adequate to the task when the left lobe was obstructed. There were no indications of increased blood destruction in these two individuals, nor any evidence of infectious hepatitis. However, in each case there were certain similarities. Both women were aged, both had mild heart failure, and in both there was calculous obstruction of the left hepatic duct. It is probably significant that the jaundice in the second patient was observed to clear following digitalization and several days of rest, prior to removal of the obstructing stones. It may be reasonable to conclude, therefore, that obstruction of the left hepatic duct in an aged individual with reduced hepatic reserve due to mild cardiac insufficiency can produce a moderate degree of jaundice.

That a stone in the hepatic duct can and does cause other clinical symptoms is also apparent. Both patients had right upper abdominal pain, anorexia, weight loss, nausea, and vomiting. These symptoms are not pathognomonic, but it would seem that their occurrence in patients without other significant symptoms or signs should lead to a surgical exploration which includes operative cholangiography when the surgeon does not find an obvious cause of the patient's symptoms.

It is not the purpose of this report to discuss the technical details of operative cholangiography nor to generalize upon the indications for or the value of that diagnostic procedure. Of interest, however, is the obvious fact that a certain number of hitherto unsuspected intrahepatic duct stones are thus discovered. In a series of 100 operative cholangiographies studied by one of us (J. P. I.), one instance (Case 2) of single hepatic duct stone was discovered.

Summary

The case histories of two patients who had calculous obstruction of the left hepatic duct accompanied by mild jaundice are reported. Both of these patients were old and had evidences of heart failure. Operative cholangiography was useful in discovering the obstruction in the second case. The hypothesis is advanced that jaundice occurred in these two patients because the functional reserve power of the liver suffered a double impairment from blockage of the left hepatic duct and heart failure.

Reference

1. Norman, O.: The Hepatic Ducts in Cholangiography, Acta Radiol., Suppl., **84**; 1951.

Discussion

Dr. Harry J. Warthen: I welcome this opportunity to say a few words about Dr. Stafford's excellent paper. In the first place, it is a subject of considerable general interest to me, and in the second place, I understand that I did the first operation on one of these patients, in 1932.

Dr. Stafford raises the question as to why jaundice should occur with obstruction of only one hepatic duct. I think the factors he mentioned are certainly the major ones, that is, the general condition of the patient, the obstruction to the left hepatic duct, and also the cardiac status of the patient. There may be one other consideration in the second case. This patient had a temperature of 102° on admission, so it may well be that inasmuch as this patient had the major degree of jaundice there may have been an associated cholangiitis which involved both radicles and may have caused some blockage in both lobes of the liver.

I think that operative cholangiography offers more in the case of stones in the hepatic ducts than in any other condition in the biliary tree. As a rule the surgeon can identify stones distal to the point that the T-tube has been inserted in the common duct. But those stones proximal may easily be overlooked unless cholangiogram has been done.

Dr. George Crile, Jr.: With the permission of Dr. Stafford I am going to make a little twist to his title of "Stone in the Left Hepatic Duct" to "Stones Left in the Hepatic Duct," because having practiced routine cholangiography for many years

we have often been aware of the strong probability that we have left stones in the hepatic ducts. I am speaking about multiple non-opaque shadows high up in the biliary tree. We know that many of these are destined to come down and ultimately to cause obstruction of the ampulla and recurrence of jaundice. It is not always possible to remove these as skilfully as the author of this paper has done, because they may be multiple and very high in the smaller radicles.

I claim no originality for this procedure, but I think under such circumstances when you have removed many stones from the common bile duct and you suspect strongly that there are others above, a side-to-side anastomosis between the bile duct and the duodenum avoids recurrence of obstruction and makes a little sump down below where these stones can accumulate harmlessly if they do not pass on.

Dr. Edward S. Stafford (closing): I would like to thank Dr. Warthen and Dr. Crile for their discussions and to say that, whereas the first stone certainly was in the left duct but not left there, Dr. Warthen will have to answer about the second patient.