The differentiation of sarcoidosis with hypercalcaemia from hyperparathyroidism is discussed.

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ADDENDUM.—Since this report was prepared we have had another opportunity of studying the patient under constant normal dietary intake of calcium with and without cortisone. This time no change in serum proteins was observed, but again the cortisone reduced the serum calcium level to normal, improved renal function, and greatly improved the patient's well-being. This has now been repeated on three other patients with similar results. It appears that the improvement can be maintained for some months at least on a reduced dose of cortisone. It is hoped to publish these results later when a longer follow-up has been obtained. A recent paper by Shulman, Schoenrich, and Harvey (*Bull. Johns Hopk. Hosp.*, 1952, **91**, 371) on the general effects of cortisone on patients with sarcoidosis briefly mentions changes in calcium levels and in renal function which are very similar to those we have described above.

SPLenic VENOGRAPHY

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Great interest has lately been taken in the surgical treatment of cirrhosis of the liver (Berman *et al.*, 1951; Reinhoff, 1951; Leger *et al.*, 1952; Hunt, 1952) and portal hypertension (Whipple, 1945; Blakemore and Lord, 1945; Blakemore, 1951; Walker, 1952; Hunt, 1952). Valuable information may be obtained by needle biopsy of the liver in cases of hepatic cirrhosis. The procedure is sometimes difficult owing to the hardness and smallness of the liver and to the presence of ascites. Portal hypertension is usually determined by noting the pressure in one of the tributaries of the portal vein. Cavernomatous changes in the portal vein and obstruction in its prehepatic part or in the splenic vein may be made out by injecting a radio-opaque dye in the tributaries. In all these cases the abdomen has to be opened to carry out the investigation. Moreover, a surgeon must be sure that the splenic vein is patent and that the veins are large enough before attempting spleno-renal anastomosis. If useful information could be obtained

without laparotomy by a procedure which is safe it would be welcome. Splenic venography was done by Dreyer and Budtz-Olsen (1952) in 11 cases without any untoward incident. They suggested, among other things, that the method might be useful in finding out the site of block in cases of portal hypertension.

We carried out splenic venography in two control cases, in two with portal hypertension, in three cases with cirrhosis of the liver, and in seven cases of splenomegaly of unknown aetiology.

Method

The patients fasted overnight. Half an hour before the procedure 50 mg. of pethidine hydrochloride was injected. The patients lay supine on the x-ray table. The left ninth intercostal space in the mid-axillary line was chosen as the

FIG. 1.—Splenic venogram showing iodoxyl in spleen, splenic vein, upper part of a superior mesenteric vein, portal vein, and intrahepatic branches of portal vein.

FIG. 2.—Most of the dye has left the spleen and accumulated in the right lobe of the liver.

site for injection of the radio-opaque dye. The part was sterilized and the space up to the splenic capsule was anaesthetized with 2% procaine hydrochloride solution. About 5 ml. was needed. Then 20 ml. of a solution of "iodoxyl" (N-methyl-3:5-di-iodo-4-pyridone-2:6-dicarboxylic acid) was taken into a 20-ml. Record syringe to which a lumbar puncture needle was attached. It was pushed in medially and slightly downwards. The engagement of the needle in the spleen could be felt. The patients were asked to hold their breath at the end of inspiration until the whole amount was injected. An assistant held the lower pole of the spleen in cases in which it was enlarged.

The dye was injected as quickly as possible and a picture was taken when 15 ml. of dye had been injected (Fig. 1). That amount took about five seconds to inject. The next picture was taken five seconds later, when the full amount of the dye had been injected (Fig. 2). The needle was taken out and the site was sealed. At first we used a fine lumbar-puncture needle (children's size) attached to a 20-ml. all-glass syringe. It required great force to inject the dye into the splenic pulp. Later on, an adult lumbar-puncture needle attached to a Record syringe was used, when it became easy to inject the dye in five seconds. If the spleen was enlarged the needle was pushed for about 5 cm. from the skin surface. In cases without splenic enlargement this

distance varied between 3 and 4 cm., depending on the thickness of the parietes. The patients were kept in bed for 24 hours and the pulse, respiration, and temperature were noted every hour. Sensitivity to iodine was not tested.

Reactions

If we exclude the first patient, who neither fasted nor had a sedative before the injection of the dye, there were practically no untoward reactions. Most of the patients complained of some pain over the spleen which lasted for about 10 minutes. There was no obvious alteration in pulse, respiration, and temperature. To note the amount of bleeding we drew out ascitic fluid in two cases of cirrhosis of liver before and after venography. In both cases only the second specimen contained blood. The patients were up and about from the next day and took their usual diet. The first patient vomited immediately after the injection of the dye, had a rigor, and was febrile for several days. He is now quite well. The cases are summarized in the Table.

Discussion

In a normal splenic venogram the splenic vein and the portal vein and its branches for some distance inside the liver are visible. A small portion of the superior mesenteric vein near its entry into the splenic vein may sometimes be made out (Fig. 1). The dye leaves the spleen very rapidly (Fig. 2). A small remnant may, however, be seen inside the spleen even an hour after the investigation. It usually appears in the urinary bladder within 30 minutes of the injection of the dye. In cases of obstruction of the splenic vein the portion of the vein beyond the obstruction will not appear, as shown by Dreyer and Budtz-Olsen (1952). In portal hypertension due to greatly increased pressure in the portal circulation the blood flow may be reversed and the dye may enter the inferior mesenteric vein, its tributaries, and the left gastric vein (Fig. 3).

In cirrhosis of the liver, as the obstruction to the portal vein is inside the liver, the intrahepatic branches of the vein

are either not made out or faintly seen, depending on the degree of obstruction, and the extrahepatic portal vein and the splenic vein become markedly dilated and tortuous (Fig. 4). The inferior mesenteric and left gastric veins may not be demonstrated unless the portal hypertension is great. Hence the degree of prominence and tortuosity of these veins in the splenic venogram will be a measure of the extent of portal hypertension. Case 5, who was admitted to hospital for operative treatment of cirrhosis of the liver, had a contracted liver with a granular surface. The portal pressure was 300 mm. of saline, and immediately after ligation of the hepatic and splenic arteries it fell to 225 mm. There was no injury to the spleen due to venography.

In our cases of splenomegaly of unknown aetiology there was no clinical evidence of portal hypertension, the liver-function tests were within normal limits, and liver biopsy did not show cirrhotic changes. Owing to the huge splenic enlargement the splenic vein has to carry a large amount of blood and becomes dilated and tortuous. The portal vein and its intrahepatic branches also become dilated. In these cases the dye will be poorly concentrated, and the venogram will show dilatation and tortuosity of the splenic and portal

FIG. 3.—Tortuous splenic and inferior mesenteric veins. Extrahepatic portion of portal vein and left gastric vein can be seen.

Summary of Cases

Case No.	Age and Sex	History of Bleeding	Veins over Abdominal Wall	Venous hum.	Spleen	Liver	Ascites	Liver-function Tests	Liver Biopsy	Clinical Diagnosis	Splenic Venogram
1	24 M	—	—	—	N.P.	N.P.	—	Normal	Not done	Neurosis	Showed splenic vein, part of superior mesenteric vein, and portal vein with its intrahepatic branches (Fig 1)
2	20 M	—	—	—	1 F.	1 F.	—	"	" "	Tuberculous cervical lymphadenitis with chronic malaria	Same as above. Superior mesenteric vein not shown
3	12 M	Haemat- emesis	+	+	3 F.	2 F.	—	"	Slight fatty changes in peripheral part of lobules	Splenomegaly with portal hypertension	Tortuous splenic vein, prominent and tortuous inf. mesenteric vein extending up to pelvis with its tributaries, left gastric vein, and portal vein before its entry into liver (Fig. 3)
4	26 M	Haemat- emesis and melaena	+++	++	4 F.	—	—	Abnormal	Not done	" "	Dilated and tortuous splenic and portal veins. Inf. mesenteric vein shown faintly
5	50 M	—	+	—	2 F.	—	+++	"	Marked cirrhotic changes	Portal cirrhosis	Very dilated splenic and portal veins. Intrahepatic branches of portal vein not shown (Fig. 4)
6	24 M	Haemat- emesis	+	—	2 F.	—	+++	"	Not done	" "	" "
7	35 M	—	+	—	3 F.	1 F.	++	Within normal limits	Slight fatty changes	Splenomegaly of unknown aetiology	Marked dilatation and tortuosity of splenic and portal veins. Intrahepatic branches faintly shown (Fig 5)
8	42 M	—	—	—	Symphysis pubis	3 F.	—	"	"	" "	" "
9	25 M	—	—	—	Left iliac fossa	3 F.	—	"	Focal areas of early fibrosis	" "	" "
10	35 F	—	—	—	2 F below umbilicus	2 F.	—	"	Slight fatty changes	" "	" "
11	26 M	—	—	—	4 F.	2 F.	—	"	Not done	" "	" "
12	22 M	—	—	—	Umbilicus	2 F.	—	"	"	" "	" "
13	23 M	—	—	—	Left iliac fossa	3 F.	—	"	"	" "	" "
14	22 M	—	—	—	Umbilicus	3 F.	—	"	No abnormality	" "	Very faintly outlined splenic and portal veins

— Absent. + Slight. ++ Moderate. +++ Marked. N.P. Not palpable. F. Finger below costal arch.

veins (Fig. 5). As there are no cirrhotic changes, the intrahepatic branches of the portal vein can be made out, though faintly owing to dilution of the dye. Inferior mesenteric and gastric veins are not seen, as there is no associated portal hypertension. In Case 14, who underwent splenectomy, the portal venous pressure was 120 mm. of saline. Often some of the dye gets underneath the capsule of the spleen, probably owing to adhesions between the spleen and the parietal wall; but in the case of splenomegaly in which splenectomy was done no such adhesions were found. In this case also no injury was noted in the spleen due to venography.

In experienced hands splenic venography is usually safe. Rarely the dye may produce vomiting and rigor, as is sometimes seen when carrying out intravenous pyelography.

FIG. 4.—Markedly dilated splenic vein. Extrahepatic portion of portal vein faintly seen, but the intrahepatic branches are not visible.

FIG. 5.—Tortuous and dilated splenic and portal veins. The intrahepatic branches are dilated and the dye is poorly concentrated in them.

Overnight fasting and the use of pethidine hydrochloride usually prevent these complications. Though pethidine quiets the patient and removes his apprehensiveness, he remains co-operative and holds his breath during injection of the dye. There is some bleeding due to puncture of the spleen, which, however, stops spontaneously. The needle should be pushed for some distance inside the spleen and the dye injected into the splenic pulp. There is far less chance of rupture of the spleen than when the dye is forcibly pushed immediately underneath the capsule. The possibility of excessive bleeding and of rupture of the spleen, though very remote, should be kept in mind, and the procedure carried out only in a hospital where emergency splenectomy could be done.

Most of the patients complained of pain over the spleen immediately after injection of the dye. It lasted from five to ten minutes. It is probably due to spasmodic contraction of the spleen, set up by the large amount of foreign substance inside the splenic pulp. If there is associated spasm of the splenic vein the dye is retained longer inside the spleen.

Summary

Splenic venography was done on 14 cases without untoward incidents.

Though there is slight haemorrhage from the spleen the procedure is safe.

The venogram shows the size and patency of the splenic and portal veins.

The intrahepatic branches of the portal vein are visible in a normal venogram, but, depending on the degree of obstruction, they are either absent or are faintly made out in venograms of cases of cirrhosis of the liver.

In portal hypertension the inferior mesenteric and left gastric veins may become visible and their prominence and tortuosity may be a measure of the degree of hypertension.

In splenomegaly without portal hypertension or cirrhotic changes in the liver the splenic and portal veins are dilated and tortuous and are fainter in outline than in normal cases. In these patients and in cases of cirrhosis of the liver the splenic and portal veins are sometimes so dilated as to resemble a loop of intestine (see Fig. 4).

ADDENDUM.—Since the submission of the paper for publication we have carried out splenic venography on four cases of cirrhosis of the liver, two of nutritional oedema, and three of splenomegaly of unknown aetiology without any untoward incident. The conclusions drawn in the paper have been corroborated.

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On Thursday last a plaque was unveiled on the wall of an old people's home in the King's Road, Chelsea, to commemorate the association of Sir Hans Sloane with the district. Sloane was born in Ireland in 1660. He studied medicine in Paris and Montpellier and graduated at Orange in 1683. He became a fashionable London doctor and a Fellow of the College of Physicians and of the Royal Society. In 1687 he sailed to Jamaica as physician to the Duke of Albemarle. From there he brought back a large number of plants and animals which formed the basis of his famous collection of specimens and books. As a physician he was as well known for his charity as for his professional skill, and devoted part of his salary to establishing a dispensary for the poor. He was elected secretary and later President of the Royal Society, and in 1716 he was made a baronet. He did not live permanently in Chelsea until 1742, but it was there that he died in 1753. In his will he left his famous collections to the nation, and they were housed in a building on the site now occupied by the British Museum.