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Clinical and Histological Studies on the Effect of Large Doses of Roentgen Contrast Media in Renal Arteriography

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ABSTRACT

A newly synthesized dimer Ph DZ 59B and Angiografin were used in high doses in renal angiography. The two contrast media appeared to have no clinical effects. Light microscopy shows no changes from the radiographic agents in the kidneys removed due to carcinoma.

Modern iodine-containing roentgen contrast media for intravascular use are eliminated largely through the kidneys. Only small amounts are eliminated via other pathways, such as the liver, intestines, salivary glands, etc. It is therefore of interest to study the effect on the kidney of large doses of roentgen contrast media in man in connection with arteriographies and angiocardiographies. Effects can be expected to be seen primarily when large doses of contrast media have to be excreted. In previous reports various effects of roentgen contrast media on the tubuli of the kidney have been described in patients given large amounts of contrast media (1, 2). Similar changes have also been demonstrated in animal experiments following injec-

Table I. *Patients with ca renis unilat, investigated by Ph DZ 59B and Angiografin. The contrast medium is injected in aorta abd. and selectively in the renal artery on the diseased side*

No.	Age	Sex	Weight (kg)	Aortic inj. ml	Selective inj. ml	Type of contrast medium	Obs. time (days)
1	47	♂	72	70	60	Ph DZ 59B	1
2	70	♀	–	60	12	Angiografin	8
3	62	♂	62	70	70	Ph DZ 59B	5
4	48	♂	75	40	50	Ph DZ 59B	2
5	68	♂	85	30	20	Ph DZ 59B	12
				45		Angiografin	
6	64	♂	54	40	50	Ph DZ 59B	5
7	49	♀	68	30	35	Ph DZ 59B	5
8	36	♀	60		15	Ph DZ 59B	6
				45	45	Angiografin	
9	64	♀	61	35	50 sin	Angiografin	8
					12 dx	Angiografin	
10	40	♂	65	70	100	Ph DZ 59B	6
11	69	♂	75	80	80 sin	Ph DZ 59B	inop. (6)
					15 dx (cavografi)	Angiografin	
					60 (cavografi)	Angiografin	
12	40	♀	52	75	90	Ph DZ 59B	inop. (6)
					70 (cavografi)	Ph DZ 59B	
13	59	♂	70	70	80	Angiografin	13
14	69	♀	56	75	85	Angiografin	14
15	54	♂	53		60	Angiografin	9
16	70	♂	70		50	Angiografin	11

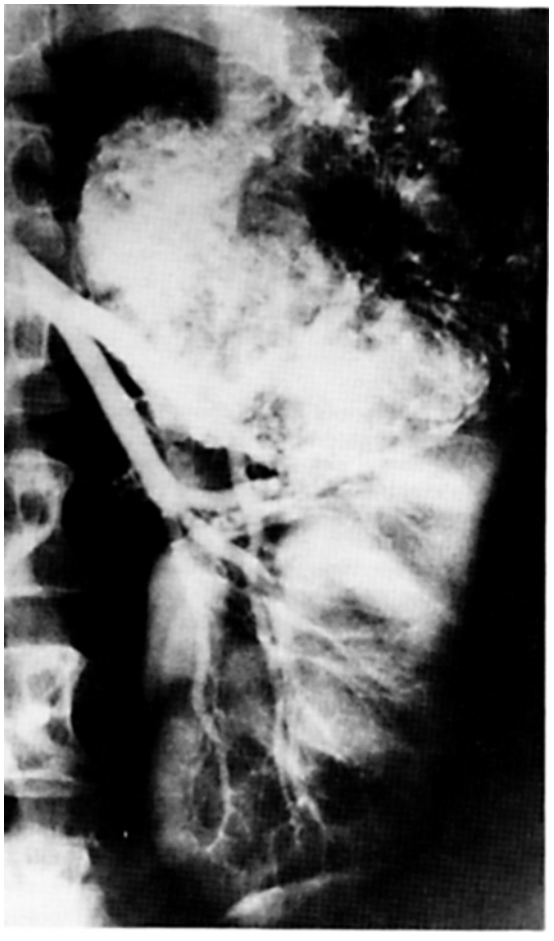

Fig. 1. Arterial phase in selective renal arteriography in a 40-year-old man with renal cancer. 70 ml of Ph DZ 59B (Pharmacia) were injected; 10 ml/sec. Case 10.

tion of large doses of modern vascular roentgen contrast media (2).

We considered needle biopsy of the normal part of the kidney unjustified. We therefore decided to study the morphology of the non-tumorous part of the kidney in patients with renal carcinoma, where the kidneys were removed within a few days following renal arteriography.

MATERIAL

The material consisted of 16 patients, 10 men and 6 women, 36 to 70 years old and weighing 52 to 85 kg. All patients had carcinoma of the kidney which had been suspected on previous intravenous urography, performed on the average 15 days before the angiography. A dose of 40 ml Urografin 60% was given intravenously.

METHODS

All patients underwent selective renal arteriography and renal aortography. The transfemoral route and the Seldinger technique were used for the catheterization. The total amount of contrast medium injected into the aorta varied from 30 to 80 ml and the total amount injected selectively into the renal arteries varied from 12 to 100 ml (Table I). A relatively large amount of contrast medium was used in the selective injections in order to visualize the renal vein. Two contrast media were employed: Ph DZ 59B with an iodine content of 235 mg/ml (Björk, Erikson & Ingelman, 1969) (4) and Angiografin (Schering AG, Berlin), with an iodine content of 310 mg/ml. In 7 cases only Ph DZ 59B was used, in 3 cases both Ph DZ 59B and Angiografin, and in 6 cases only Angiografin (Table I). Two patients were inoperable, and from these patients no specimen for histology were taken.

After an interval of one to 14 days the other patients were operated on and the carcinomatous kidney removed. Approximately 5 mm thick slices were immediately cut from the normal part of the kidney and fixed in 10% formaldehyde. Using a conventional histological technique and hematoxylin-eosin staining, slides were prepared and studied in a light microscope.

RESULTS

The clinical results of the angiographic examinations, both with Angiografin and Ph DZ 59B, were excellent in all cases from an angiographic point of view (Figs. 1 and 2). No adverse effects of the con-

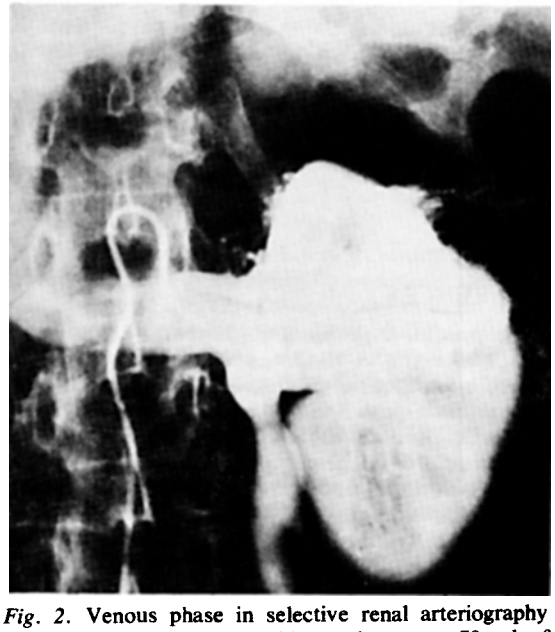

Fig. 2. Venous phase in selective renal arteriography in a 69-year-old woman with renal cancer. 70 ml of Angiografin (Schering) were injected; 10 ml/sec. Case 13.

trast agents were noted in these series and not even high doses disturbed the kidney function:

Histological examination. There was no evidence of damage to the tubular epithelium from the roentgen contrast agent in any of the kidneys.

Some slight chronic inflammatory changes and some slight signs of nephrosclerosis were seen in a few kidneys. Such changes are not uncommon, however, especially in elderly patients.

DISCUSSION

Even with the relatively large doses of contrast media injected selectively into the renal artery in these patients (up to 3 ml/kg body weight), no histological changes were noted in the kidneys. This seems to indicate that at this dose level the two contrast media used cause no permanent damage to the human kidney. This does not exclude the possibility, however, that renal damage may result from larger doses of contrast media. Previous reports on newborn children with congenital heart disease indicate that this can occur (2). It should also be noted that none of our patients had any clinical signs of impairment of the renal function. It is possible that patients with poor renal function may be more sensitive to renal damage following injection of roentgen contrast media. Using needle biopsy, Michel & Moreau (3) observed osmotic nephrosis in 6.5% of patients who had undergone urography and angiography with conventional commercially available contrast media.

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