As the artery was being freed from adjacent tissues by gentle dissection with Lahey swabs it started pulsating, but this was minimal and just perceptible at the wrist. A solution of 1 in 80 papaverine sulphate was applied to the surface of the artery in the form of drops. The artery visibly dilated and pulsation became stronger. The vasa vasorum filled and the surface of the vessel became pink. At this stage the pulse was readily perceptible at the wrist and colour returned to the hand and forearm. The papaverine was then washed off with saline and the skin sutured directly without any attempt being made to close the incision in the bicipital aponeurosis. Cotton-wool was loosely bound around the wound and the patient was returned to the ward.

The resected specimen of the median cubital vein was examined. There was a puncture wound in the superficial part of the vein through which the infusion had been given, but the deep surface showed no signs of trauma or any indication that the needle had transixed the vein and so possibly impinged upon the artery.

The next day the patient felt quite well apart from "soreness" of the tip of his left index finger. There was an area of brownish-black discoloration, about $\frac{1}{4}$ in. (6 mm.) in diameter, at the tip of the left index finger. This was slightly tender to touch. There were no other relics of the arterial spasm that had occurred a few hours before.

Comment

Spasm of the main artery of a limb is a well-recognized condition which may follow trauma to the arterial wall. This trauma may be caused by the passage of shrapnel or bullets close to the artery, as described in the cases of Küttner and Baruch (1920), or may occur during an operation in which there has been some manipulation of an artery. It may follow supracondylar fractures of the humerus, and Griffiths (1940) has brought much clinical and operative evidence to show the importance of this phenomenon in the development of Volkmann's ischaemic contracture. Griffiths quotes a case in which a tourniquet was accidentally left in place for six hours; 18 hours later, the symptoms of ischaemia persisting, the limb was explored and the femoral artery was found to be in a state of spasm. It has also been known to occur as a complication of arteriography, but most of these cases are instances of true primary thrombosis (G. J. Hadfield, 1952, personal communication).

The case reported here is interesting because the trauma to the artery, if existent at all, must have been minimal. The induction of the infusion appeared to be smooth. The patient was not restless, and therefore it is unlikely that he moved his own arm during the infusion and so traumatized the artery. The operation revealed no signs that the artery had been injured, apart from the small area of redness in its wall, and this could possibly have been an artifact occurring as a result of freeing the artery by dissection. It is interesting to speculate whether the presence of saline, at a lower temperature than that of the blood, passing through a vein close to an artery could have any adverse effect on the arterial wall.

Kinmonth (1952) has shown that in rabbits a gradual fall in blood pressure is associated with a parallel shrinking of large arteries. If we can postulate this state of affairs in man, then in post-operative shock, a condition associated with a fall in blood pressure, it is possible that there is an increased susceptibility to spasm of large arteries. This may apply to the case described above. The spontaneous termination of the intravenous infusion may be explained on the basis of venous stasis due to an impaired arterial supply leading to an impaired venous return.

This case is also of interest because it shows that, in common with many previously reported cases of arterial spasm (Cohen, 1940), mere exploration and freeing of the vessel was enough to restore some degree of blood flow to the limb.

The treatment employed in this case—namely, the local application of papaverine sulphate—is of interest in view

of the experiments recently carried out by Kinmonth (1952). Various smooth-muscle-relaxing agents were tested for their ability to relieve arterial spasm. It was shown that papaverine was the most consistently successful in producing relaxation, which did not retrogress when the drug was removed.

I wish to thank Mr. A. E. Roche for permission to publish details of the case. I am also indebted to Mr. G. J. Hadfield for helpful advice and to Mr. J. C. B. Serjeant, who operated for the arterial spasm.

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PHAECHROMOCYTOMA WITH FATAL MYOCARDIAL INFARCTION IN A MAN AGED 22

BY

W. M. PRIEST, M.D., M.R.C.P.

Physician, No. 14 South Warwickshire Group

Phaeochromocytoma is being reported with increasing frequency; about 194 cases were recorded up to 1950 (Walton, 1950), and four more have been described in the *British Medical Journal* alone in the past year (Swan, 1951; Crowther, 1951; Pantridge and Burrows, 1951). Nor is myocardial infarction in young persons rare enough to merit the report of a single case, several series having been published since 1937 (Scott, 1938; French and Dock, 1944; Newman, 1946, 1951). Myocardial infarction in a young hypertensive subject with phaeochromocytoma might occasionally be expected to occur, but I have been able to find only two references to this combination (Goldenberg *et al.*, 1947; Wilkins *et al.*, 1950).

The following case is remarkable for the short period of disability, the patient having remained at work, apart from two brief intervals (one for hospital investigation), until ten days before death; the degree of cardiac enlargement; and the evidence of multiple myocardial infarcts, old and recent.

Case History

The patient, a farm-worker aged 22, had been subject to severe headaches for two years. While fielding at a cricket match he collapsed, with burning substernal pain, and was taken home, where he remained in the care of his doctor for four days. The pain subsided in a few hours, but on the fourth day he showed evidence of left ventricular failure. Orthopnoea and cyanosis were present, the pulse was 130, the apex beat was in the sixth space in the mid-axillary line, and there was presystolic gallop. Basal rales were heard and the blood pressure was 136/120.

On his admission to hospital an x-ray film of the chest, sitting, showed gross cardiac enlargement and some pulmonary congestion (Fig. 1); and an E.C.G. showed the changes of a posterior infarction. He improved for four days; there was no further pain, the dyspnoea and cyanosis had subsided, the pulse rate fell, and the gallop became inaudible. He died abruptly on the fifth day after admission, the tenth after his collapse on the cricket field. Death was instantaneous and not associated with unusual movement or effort.

Earlier History.—He had lived and worked on a farm all his life, and, apart from what were described as occasional "sick headaches" in adolescence, had had good health.

playing football and cricket regularly till the onset of his terminal illness. At the age of 20, however, his headaches had become more frequent and severe. Mainly frontal, they began mid-morning, continuing all day. Occasionally he vomited, and sometimes had black spots in front of his eyes. When he first sought advice the headaches were occurring once or twice a week; his blood pressure was then found

FIG. 1.—Radiograph of the chest taken in the sitting position with portable machine.

to be elevated, and he was referred to the General Hospital, Birmingham, in August, 1947. He was there seen to be a well-built healthy-looking young man of 12 stone (76.2 kg.) (having lost 2 stone (12.7 kg.) in the last six months). His blood pressure varied between 160 and 240 systolic and 120 and 160 diastolic. The apex impulse was $1\frac{1}{2}$ in. (3.8 cm.) outside the mid-clavicular line, and, apart from an accentuated aortic second sound, the heart was normal. The retinal vessels were somewhat narrowed and tortuous, but no other changes were seen. Full investigation of renal function, including intravenous pyelography, showed no evidence of impairment. X-ray films showed some prominence and widening of the aorta but no obvious increase of the cardiac shadow. Intravenous tetraethylammonium bromide, 500 mg., produced a rise in blood pressure from 184/138 to 240/184, reverting to the previous level in 11 minutes; there was no rise in skin temperature of the legs. Amytal-depression and cold-pressor tests gave no significant response. The patient was considered unsuitable for lumbodorsal sympathectomy, and was discharged.

In 1948 he remained fairly well apart from headaches about once a week, but he began to have profuse sweats. In March, 1949, his doctor had noted some cardiac enlargement, a mitral systolic murmur, a pulse rate at times of 120, and a blood pressure on one occasion of 170/150. Two months before his final collapse he had a sudden attack of "weakness of the legs and faintness" while out in the fields rabbit-catching; thereafter he remained active until his coronary occlusion in June.

Post-mortem Findings

Heart.—The pericardial sac contained blood-stained fluid. The heart, when removed from the body and freed from clot, weighed 800 g., the increase in size being largely due to left ventricular hypertrophy. There was an area of scarring and fibrosis in the lateral part of the left ventricular wall and a recent infarction of the posterior wall. At the apex of the left ventricle there were three small-areas of

haemorrhagic infarction. Atheromatous plaques with adherent thrombi were present in the much-narrowed coronary arteries.

Suprarenals.—The left suprarenal was represented by a tumour weighing 20 g. and measuring 6 cm. in greatest diameter. It presented a smooth external surface; the cut surface showed a yellowish semi-translucent central area surrounded by a narrow more whitened cortical zone. Some tiny flecks resembling lipid material were discernible; there was no resemblance to normal suprarenal tissue.

Kidneys.—These were normal macroscopically and microscopically.

Microscopical examination of the suprarenal tumour (Fig. 2) showed that it was made up of large epithelioid cells arranged in groups. They were irregular and polygonal, with some vacuolation, and many of the outlines were indistinct. Nuclei were hyperchromatic, and multinucleate forms were present; there was a general superficial resemblance to the cells in the zona fasciculata. The tumour was firmly encapsulated and showed no invasive properties. Placed in chrome cell fixative, it showed typical macroscopic brown coloration; sections of this material revealed a number of cells with chromaffin granules not visible in tissue fixed in formalin. The latter, however, showed the presence of much argyrophil substance. No attempt was made to assay for pressor substances.

FIG. 2.—Suprarenal tumour, showing prominent vessels with perivascular distribution of cell-columns; many large cells, some multinucleate, are visible. No granules. (H. and E. $\times 180$.)

Morphologically the tumour conformed to standard descriptions (Willis, 1948; Brines and Jennings, 1948; Pinniger and Brown, 1949). In the present instance chromaffin granules could be found by diligent search: their incidence varied greatly even in adjacent cells.

Comment

In adolescence this young man had suffered headaches originally thought to be migrainous; when he was 20 they became severe and led to the discovery of hypertension. At this time there was nothing to suggest the adrenal-sympathetic syndrome; after investigation it was decided that sympathectomy was unlikely to benefit him, and the adrenal tumour escaped detection. In the absence of suggestive symptoms the diagnosis of these tumours is difficult, and had splanchnic resection been attempted, as in Swan's case, the tumour might have been found and successfully removed. Smithwick, quoted by Goldenberg *et al.* (1947), found five cases of phaeochromocytoma among 1,000 hypertensive subjects sent to him for sympathectomy; several authorities have recently emphasized that all young and middle-aged hypertensive subjects should be investigated with this in mind; it may become easier in future with the aid of agents such as "piperoxane." Until lately many of the reported cases, like that recorded here, were diagnosed only after death. The earlier investigations in this case, however, do provide retrospective clues to the true diagnosis—namely, the absence of response to depression and cold-pressor tests, and the rise in blood pressure with T.E.A.B.

The first symptom really suggestive of an adrenal medullary tumour—profuse sweating—appeared a year after the hospital investigations had been done, and seems to have

been associated by the patient with exertion; for this reason, presumably, no special attention was paid to it. Questions put to his mother after his death revealed that the sweats were not related to effort. The only other suggestive feature in his history, also elicited after death, was a single attack of "weakness and shaking of the legs," and no further details of this episode are available. The symptoms as known before death were compatible with essential hypertension, which was presumed to have caused the coronary occlusion.

The cardiovascular syndrome, of which this case is chiefly an example, may occur at all ages, mostly from 20 to 50 (Mackeith, 1944). While in hospital in 1947 the patient showed fairly wide fluctuations in pressure, but they lay within the range of variation recognized in essential hypertension and were unassociated then with other features suggestive of hyperadrenalinism. In the subsequent two years of his life blood-pressure readings were infrequent and showed only minor fluctuations in a sustained hypertension. Williams (1950) states that "patients (with phaeochromocytoma) showing persistent elevation of blood pressure may have all the anatomical and symptomatic complications that go with hypertension." None the less, reports of frank coronary occlusion in such patients seem to be rare, and death has usually been recorded as due to cerebral vascular accident, acute left ventricular failure, and renal or hypertensive failure (Green, 1946; Walton, 1950). Wilkins *et al.* (1950) report a case of myocardial infarction following removal of the tumour, diagnosed by E.C.G. in a man of 22 who survived; Goldenberg *et al.* (1950) report one in which infarction was believed to have occurred two years before diagnosis of the tumour.

The reported series of coronary occlusions in young adults (French and Dock, 1944; Newman, 1946, 1951; Reich, 1948) make only brief reference to hypertension because most of the deaths occurred suddenly in apparently healthy men and few previous records of blood pressure were known: the true incidence of hypertension and its relation to coronary disease in the young is uncertain. Phaeochromocytoma was not found in any of these recorded series.

The size of the heart in hypertensive heart disease seems to depend rather on the duration of heart failure than on the duration or degree of hypertension (Harrison and Wood, 1949). My patient showed gross cardiac enlargement, mainly due to left ventricular hypertrophy developing during his last two years of life, since the x-ray film taken in 1947 showed no appreciable increase in heart size. It is a remarkable feature of the case that there was little evidence of failure before the fatal coronary occlusion which occurred on the cricket field, and the patient had followed a normal working life (including games) up to that time.

I am indebted to Dr. A. P. Prior for the post-mortem report and the photomicrograph; to Professor F. A. R. Stammers for details of the earlier investigations; and to Dr. C. L. Wharton, of Kineton, for the patient's medical record while under his care at home.

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NYSTAGMUS AND OTHER EYE SIGNS IN ACUTE ALCOHOLISM

BY

DENYS E. HOWELLS, M.B., B.S., M.R.C.S.

Member of the Association of Police Surgeons of
Great Britain

Clinicians often find it difficult to decide whether or not a patient is under the influence of alcohol. The difficulty lies in the fact that the physical signs vary from patient to patient and may be different in the same individual when seen in similar circumstances a second time. The suffused conjunctiva, the dilated pupil, and its sluggish or absent reaction to light have long been used to support an opinion that a given clinical picture was due to alcohol, but little has been said of any other eye signs.

In view of this it was decided to examine in retrospect a random selection of 40 subjects, known or suspected to have taken alcohol, in order to discover the number who exhibited nystagmus or nystagmoid jerks. For the purpose of classification nystagmus was regarded as having a slow component in one direction with a fast return to the opposite, which persisted so long as the subject continued to look at the examiner's finger. The nystagmoid jerks, however, were smaller and faster oscillations in which the components were equal in speed and the phenomena lasted for only a limited time but could be re-established by getting the subject to look ahead and then return his gaze to the examiner's finger.

Source of Clinical Evidence

The material was taken from notes made during the examination of persons believed to be driving motor-vehicles whilst under the influence of alcohol. All the examinations were carried out by me, and took place at four police stations in two divisions of the Metropolitan Police District. Each case was examined in the same manner, details of name, age, address, occupation, and relevant medical history being taken. An attempt was made to get a detailed account of how the previous six hours had been spent, with special emphasis on the events leading up to the arrest. This was then followed by a clinical examination. The emotional upset caused by the arrest and subsequent attendance at a police station produced a rapid sobering effect in some cases, which continued through the period of questioning. It was decided, however, in spite of a possible modification of physical signs, to continue this method of approach because without such initial questioning personal contact between the examiner and examinee was impossible and full co-operation in the examination could not be obtained.

Clinical Findings

Of the 40 cases examined 39 freely admitted taking alcohol. One (Case 38) denied it, and was subsequently found to be suffering from the effects of excessive fatigue and extreme chilling after sleeping in the cab of his truck in mid-winter. Of those examined, 37 were civilians and three (Cases 7, 16, and 23) were members of the United States Armed Forces based in England. All save one (Case 13) spoke English; the exception was a Pole, who was examined with the help of an Italian and later a Polish interpreter.

In testing for nystagmus the patient was asked to follow with his eyes the examiner's index finger first to the extreme right and then to the extreme left. Of the 40 cases examined 16 exhibited a lateral nystagmus and a further 13 showed nystagmoid jerks. Ten of the cases with nystagmus were associated with dilated pupils which did not react to light.