.

gained in three instances that the probe had traversed the papilla when it actually had not. In three patients a Bakès dilator introduced through the supraduodenal opening of the duct and felt through the duodenal wall as apparently in the duodenum, was ascertained, after opening the duodenum, to be still in the ampullary portion of the common duct and had not come

through the opening in the papilla which was definitely stenosed. When there is little or no inflammatory reaction or edema in the region of the common duct the pancreas is quite mobile, and with a small Bakès dilator it is possible by feeling through the unopened duodenal wall the point of the dilator, to gain the impression that it is actually in the duodenal lumen, when such is not the case. Such a false impression may be one factor in the recurrence or persistence of benign obstructions of the common duct.

TABLE I.—*Operations Primarily for Benign Lesions of the Biliary System*

Cases.....	78
Cholecystectomy (without exploration common duct).....	56
Cholecystectomy (and exploration duct 26%).....	20
Exploration duct without cholecystectomy.....	2
(During gastrectomy, 1)	
(Duodenal diverticulum, 1)	
Duct explored, duodenum opened.....	16
Duct explored, duodenum not opened.....	6
Jaundice.....	14
Jaundice from stenosis (no stones).....	3
Stones common duct.....	14
Stones common duct; no jaundice.....	3
Death (1) supraduodenal (only) exploration duct	

Stenosis (once with a duodenal diverticulum near the opening of the common duct) was found in four instances. By stenosis is meant a contracture at the opening of the duct into the duodenum which will not pass a 3-millimeter dilator without undue force or cutting the papilla. Perhaps stenosis may explain the high percentage of cases in reported series in which stones are known to be accidentally left in the common duct or reformed after supra-duodenal exploration of the common duct had been performed. Certainly many

TABLE II.—*Duodenum Opened (During Common Duct Exploration) 16 Cases*

Unexpected findings	
Stenosis at papilla of Vater.....	3
(Bakès dilator failed to pass into duodenum)	
Inflammatory mass region of ampulla.....	1
Passage of residual stones.....	1
Papilloma papilla of Vater.....	1
(Stones in common duct)	
Stone in head of pancreas.....	1
Duodenal reflux.....	3

of the cholangiograms which are shown in an effort to demonstrate absence of stones or presence of stones after operation show a very decided partial obstruction at the ampulla. Possibly this is ampullary contraction but it may also be stenosis which would be disclosed by the combined operation. In those instances where severe stenosis was found in our cases the ampulla was cut.

We found other surprising conditions when the duodenum was opened which had we not opened it might have been overlooked. In one instance a hard inflammatory lesion of the duodenal wall was found near the ampulla of Vater

causing stenosis. In another instance a patient who had been explored at a renowned institution elsewhere twice within the last three years and stones removed, came to us with recurrent common duct obstruction. We also removed stones through a supraduodenal opening in the common duct, but on opening the duodenum we found a large papilloma, soft and easily overlooked unless the duodenum had been opened and affecting the ampulla of

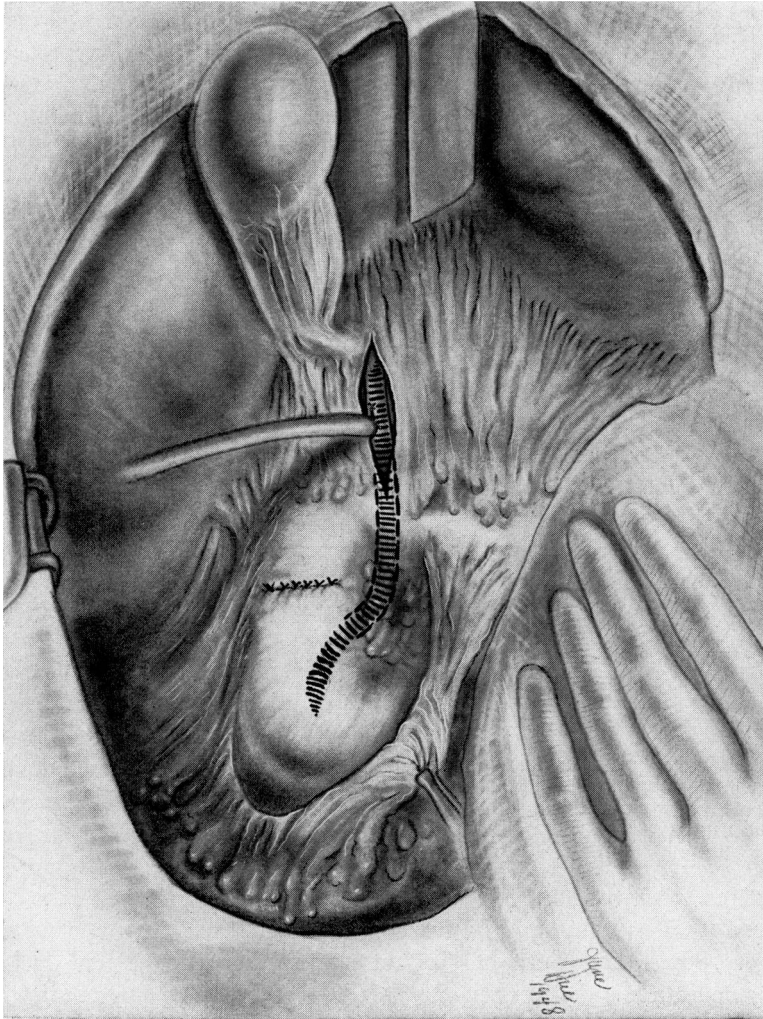


FIG. 4.—After the T-tube is placed in the common duct the supraduodenal opening is closed around the T-tube. The duodenal opening is closed transversely and with care to obtain security. The gallbladder is then removed.

Vater. This was removed; the common duct was transplanted into the superior surface of the duodenum and the upper end of the residual intrapancreatic portion of the common duct was closed off by inverting sutures. Because the patient's condition was such that he could not stand pancreatec-

tomy at the time, it has been deferred until he can gain a little more strength. This is a recent case. The patient recovered and has returned to his home in another city. He has gained weight and strength. Another operation will be done in the near future with intention of removing the remaining lower portion of the common bile duct.

In two instances the Bakês dilator made false openings around the stone, once through the pancreas and once through the common duct into the duodenum above the ampulla of Vater. In each instance the stone was removed by transduodenal approach combined with the supraduodenal approach and the patient recovered. In one instance, we have reason to believe that we left

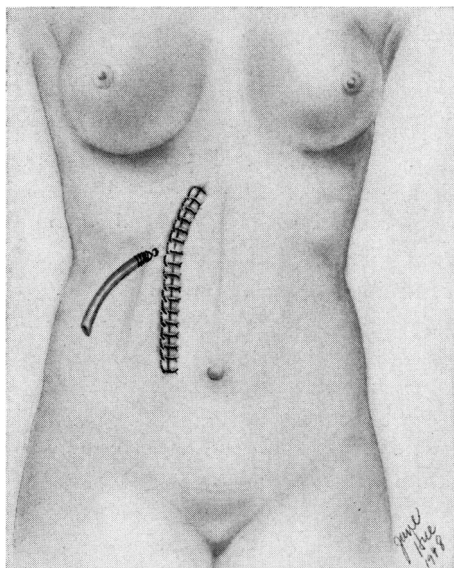


FIG. 5.—After exploration of the common duct super- and transduodenally and removal of the gallbladder the area is lavaged with saline and the common duct tube and a Penrose drain are brought through a separate small subcostal wound.

three calculi in the common duct. This patient had had a combined supra- and transduodenal exposure and an ampullotomy for numerous stones contained in the gallbladder and common duct. Postoperative roentgenograms showed shadows which we believed to be stones in the common duct. Subsequent studies showed the disappearance of these stones. We believe that they were passed into the duodenum due to the fact that the lower end of the common duct was widely opened.

We have encountered reflux of duodenal drainage, not only through the tube in a number of instances (in almost all cases this may be obtained by suction), but also around the tube in three instances in which it was very severe. All of these patients recovered. It is undoubtedly undesirable to have this as a complication, but it is also undoubtedly not nearly

so dangerous as it has seemed to be regarded by surgeons in general.

These 16 cases of supra- and transduodenal choledochotomy occurred in a group of 78 primary operations on the gallbladder and the bile ducts. By primary operation is meant operations directed to the biliary system itself and not to gastric or small intestine or other lesions. Moreover these cases only include nonmalignant lesions.* In this group cholecystectomy has been performed alone in 56 cases, cholecystectomy and exploration of the common duct in 20 cases. Thus the common duct was explored in 26 per cent of the

* Two exceptions, papilloma of the ampulla (because he had stones) and 1 gastric resection where the common duct was intubed by supraduodenal and transduodenal approach.

cases. Exploration of the duct without cholecystectomy was done twice, once because the duct was intubed during a gastrectomy for ulcer which had penetrated onto the head of the pancreas and once for operation for duodenal diverticulum.

There was one death in the entire series of 78 cases, and this occurred in a patient who had cholecystitis and cholelithiasis, choledocholithiasis and hepatitis. We operated upon him under unfavorable conditions and when he had high fever, feeling that his condition was deteriorating and that we must hasten to give him a chance of survival. The supraduodenal portion only of the common duct was opened, stones were removed and a T-tube was placed in the common duct. The gallbladder was removed. Another patient in which a cholecystectomy was done during the course of an operation which was performed for resection of jejunum for diverticula, died. The judgment at operation was that cholecystectomy would add little to the risk and it was done. The patient died of peritonitis. This case is not included because it is not considered an operation primarily directed to benign lesions of the biliary system. The major problem was of another character. Another case is excluded in which a cholecystostomy was done but the operation was performed for filling defect, (polyposis) of the stomach in an 80-year-old woman. In two instances, in addition to the above, we removed the gallbladder for carcinoma, once in conjunction with resection of the transverse colon onto which the carcinoma had spread. Both of these patients recovered.

SUMMARY

A group of cases is reported in which the exploration of the common duct was carried out both supraduodenally and transduodenally. There were no deaths from the 16 operations. Simultaneous supra- and transduodenal exploration of the common duct revealed at times unexpected pathologic findings, such as stenosis of the ampulla of Vater, unexpected neoplastic and inflammatory lesions of the ampulla, residual stones in the lower end of the common duct. The duodenum may be opened without an appreciable increase in risk to the patient and it probably insures the surgeon and patient against persistence of conditions which primarily led to the formation of stones in the common duct.

Routine intubation of the common duct with a T-tube following exploration, always with the lower end of the tube traversing the opening in the papilla and entering the duodenum is advocated. This will tend to keep the ampulla open and prevent recurrence of stenosis if it has been present. It is an additional safety factor to permit the passage of small stones when the tube is removed because of the widely dilated papilla of Vater. The dangers which have been attributed to duodenal reflux probably have been in the past greatly exaggerated.

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DISCUSSION.—DR. WILLIAM F. RIENHOFF, JR., Baltimore: I have enjoyed Doctor Mahorner's presentation very much and heartily subscribe to his idea of transduodenal removal of gallstones which are impacted in the ampulla of Vater. It has been our custom to make a small incision in the anterior wall of the duodenum parallel with its long axis and over the area in which the impacted stone is palpable. The duodenum once opened, the impacted stone at the ampulla may be delivered up into the wound without difficulty, and incision made in the ampulla with subsequent delivery of the stone. Also, any stones which remain in the common duct may be milked down with great ease. It has often occurred to me that this might be the method to be preferred for removal of a stone of the common duct, rather than opening the duct above the duodenum.

The technic I have employed in closure has been to suture the mucosa of the common duct about the duodenal mucosa through the entire thickness of the wall of the duodenum with interrupted "o" catgut sutures. The incision in the anterior wall of the duodenum is then closed in the opposite direction as in a Heineke-Mikulicz operation.

With regard to drainage of the common duct with a rubber tube for the ordinary run-of-the-mill case of common duct stone, to be differentiated from those cases in which the common bile ducts are full of smudge or bile stone mud, it has been our custom for the past 20 years to avoid placing a tube of any type in the common duct. In 1919, when the late William S. Halsted was recovering from the first operation on his common duct for removal of a common duct stone (which operation was performed by R. H. Follis, Sr.), a T-tube was inserted into the common duct. At that time I was medical interne on the service of Dr. Thomas R. Boggs, who was Doctor Halsted's physician. After removal of the T-tube, drainage of bile persisted for a long period, and Doctor Halsted's