The patient was readmitted in August, 1928, as a surgical emergency, with pains of a severe gripping character, irrespective of taking food. These had been present for thirteen days, and were worse for the three days immediately preceding admission. She had vomited once only, immediately after a dose of castor oil taken at home. She was subsequently transferred to my care on the medical side whilst acting as deputy to Dr. Batty Shaw. Between the two attacks the patient had been treated for rheumatoid arthritis, but had complained of no symptoms which might draw attention to her abdomen.

Her condition was as follows: There was no evidence of jaundice. Examination of the abdomen showed considerable divarication of the recti. The liver, spleen, and kidneys could not be palpated, but there was an indefinite mass deep in the right hypochondrium. The tumour noted at the previous admission had disappeared. An occult blood test was positive.

Radiograms of an opaque meal taken at this time showed no abnormality in the stomach, but an unusual shadow was seen passing outwards and to the right from the second part of the duodenum (Fig. 1). The true significance of this abnormality was

FIG. 1.—Tracing from a radiogram of a barium meal taken in the supine position a quarter of an hour after the meal was given. It shows the stomach partially filled with barium and undergoing active peristalsis. The duodenum is normal, with the exception of a fistulous track passing downwards and to the left from the second part.

not realized until an opaque enema several days later was screened and photographed. This was found to pass directly from the colon to the duodenum, while at the same time the biliary passages and even the intrahepatic bile ducts were outlined in an unmistakable manner (Fig. 2).

FIG. 2.—Tracing of a radiogram of a barium enema. The opaque substance passed easily into the colon. From a fistulous opening in the transverse colon the barium can be seen to have entered the duodenum and the bile ducts. There was no evidence of barium in the alimentary tract immediately preceding the enema.

A cholecystography was attempted three months later, the dye being given by the oral method. No evidence of gall-stones could be detected, nor was the gall-bladder outlined.

It was decided to adopt an expectant method of treatment, owing to the age of the patient and the absence of any urgent symptoms. This course has, I think, been fully justified, as I have recently (September, 1929) been in communication with the patient, who states that she feels well and has had no abdominal discomfort for some time.

Comment.

The most probable explanation of the case would appear to be that, at the time of her first admission to University College Hospital in April, 1923, she had a mucocele of the gall-bladder due to impaction of a stone in the neck of that viscus. This remained in a quiescent state until August, 1928, her second admission, when the stone ulcerated through

the gall-bladder into the alimentary tract. It is well known that an impacted gall-stone may ulcerate either into the colon or the duodenum. In this case, however, it would appear that there is a connexion between all three viscera—namely, the biliary passages, duodenum, and transverse colon. The possible explanations are three:

1. That a single large stone passed into the duodenum and then ulcerated into the colon.
2. That there were two separate stones, one of which ulcerated into the duodenum at the first attack, and the other into the colon at the second.
3. That a stone ulcerated from the biliary passages into the colon, damaging the subjacent duodenum in its passage.

Against the first hypothesis is the fact that a stone sufficiently large to obstruct the duodenum and ulcerate thence into the colon would almost certainly have produced urgent signs and symptoms of acute intestinal obstruction with vomiting. With regard to the second possibility, there was no radiological evidence of ulceration into either the colon or duodenum at the time of the first admission, the occult blood test was negative, and the patient was discharged with what was probably an enlarged gall-bladder. One is left with the third suggestion, which would seem to fulfil all requisites.

Apart from this somewhat academic discussion of the methods by which an undoubted short-circuit has been produced between the biliary apparatus and the large intestine, the really interesting point is that the patient had barium from her colon forced into the intrahepatic bile ducts without any apparent ill effect at the time, and has subsequently remained in good health.

I have decided to call this case one of cholecysto-colic fistula, as although there is no very definite evidence of the gall-bladder in the radiograms, yet, from the absence of obstructive jaundice, the stone could not have been lodged in the common bile duct, but, as has been previously stated, was probably impacted in the neck of the gall-bladder.

I have searched through the *Quarterly Cumulative Index* for references to similar cases. There are several instances reported of barium leaving the duodenum as in Fig. 2, but none, so far as I am aware, in which the intrahepatic bile ducts have been filled.

I wish to thank Dr. Batty Shaw for giving me permission to publish the case.

THE ESTIMATION OF PROTEIN IN URINE AND ITS RELATION TO CASTS.

BY

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In the routine examination of a large number of nephritics during 1925-26 certain facts came to light which are not without interest to the general practitioner. The first was that the general impression that protein stands in close relation to casts was borne out. In order, however, to arrive at this result it was necessary to have a fair idea as to the amount of protein present and that casts should be properly looked for.

As to casts, I am indebted to Dr. Broughton-Alcock for the following method of search, which I am convinced is the best:

Take up the material to be centrifuged from the bottom of the container, which has been allowed to stand (not too long in the case of children). After centrifuging at a fairly high speed, take up with a bacteriological pipette, which has been thoroughly rinsed between-whiles, about 0.5 c.cm. from the bottom of the centrifuge tube, and spread out in a large flat oblong layer on a slide, the large area thus provided being carefully explored on the mechanical stage with the one-third objective. A good deal of practice is necessary before certainty can be attained, but by this method casts will rarely be missed.

It was evidently of interest to determine the value (if any) of the conventional terms used in estimating protein at a glance, and though it must be admitted at once that those who deal with a large number of specimens are rarely

far out in their estimates, yet, because the general practitioner has not the opportunity to deal with large numbers, and because greater accuracy is desirable, if readily attainable, the following opacity method is proposed:

Add to 5 c.cm. of urine (filtered through two layers of filter paper, and if necessary through sand also¹) 0.5 c.cm. of 25 per cent. salicyl-sulphonic acid. (It is convenient to have a set of test tubes with the 5 c.cm. level marked.) If the resulting turbidity is outside the range of the standards of the author's proteinometer,* reject that test tube and dilute, say, 1 in 5 with physiological saline, when (after the addition of the precipitant) the resulting turbidity will (unless the amount of protein content be unusually high) be brought within the range of the standards. If the protein content is unusually high, the urine can be diluted to 1 in 10 with physiological saline. The turbidity produced is then compared, by the aid of the green glasses supplied, with the standards, and with practice a good reading is quickly obtained.

With regard to these turbidities, it is to be noted that the turbidity which just obscures print (using a test tube of 5/8 in. bore) corresponds to 0.020 per cent. albumin, or 20 mg. per 100 c.cm.; a turbidity presenting a frosted appearance through which light ceases easily to be transmitted corresponds to 0.070 per cent., or 70 mg. per 100 c.cm.; while at 300 mg. per 100 c.cm. the fluid is so opaque that light is not transmitted at all.

To return to the evaluation of terms in common use in the estimation of protein by the eye, the protein was determined in 401 cases by the method of Roberts and Stohnikow, and averages taken of these values under the heads supplied by the original rough eye estimation—namely, a trace; fair amount; considerable amount; large amount; very large amount. The results are shown in the following table.

Determination of Protein in 401 Cases.

	Cases.	Average Protein.
For a trace	34 gave ...	0.010 per cent.
For fair amount	150 „ ...	0.050 „
For considerable amount	101 „ ...	0.110 „
For large amount	60 „ ...	0.440 „
For very large amount	56 „ ...	1.050 „

These figures are reasonable, but the unreliability of rough estimation in individual cases is shown by the fact that the column "fair amount" showed occasional variations from 0.030 to 1 per cent., only the average of a large number giving a reasonable figure. On the other hand, quite low values were at times found in the column "considerable amount," and comparatively low values even in the column "large amount."

The next step was to consider what relation, if any, existed between the amount of protein and the incidence of casts. It having been shown that the conventional expressions have a value where large numbers are concerned, it became permissible to include a further 814 cases in which the protein had not been actually measured (but only roughly estimated), with the following striking result.

Relation between Protein Content and Incidence of Casts.

Of 759 cases with a trace of protein ...	18% had casts
Of 197 with fair amount	53% „
Of 152 with considerable amount	49% „
Of 90 with large amount	77% „
Of 27 with very large amount	78% „

Rewriting in round figures we may say that 20 per cent. of cases show casts for a trace of protein; 50 per cent. for a fair amount and a considerable amount; and 80 per cent. for a large amount and a very large amount. This simple progression is very striking, though it would seem at first sight that cases showing averages of 0.050 and 0.110 per cent. protein are clinically on the same footing. On carrying the analysis further, however, so as to take into consideration the type of casts, the more serious view taken of granular casts will be seen to be justified, for the following table shows that from 0.110 per cent. protein upwards granular casts show a sudden increase at the expense of hyalogramulars.

* Obtainable from Messrs. Baird and Tatlock.

Percentage Incidence of Types of Casts at varying Protein Content.

	0.010 % Trace.	0.050 % Fair Amount.	0.110 % Consider- able Amount.	0.440 % Large Amount.	1.05 % Very Large Amount.
Hyalogramular	55	63	47	43	40
Granular ...	20	19	32	33	40
Epithelial ...	5	2	7	9	20
Hyaline ...	20	16	14	15	—

The work of which these studies are the outcome was done in the Central Laboratory of the Ministry of Pensions.

REFERENCE.

¹ *British Medical Journal*, 1922, ii, 616.

OPERATIVE TREATMENT OF CIRRHOSIS OF THE LIVER.

BY

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THE following case, one of alcoholic cirrhosis of the liver, in a man 70 years of age, is worthy of record principally because of the excellent result of the surgical treatment employed, the technique of which I am sure is not widely known.

Mr. X first came under my care in January, 1929, and a diagnosis of cirrhosis of the liver was made. At that time there was some free fluid in the abdominal cavity and signs of arteriosclerosis throughout the body, with gradual loss of weight and of strength. In March his condition became decidedly worse; his weight decreased rapidly, his abdomen became more distended with fluid, and a caput medusae was apparent; the daily output of urine dropped to about 20 oz. and a very grave prognosis was made.

On March 30th he was tapped and 170 oz. of fluid were withdrawn from the abdominal cavity. No improvement followed, and on April 4th Mr. G. C. Swanson of Glasgow was called in consultation. The patient was removed to a nursing home, and the following operation was performed.

A vertical incision, slightly to the right of the middle line, and extending from the ensiform cartilage above to within an inch of the umbilicus below, was made through the skin and subcutaneous tissue. The anterior sheath of the rectus was opened in the same line, the rectus pushed aside, and the abdominal cavity entered through the posterior sheath and peritoneum. On opening the abdomen bile-stained ascitic fluid welled out of the wound in large quantity.

The diagnosis was confirmed by an examination of the liver, which was typical of cirrhosis. The spleen and kidneys were not unduly affected in size.

The great omentum was drawn upwards and sutured into an opening in the upper part of the posterior sheath of the left

rectus muscle (epiploexy), the object of this being twofold: first, in order to establish a collateral circulation or by-pass between the portal and systemic venous systems and so relieve the portal obstruction, and, secondly, in order to keep the omentum from

interfering with the second procedure adopted. The second procedure was carried out in order to cause absorption of the ascitic fluid by the lymphatic and circulatory systems. This was done by insertion of two Paterson's buttons (devised by Professor Peter Paterson of Glasgow University), one on each side of the incision. These buttons are made of smooth glass, in shape they are like collar-studs, but with both discs equal in size, and with