

HIGH INCIDENCE OF PROXIMAL RENAL ARTERY LESIONS IN ACCELERATED OR MALIGNANT HYPERTENSION

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Summary

From 1979 to 1983 we have prospectively performed in 50 patients with accelerated or malignant hypertension a total and selective renal arteriogram. Lesions of the proximal renal artery were found in 20 patients (40%), unilaterally in 15 (75%) and bilaterally in five (25%). Eleven patients underwent surgery (two nephrectomies and nine aorto-renal bypass) with good renal function results. Our study confirms a high prevalence of renovascular lesions in patients with accelerated or malignant hypertension.

Introduction

In hypertensive patients the incidence of renovascular hypertension is five per cent or less. Davis [1] has found in accelerated and malignant hypertension a prevalence rate of 48 per cent for renal artery disease corresponding to a rate of 23 per cent of renovascular hypertension. We wished to define the frequency of proximal artery lesions in such patients and to validate our reasons for undertaking systematic renal arteriography in these patients.

Patients and methods

From 1979 to 1983 we have investigated 50 consecutive patients with accelerated and malignant hypertension, 40 males (mean age 54 ± 10 years) and 10 females (mean age 51 ± 11 years). All patients had diastolic blood pressure >130 mmHg. The mean blood pressure was systolic 237 ± 28 (SD) mmHg and diastolic 139 ± 21 (SD) mmHg (range 185/130 to 300/180). Thirty-three patients had grade III fundi (accelerated hypertension) and 17 grade IV fundi (malignant hypertension). At the time of admission, the mean serum creatinine was 411 ± 323 (SD) $\mu\text{mol/L}$ (range 89 to 1250). Nine patients had a normal serum creatinine ($<150 \mu\text{mol/L}$) and four patients required immediate dialysis.

Renal angiography using the Seldinger technique with midstream and selective renal arteriograms (twofold magnification) was performed systematically in all patients. In some cases, the angiography was delayed because of advanced renal failure. A systematic wash-out was performed after arteriography to avoid acute renal failure due to contrast media.

In 41 patients, venous samples were obtained at the time of arteriography to measure renal vein renin activity. In addition, 20 patients had previous intravenous pyelography and 21 a DTPA renogram [2].

To measure the diagnostic value of presumptive criteria for renovascular hypertension the following indexes were used. The sensitivity (Se) is the frequency of a positive test in patients with renal artery disease. The specificity (Sp) is the frequency of a negative test in patients without renal artery disease. The positive predictive value (PPV) is the ratio between number of patients with renal artery disease and a positive test and total number of patients with a positive test. The negative predictive value (NPV) is the ratio between the number of patients without renal artery disease and with negative test and total number of patients with a negative test. PPV/1-NPV ratio, k, is the relative risk.

Results

Renal arteriogram Proximal renal artery lesions were found in 20 patients (40%), bilateral in five cases (25%) and unilateral in 15 cases (75%). They were the following: 16 stenosis (reducing the lumen more than 50%), four thrombosis, three dysplasia, one single aneurysm and one primary dissecting renal aneurysm. In the 30 remaining patients (60%) the arteriogram showed no proximal vascular lesions but only distal vascular lesions.

Renal vein renin activity (41 patients) RVRA asymmetry (ratio >1.5 between involved and non-involved kidney (Table I) occurred in 14 of 41 (34%) in the overall group, 10 of 19 (58%) in those with a positive arteriogram, nine of 15 (60%) patients with unilateral lesions and one of 15 (60%) patients with bilateral lesions. Four of 22 (18%) with a negative arteriogram group had a ratio >1.5 :

$$\begin{aligned} \text{Se} &= 0.53 \pm 0.15. & \text{Sp} &= 0.82 \pm 0.12 \\ \text{PPV} &= 0.71 & \text{NPV} &= 0.67. & k &= 2 \end{aligned}$$

Secretion rate: V-A/A ratio, V is RVRA and renin activity in the inferior cava below the renal vein [3].

In the positive arteriogram group, V-A/A >0.50 in the involved kidney is found in 13 of 17 (76%), 10 of 13 (77%) patients with unilateral lesions and three of four (75%) patients with bilateral lesions. V-A/A <0.25 in the non-involved kidney is found in nine of 17 (53%) patients, seven of 13 (54%) patients with unilateral lesions and two of four (50%) patients with bilateral lesions.

Asymmetry of secretion rate (ratio >2 between the involved and non-involved kidney) (Table I) was found in 13 of 39 (33%) in the overall group, 11 of 17 (65%) in the positive arteriogram group, 9 of 13 (69%) patients with unilateral

TABLE I. Validity of the presumptive criteria of renovascular hypertension

	Positive arteriogram	Negative arteriogram	Total
ARP >1.50	10	4	14
ARP <1.50	9	18	27
Total	19	22	41

V-A/A >2	11	2	13
V-A/A <2	6	20	26
Total	17	22	39

DTPA >1.50	9	4	13
DTPA <1.50	4	4	8
Total	13	8	21

lesions and two of four (50%) patients with bilateral lesions. There was asymmetry of secretion in two of 22 (9%) patients in the negative arteriogram group:

$$\text{Se} = 0.65 \pm 0.15. \quad \text{Sp} = 0.91 \pm 0.13$$

$$\text{PPV} = 0.85. \quad \text{NPV} = 0.77. \quad k = 3.69.$$

DIPA renogram (Table I) = ratio >1.50 between the non-involved and the involved kidney was found in 13 of 21 (62%) patients in the overall group, nine of 13 (69%) patients in the positive arteriogram group, in seven of nine (78%) patients with unilateral lesions and two of four (50%) patients with bilateral lesions. A ratio was found in four of eight (50%) patients in the negative arteriogram group:

$$\text{Se} = 0.69 \pm 0.19. \quad \text{Sp} = 0.50 \pm 0.21.$$

$$\text{PPV} = 0.69. \quad \text{NPV} = 0.50. \quad k = 1.38.$$

The initial serum creatinine was not significantly lower in the positive arteriogram group ($347 \pm 308 \mu\text{mol/L}$) than in the negative arteriogram group ($458 \pm 324 \mu\text{mol/L}$).

Eleven patients with a positive arteriogram underwent surgery 3.7 ± 2.8 months after the diagnostic procedure (two nephrectomies and nine aorto-renal bypass). The surgical patients did not differ from those treated by medical means with respect to RVRA, V-A/A ratio, DTPA asymmetry. No surgical patient died. For nine of the 11 patients we have a follow-up of 36 ± 14 months. At this time the average blood pressure is 166 ± 19 (SD)/ 99 ± 7 (SD) mmHg with 3.4 ± 0.5 antihypertensive drugs per patient. The average serum creatinine is 119 ± 26 (SD) $\mu\text{mol/L}$ and all patients are free from dialysis.

Discussion

The present study demonstrates a very high incidence of proximal renal artery lesions (40%) in this group of patients with accelerated and malignant hypertension.

Twenty-five per cent of the lesions are bilateral. This fact decreases the sensitivity of renal vein renin as a lateralization predicting test. The classic presumptive criteria for renovascular hypertension such as renin secretion lateralization detect no more than 50 per cent of renovascular hypertension. Using a V-A/A ratio, the sensitivity reaches 65 per cent. In the long term, the nine patients with aorto-renal bypass have a good result, especially in regard to renal function.

In summary, systematic renal arteriography is of great value in accelerated and malignant hypertension.

References

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- 2 Gonthier R, Champailler A, Juge J et al. *Nephrologie* 1984; 5: 21
- 3 Vaughan E, Buhler F, Laragh H et al. *Am J Med* 1973; 55: 402