BLOOD-PRESSURE CHANGES DURING ANGIOCARDIOGRAPHY

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In view of the increasing number of accidents reported as a result of angiocardiology, further information about changes occurring in the circulation after the injection of diodone for this purpose would seem to be of interest. Below are reported changes in blood pressure recorded during routine angiocardiology.

Material and Methods

Six cases were investigated, in five of which an intracardiac shunt was demonstrated (Table I). The cases were subjected to routine procedures used for angiocardiology at the National Heart Hospital for the purpose of diagnosis. All the subjects were non-reactors to iodine-sensitivity tests. Each case was premedicated, and five were lightly anaesthetized before diodone injection. Continuous blood-pressure records were taken from the brachial or femoral artery, using a condenser manometer (Hansen, 1949).

Results

A conspicuous fall in blood pressure occurred in every case following the injection of diodone (Table II). Typical

TABLE I.—Details of Cases

Case	Age Sex	Diagnosis	Premedication	Anaesthetic	Injection 70% Diodone	Remarks
1	38 M	Pulmonary hypertension from chronic bronchitis and bronchiectasis	Quinidine sulph., 5 gr. (0.32 g.) Atropine sulph., 1/100 gr. (0.65 mg.) Morphine sulph., $\frac{1}{4}$ gr. (16 mg.) "Benadryl," 50 mg.	Nil	55 ml.	
2	6 F	Fallot's tetralogy	"Avertin" p.r., 0.1 ml./kg. b.w. Atropine sulph., 1/100 gr.	Thiopentone i.v. Procaine i.v.	25 ml.	Respiration increased in depth for about two minutes
3	11 F	Pulmonary stenosis. Atrial septal defect	Quinidine sulph., 3 gr. (0.2 g.) "Omopon" 1/6 gr. (11 mg.) Scopolamine, 1/300 gr. (0.2 mg.)	Thiopentone i.v. Procaine i.v.	45 ml.	Slight breath-holding immediately after injection
4	21 F	Fallot's tetralogy	Quinidine sulph., 5 gr. Atropine sulph., 1/50 gr. (1.3 mg.) Omopon, 1/3 gr. (22 mg.)	Small doses of intravenous thiopentone and procaine	52 ml. 45 ml.	Not anaesthetized; sedated. Blood-pressure records successful with second injection only. Respiration quicker; moved slightly after injection
5	11 M	Pulmonary atresia. Ventricular septal defect	Omopon, 1/6 gr. Atropine sulph., 1/100 gr.	Thiopentone i.v. Procaine i.v.	37 ml. 37 ml.	Momentary breath-holding on injection. B.P. records on second injection
6	5 M	Pulmonary atresia. Ventricular septal defect	Thiopentone p.r., 0.6 g. Atropine sulph., 1/100 gr.	Thiopentone i.v. Procaine i.v.	20 ml. 20 ml.	Recordings from femoral artery during both injections

TABLE II.—Showing the Effects of Diodone Injection on the Blood Pressure

Case	Time After Injection of Diodone (Blood Pressure in mm. Hg)									Remarks
	Before	30 sec.	50 sec.	1 min.	1½ min.	3½ min.				
1	Before 147/77	30 sec. 110/60	50 sec. 80/50	1 min. 87/58	1½ min. 120/70	3½ min. 137/77				Delay of approximately 20 seconds after injection before B.P. fell. Resting heart rate 90, increasing to 150 at 1 minute
2	Before 108/69	30 sec. 60/35	1 min. 63/38	2 min. 72/44	3 min. 88/58	4 min. 118/75				Delay of about 9 seconds before B.P. fell. Cardiac irregularities and arrhythmias (Fig. 2)
3	Before 104/75	20 sec. 90/62	30 sec. 68/46	50 sec. 59/44						Delay of approximately 13 seconds before B.P. fell
4	—	—	—	—	—	—				1st injection: B.P. fell, but bad record
	Before 169/86	20 sec. 123/66	30 sec. 95/53	1 min. 111/63	1½ min. 132/72	2 min. 150/83	2½ min. 165/93	4½ min. 178/76		2nd injection: Delay of approximately 12 seconds before B.P. fell. Nodal rhythm at rest
5	—	—	—	—	—	—	—	—	—	1st injection: No record taken
	Before 100/70	10 sec. 80/64	1 min. 50/43	4 min. 70/53	7 min. 78/58					2nd injection: Delay of 6-7 seconds before B.P. fell
6	Before 110/69	At inj. 94/64	30 sec. 57/38	1 min. 40/32	1½ min. 40/34	2½ min. 45/34	3 min. 50/36	3½ min. 50/38	12 min. 108/74	Arrhythmia began 30 seconds after injection, when B.P. had already fallen
	Before 148/85	20 sec. 107/55	30 sec. 88/45	1 min. 90/45	1½ min. 95/52	2½ min. 98/55	3 min. 112/64			Delay of about 8 seconds. No cardiac irregularities

FIG. 1.—Case 1. Blood-pressure record from the brachial artery following injection of diodone (indicated by arrow). The interference on this and subsequent records is due to vibration of the cassette changer. A was taken 1½ minutes after injection with the same zero level; B at about 3 minutes with a different zero. Time (top tracing) in seconds. Calibrations in mm. Hg. The E.C.G. is also shown.

FIG. 2.—Case 2. The arrow indicates the moment of diodone injection. The effect is recorded on femoral arterial pressure and later the E.C.G. A was taken 2½ minutes after injection, B about 5 minutes. Time in seconds.

examples are shown in Figs. 1, 2, and 3. The fall in blood pressure was not immediate, but was delayed for approximately 6 to 20 seconds after injection. The duration of the low-blood-pressure state varied from case to case. The fall in arterial pressure was neither so striking nor so prolonged after the second injection as after the first in Case 6,

FIG. 3.—Case 3. Slight breath-holding followed injection (indicated by arrow). Arterial blood pressure fell. Time in seconds (bottom of tracing). Interference on the E.C.G. was caused by angiocardio-gram time switch. Signals refer to fall of x-ray plates.

in which two sets of angiocardio-grams were taken. The pulse pressure decreased in all cases as the blood pressure fell.

Little or no rise in blood pressure was associated with the sudden injection of diodone. A control injection of saline, given in the same bulk and at the same rate as that of diodone, produced no change in blood pressure (Fig. 4).

FIG. 4.—Case 2. Control injection of saline, injected at same rate and in same bulk as diodone, produced no effect on blood pressure or E.C.G.

Cardiac irregularities occurred following diodone injection in Cases 2 and 6 (first injection) (Table II). In Cases 1, 3, 5, and 6 (second injection), however, there was no obvious irregularity, though a conspicuous fall in blood pressure took place.

Discussion

The mechanism of the fall in blood pressure is at present undetermined. It would seem to be independent of sudden injection of fluid bulk, since a control injection of saline did not produce it. The time interval existing between the injection and the fall in arterial pressure suggests a peripheral action of diodone, either directly on the arterioles or indirectly through sino-aortic or other reflex mechanisms. Intra-arterial and, to a lesser extent, intravenous injection of diodone has been shown by indirect methods to give rise to vasodilatation in the dog hind-limb, both direct and reflex mechanisms being involved (van der Linden, 1942). The effect of diodone on cardiac output has not been determined. The electrocardiogram, in spite of a considerable fall in blood pressure, may remain unchanged throughout the procedure.

Summary

Continuous blood-pressure records were obtained in six cases during angiocardio-graphy.

There was a conspicuous fall in blood pressure in every case.

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REFERENCES

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van der Linden, P. C. (1942). *Arch. int. Pharmacodyn.*, 67, 14.

An American research organization is helping to establish a new research institute dealing with tropical medicine in equatorial Africa. It is being built at Harbel, in Liberia, on land given by the Liberian Government. The institute will include laboratories for research in the causes of tropical diseases and their effects. Studies will also cover tropical husbandry and agriculture, with emphasis on food staples for men and animals. A committee representing medical schools and commercial groups in the United States has already recommended a number of study projects. Dr. Elmer Berry, of the U.S. Public Health Service, is acting director of the institute, and is supervising the construction of the research laboratory. He will also direct its first project, which is to be the study of schistosomiasis. At the same time he will test various means of controlling carriers of the disease. In the course of this work he will visit French West Africa, the Gold Coast, Sierra Leone, Nigeria, French Equatorial Africa, the Belgian Congo, Tanganyika, Kenya, Uganda, and Northern Rhodesia. Research at the institute will be supervised by the U.S. Public Health Service.