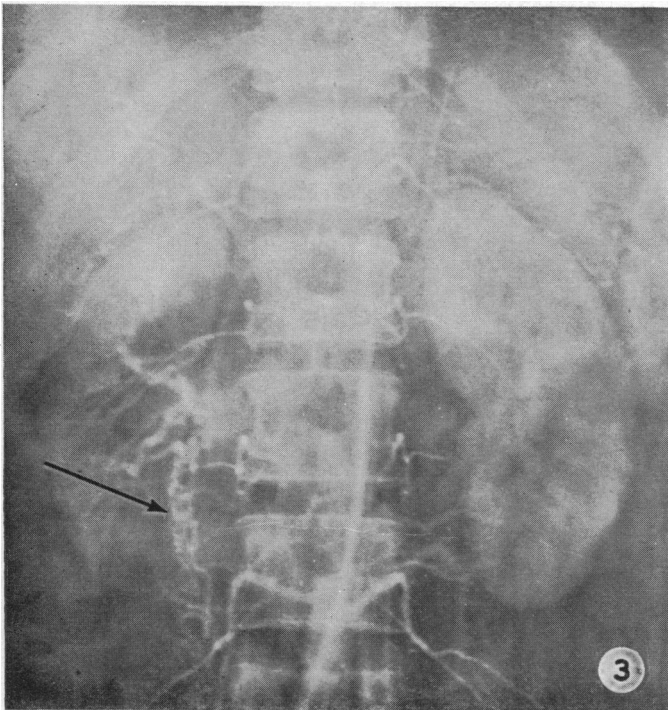
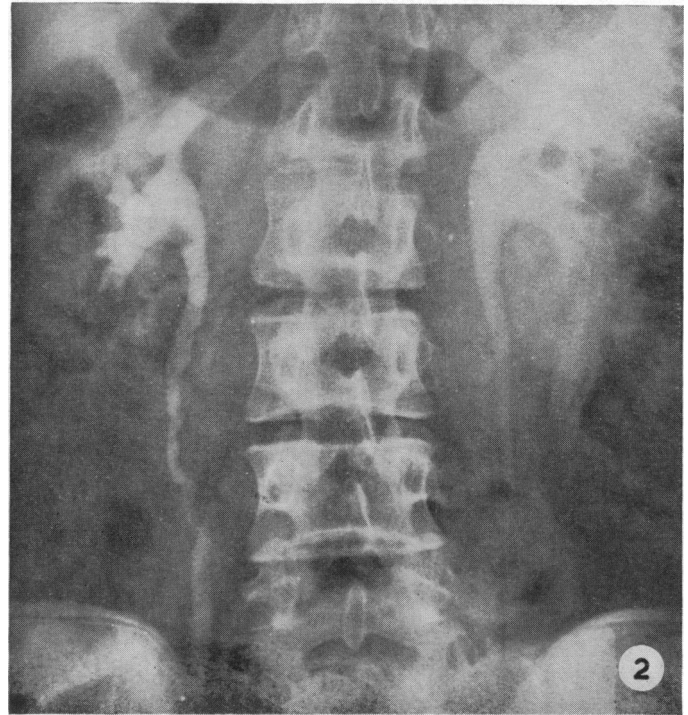
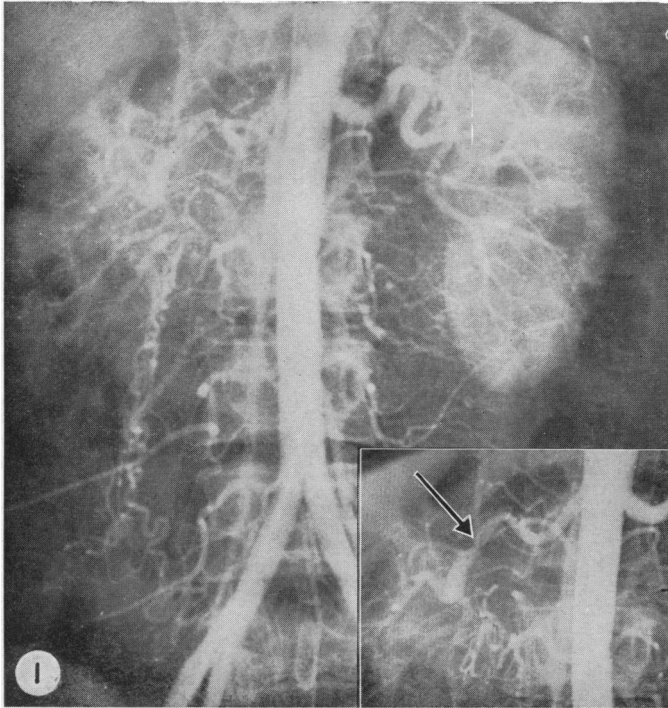


H. O. WONG AND K. W. CHOW: URETERIC IRREGULARITY IN RENAL-ARTERY STENOSIS



W. E. GIBB ET AL.: SURVIVAL IN WHIPPLE'S DISEASE

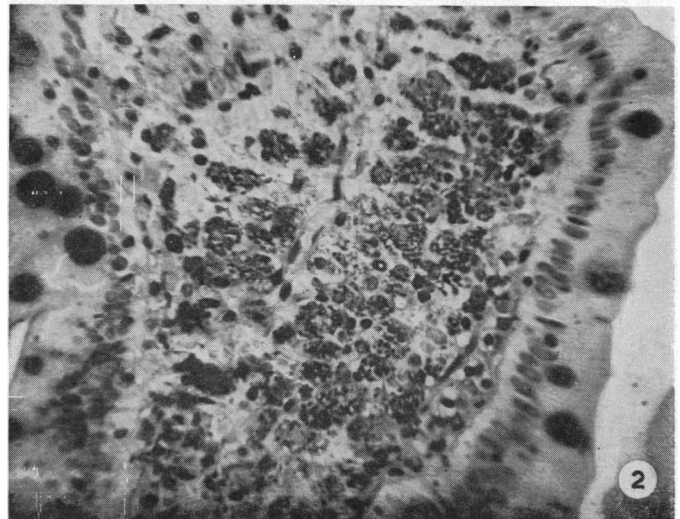
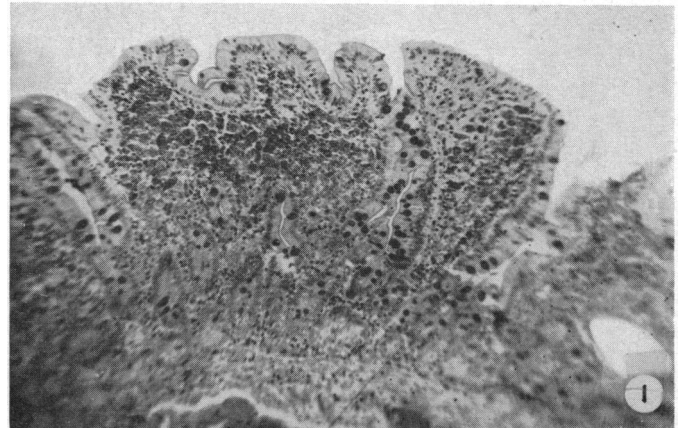


FIG. 1.—Case 1. The collection of blood-vessels from the right common iliac artery extend upwards into the hilum, filling the post-stenotic portion of the renal artery. The lower-pole branches of the right renal artery are now better opacified and look irregular. *Inset*: Retrograde aortogram demonstrating a small right renal artery which shows a localized constriction with post-stenotic dilatation of the vessel. Picture taken $\frac{1}{2}$ second before main picture.

FIG. 2.—Case 1. Excretory urogram taken 15 minutes later shows irregular indentations or scalloping of the right ureter in its upper and middle thirds. The indentations correspond exactly to the site of the tortuous vessels. Note the better concentration of the contrast medium on the right side.

FIG. 3.—Case 2. A delayed film following percutaneous aorto-renal arteriogram, showing periureteric collateral vessels on the right side (arrowed). Note the difference in size of the kidneys.

FIGS. 1 and 2.—Small-bowel biopsy, February 1963. (P.A.S. stain. Low and high power pictures.)

Ureteric Irregularity Due to Collateral Vessels in Renal-artery Stenosis

[WITH SPECIAL PLATE]

Brit. med. J., 1964, 1, 418

Several radiological signs as revealed by intravenous urography have been shown to be of considerable value in the diagnosis of hypertension due to renal-artery stenosis (Dustan *et al.*, 1959; Brown *et al.*, 1960; Poutasse, 1961). Less frequently seen on the urogram, however, is irregular scalloping of the ureter caused by periureteral collateral vessels augmenting the blood supply to the ischaemic kidney (Thomas and Levin, 1961; Woodard, 1962; Halpern and Evans, 1962). This radiological sign is of diagnostic importance and was seen in two of our patients with renal-artery stenosis. Both patients were asymptomatic and were found to be hypertensive during routine medical examinations. They had no family history of hypertension.

CASE 1

An 18-year-old Chinese girl had malignant hypertension with grade IV hypertensive retinopathy. All her peripheral pulses were palpable and equal and her blood-pressure was 250/180 mm. Hg. The heart was not enlarged and there were no murmurs. No bruit was heard over the abdomen. The electrocardiogram showed evidence of left ventricular hypertrophy. X-ray examination of the chest and abdomen revealed a normal cardiac shadow, but the right kidney appeared smaller than the left. A percutaneous retrograde aorto-renal arteriogram showed a marked narrowing of the right renal artery about 4 cm. from its origin, with post-stenotic dilatation of the vessel (Special Plate, Fig. 1 inset). A later film demonstrated retrograde filling of the post-stenotic portion of the artery from ureteric collateral vessels (Special Plate, Fig. 1). The renal pelvis and ureters were outlined in a delayed film, which showed irregular indentations and scalloping of the upper and middle thirds of the right ureter, the precise site of the collateral vessels (Special Plate, Fig. 2). The nephrogram showed that the right kidney (11.4 by 4.7 cm.) was smaller than the left (12.7 by 6.6 cm.).

At operation large collateral ureteric vessels were confirmed, and because of the peripheral site of the stricture a right nephrectomy was performed. She became normotensive three to four hours after operation, and when last seen 20 months later her casual blood-pressure reading was 130/80. Her fundal changes had regressed to normal.

Histology of the stenosed segment of renal artery revealed fibromuscular intimal proliferation, causing a narrowing of the lumen. The intrarenal arterioles, glomeruli, and tubules showed no abnormality.

CASE 2

A 20-year-old Chinese woman had been certified fit after a medical examination two years previously. On physical examination her blood-pressure was 180/110 and no other abnormal physical signs were found. No bruit was heard over the abdomen. Her fundi were normal. An electrocardiogram showed left-axis deviation. X-ray examination of the chest and abdomen revealed a normal cardiac shadow, but the right kidney appeared smaller than the left. Intravenous urography showed better opacification on the right side and irregular indentations of the upper part of the

right ureter. A percutaneous retrograde aorto-renal arteriogram demonstrated a gradual tapering of the main renal artery on the right side about 2 cm. from its origin, with marked stenosis of a small segment in the mid-portion, and post-stenotic aneurysmal dilatation of the artery. An aberrant renal artery was present on the right side, and this vessel also narrowed considerably about 2 cm. from its origin. The left renal artery showed irregularity of the lumen of the main trunk and its inferior segmental branch. A later film revealed large collateral vessels in close relation to the right renal pelvis and at the site of the upper part of the right ureter (Special Plate, Fig. 3). The marked difference in size of the kidneys was evident in the nephrogram.

A right nephrectomy was done. The renal arteries felt thickened and their lumina narrowed as compared with the renal vein. Coursing along the ureter towards the hilum were numerous dilated tortuous vessels corresponding to that seen on aortography. Histological sections revealed fibromuscular medial hyperplasia of the main as well as the aberrant renal artery. Sections of the kidney showed no pathological changes in the glomeruli and intrarenal arterioles.

Her blood-pressure returned to normal, and six months after operation was 130/90.

COMMENT

These cases demonstrate a characteristic sign which adds to the value of intravenous urography in the investigation of hypertension. The periureteral arterial plexus serves as an arterial communication between the renal artery and branches of the abdominal aorta (Sampson, 1904; Daniel and Shackman, 1952). These vessels are too minute to be seen on arteriography but become evident when they increase in size as collateral channels to the ischaemic kidney in the event of renal-artery occlusion (Thomas and Levin, 1961; Woodard, 1962; Halpern and Evans, 1962; Hunt *et al.*, 1962; Danaraj *et al.*, 1963) or in conditions such as chronic pyelonephritis, tuberculosis, and renal carcinoma (Boijesen, 1959; Boijesen and Folin, 1961).

Few conditions can cause ureteric irregularities as seen on urography, but if this radiological picture is associated with hypertension it should strongly suggest the diagnosis of renal-artery stenosis.

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