

A method for production experimental portal hypertension and ascites

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A major difficulty in experimental studies of portal hypertension and ascites has been the lack of a suitable method for producing hepatic venous outflow obstruction without producing alterations of pressure and blood flow in the inferior vena cava. It was found in our previous studies on biliary strictures that bile stasis after partial constriction of the common bile duct is often accompanied by portal hypertension and ascites. The present study was directed at developing a consistent technique of producing portal hypertension and ascites in dogs, by constriction of the common bile duct.

METHODS

In 15 dogs a plastic ring of 2 or 3 millimeters internal diameter was applied around the common bile duct. The constriction produced was 50 or 70 per cent of the area of cross section of the duct. After the operation an evaluation of the increase in abdominal circumference and of the presence of distended veins in the umbilical region was made. The serum bilirubin, GOT, and alkaline phosphatase were estimated. Laparotomy was performed when there was evidence of ascites. The portal and biliary pressures were measured, venogram or splenogram taken, and observation of any intraabdominal abnormality made. Intraabdominal fluid, hepatic and intestinal lymph were chemically investigated.

RESULTS

Portal hypertension and ascites developed in 12 of the 15 dogs (80 %) in 6 to 31 weeks after the common bile duct had been constricted. Grossly there were many dilated veins in the umbilical region. The veins in omentum and mesentery were enlarged. Multiple tortuous com-

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FIG. 1.

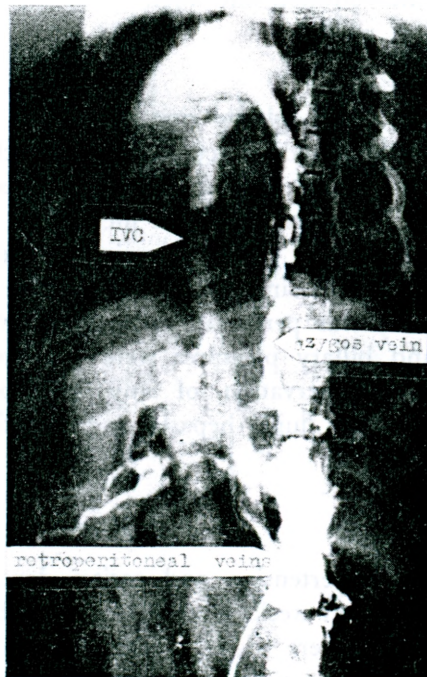


FIG. 2.

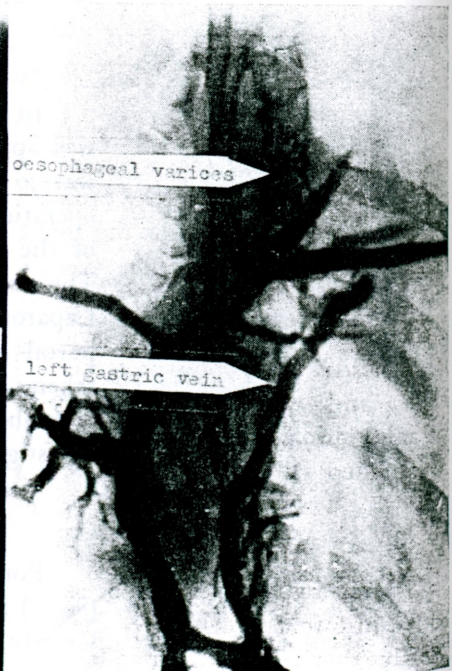


FIG. 3

municating veins between the mesenteric, splenic and left renal vein as well as the inferior vena cava were observed. The lymphatic vessels in the mesentery, liver hilum and on the anterior aspect of the spine were grossly dilated. The liver appeared to be macroscopically normal. Although the constricted segment of the common bile duct was usually patent, the extrahepatic bile ducts and the gallbladder were enormously dilated. The portal vein was patent in all cases and there was no compression by the dilated common bile duct. No splenic abnormality was seen. Microscopical examination disclosed some periportal fibrosis, proliferation of bile ducts and dilatation of veins in the portal areas (fig. 1).

The average peak of portal pressure was 22,6 cm of water, with a wide range of 15 to 41 cm of water, as compared with 11,5 cm of water in the control group. The average pressures in the inferior vena cava was 7,5 cm of water giving an average gradient of 15,1 cm of water between the portal vein and the inferior vena cava. The average pressure in the common bile duct was 15,1 cm of water with a range of 7 to 21 cm of water.

Ascites was seen in 11 of 15 dogs. The intraabdominal fluid was clear pale-yellow in all cases. Its average volume was 750 ccm, the average specific gravity was 1010, and the average protein content 0,86 g/100 ccm. The average protein content in intestinal lymph reached 0,89 g/100 ccm. Hepatic lymph protein amounted to 4,37 g/100 ccm.

Venography disclosed extensive portal-systemic collateral channels between :

1. the splenic vein and the left renal vein.
2. the superior mesenteric vein and the inferior vena cava,
3. the œsophageal veins and the azygos vein and the superior vena cava (fig. 2, 3).

CONCLUSIONS AND SUMMARY

Persistent portal hypertension and ascites have been obtained in dogs after partial constriction of the common bile duct. Histological, radiological and physiological datas are presented.

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Wir konnten beim Hund durch partielle Stenosierung des Chole-
dochus eine definitive portale Hypertension mit Ascites erzeugen. Histo-
logie, Radiologie und Physiologie dieses Zustandes werden besprochen.

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Hemos podido crear en el perro hipertensiones portales definitivas con ascitis por estenosis parcial del colédoco. En el trabajo se estudian los aspectos histológicos, radiológicos y fisiológicos de estos experimentos.

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Nous avons pu créer chez le chien des hypertensions portales définitives avec ascite par sténose partielle du cholédoque. Les aspects histologiques, radiologiques et physiologiques de ces états sont étudiés.

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Una ipertensione portale persistente con ascite è stata realizzata nei cani dopo una parziale ostruzione del coledoco.

Vengono presentati i rilievi istologici radiologici e fisiologici.

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У собаки после частичного сужения общего желчного протока была получена стойкая портальная гипертония и асцит. Представлены гистологические, рентгенологические и физиологические данные.