A CASE OF ABDOMINAL ANEURYSM WITH UNUSUAL FEATURES, OPERATED ON BY MEANS OF COLT'S APPARATUS.*

BY

J. RUPERT COLLINS, M.A., M.D.DUB.,
PHYSICIAN, CHELTENHAM GENERAL HOSPITAL,
AND

C. BRAINE-HARTNELL, F.R.C.S.EDIN.,
SURGEON, CHELTENHAM GENERAL HOSPITAL.

C. P., aged 41, had all his life been a farm labourer, and had enjoyed good health with the exception of having attacks of "indigestion" and being subject to colds. During the past twelve months he had lost weight and had lately been troubled with obstinate constipation.

He was at full work up to the day of his present illness and was accustomed in the course of his work to carry a sack of meal weighing 2½ cwt. On March 26th, 1912, he was at his work as usual when he was seized with what he described as a pinching pain which doubled him up and caused him agony. He went home to bed; his wife applied hot fomentations and the pain became less. The next morning he was feeling so well that he started out to work, but as soon as he began to labour he was seized with the same pain as previously and soon after vomited some green fluid. He returned to bed, and on April 2nd was sent into hospital on an ambulance as a case of acute appendicitis. He was admitted to the surgical ward and on the following day we saw him together, and he was transferred to the medical side.

The man was very pale, sweating, and in considerable pain, which he located as gripping him right across the abdomen above the umbilicus and going into his back. The temperature was 100° and the pulse 66. The right side of the abdomen was contracted but was not hard. There was a little tenderness to palpation over the right hypochondrium, but no tenderness. Any attempt at deep palpation produced contraction of the abdominal muscles. The area of cardiac dullness was enlarged, the apex beat was in the sixth space in the nipple line, and the blood pressure was 115 mm. of mercury. The knee-jerks and pupil reflex were normal. The urine contained a few red blood cells. The leucocyte count was under 8,000 on the three occasions on which it was examined, the haemoglobin was 100 per cent.

He was ordered belladonna suppositories and hot fomentations to the abdomen. On the following day he was much easier and the abdomen less contracted. For the next few days he felt so much better that he asked each day to be allowed to go home and resume his work. On April 6th he passed some bright blood with a motion, and had a considerable amount of pain, for which he was

given morphine. The pains now were more severe, and occurred more frequently; they were always in the same region, and he thought that the pain in the back was worse than the pain in the abdomen. On admission he lay on his left side, but later preferred to lie on his right side or on his back. The abdomen was always flatulent, and palpation was accompanied by much gurgling. The stomach was dilated.

The least exertion, as turning in bed, was liable to evoke paroxysms of the most acute pain, which rendered him pallid and perspiring. On two occasions he was in a bad attack of pain when one of us entered the ward, and the pain ceased on palpating the abdomen. The pain would come on suddenly and leave him abruptly, and, though he was an extremely plucky man, he suffered at times severely, in spite of receiving one-sixth of a grain of morphine every six hours.

We could now make out a swelling in the right hypochondrium, below the ninth costal cartilage, and wholly to the right of the middle line; the tumour pulsated, and though it was difficult to say whether the pulsation was distensible, we thought it was. A loud single sound, systolic in time and impure in character, but not harsh enough to be termed a bellows murmur, was audible over the swelling and along the spinal column. We made an entry in the notes that we were surprised to find that the pulse in the dorsalis pedis, could not be felt on the right, but easily on the left. On the following day (April 14th) the right leg and foot became oedematous. There was no sign of oedema in the left foot until April 28th, two days before the operation, when it too became oedematous. On April 14th the collateral circulation was evidenced by the distension of the right epigastric vein and by little patches of dilated venules on the right side below the costal arch. The temperature continued irregularly febrile in character. Constipation was difficult to treat, as anything in the nature of laxatives by the mouth caused him much pain.

The diagnosis was beset with difficulties. Absence of tenderness in the right iliac fossa and on rectal examination seemed to exclude appendicitis. The finding of red blood cells on three occasions in the centrifuged deposit from the urine, the sudden paroxysmal pains, and the contracted right abdominal muscles, suggested a renal cause. The history of loss of flesh (the patient was clearly wasted), with recent obstinate constipation, a tumour to be felt, a considerable haemorrhage from the rectum, and oedema of the right leg suggested strongly the existence of a neoplasm

of the bowel, with a deposit pressing on the right common iliac vein. The absence of all anaemia and of any leucocytosis was evidence against malignant disease. The expansile pulsation of the tumour, the delay in the artery of the foot, the bruit over the swelling and also over the spinal column, and the character of the pain, agonizing while it lasted and then ceasing, and readily evoked by movement of the bowels or of his position in bed, pointed to the presence of an aneurysm.

1. Aorta. 2. Coeliac axis. 3. Left renal artery. 4. Oval opening into aneurysm. 5. Upper end of wire which has penetrated into the aorta. 6. Point at which the wire was inserted. 7. Lower end of wire lying just outside the endothelium. 8. Left common iliac artery. 9. Right common iliac artery. 10. Vena cava. 11. Dissecting aneurysm round the left common iliac artery.

* Communicated in brief to the Surgical Section of the Royal Society of Medicine.

While fully recognizing that abdominal aneurysm is nearly always on the left side of the abdomen, and in spite of the fact that Stokes states "fever is rarely met with in any stage of abdominal aneurysm,"¹ and that he has never observed in cases of abdominal aneurysm "collateral venous circulation, as shown by the enlargement of the epigastric veins,"² we formed the opinion that we were dealing with an abdominal aneurysm. The patient urged us to do any operation which might ease his pain.

To a great extent encouraged by the successes of Mr. Wheeler of Dublin³ in operating on these cases, we decided to wire the aneurysm, and obtained Colt's apparatus for doing so. Before describing the operation there is one other point to which we would draw attention. Examining the patient every day in the ward, we found the aneurysm varied in the ease with which it was palpable, and on three or four occasions we were told by the house-physician that the tumour had disappeared. It certainly required at times much deeper palpation in order to feel it. This is worth recording, as it agrees with a note made by Stokes in regard to Case lxxiv, page 632 in his book, *Diseases of the Heart and Aorta*:

I had no difficulty in recognizing an aneurysm, for in addition to the evidences from the symptoms I found a large pulsating tumour in the epigastrium, having every character of abdominal aneurysm, and presenting a distinct bellows murmur. He was admitted into hospital, where, after two days had elapsed, I examined him a second time. To my surprise, the epigastric tumour which had been manifest had disappeared; so that I began to hesitate as to the correctness of the first opinion. The patient now mentioned that when he lay on his side he felt at ease, and the tumour disappeared, but that when he lay on his back the pain returned, and also the tumour. This singular experiment he performed in my presence on several occasions, and always with the above result.

I do not remember ever witnessing a more singular circumstance than the reappearance and as it were growth of the tumour under the hand when the patient continued on his back for a period certainly within two minutes.

Operation.

The operation was performed on April 30th. The patient was anaesthetized with chloroform by Dr. Tatham, Mr. Howell, our colleague, and Mr. Henry, the house-surgeon, assisting. A rubber air cushion was placed under the dorsal spines.

The abdomen was opened from the ensiform cartilage to below the umbilicus. On passing the hand in a large globular pulsating swelling about $4\frac{1}{2}$ in. in diameter, or the size of a large Jaffa orange, was found springing from the aorta, and extending over to the right hypochondrium. The tumour reached from below the renal artery to the bifurcation of the aorta. It was extremely tense. The transverse colon and the duodenum lay in front of it, the latter being adherent to the wall of the sac. The reflexion of the external peritoneal from the ascending colon was torn through, and the duodenum was with difficulty separated from the sac in an upward and inward direction. Colt's trocar was thrust into the aneurysm, and on removing the aspirator a jet of blood shot up 2 ft., and blood welled up by the side of the cannula. A cap packing containing 150 in. of wire with a surface area of $3\frac{1}{2}$ sq. in. was passed into the tumour. On withdrawing the cannula there was free bleeding from the side of the puncture, which stopped after ten minutes' pressure with a gauze sponge. The abdomen was closed without a drain.

The patient stood the operation fairly well, but had extreme pain afterwards, which $1\frac{1}{2}$ grains of morphine in the twenty-four hours following the operation failed to control. He complained even more bitterly of inability to sleep than of the pain. In addition, he caused grave anxiety by frequently vomiting large quantities of dark green watery fluid. In fact, this vomiting with inability to pass flatus or a motion for the first three days after the operation suggested that the irritation of the wire was reflexly causing a spasmodic intestinal obstruction; be this as it may, on the fourth day he passed a small partly formed motion, and the vomiting grew less. A few hours after the operation the dorsalis pedis in the right foot could be felt easily. The day following the left foot was observed to be more oedematous than the right, from which the oedema was disappearing; on May 3rd all trace of oedema had left both feet and legs. On auscultation on May 3rd the bruit was much coarser and was a definite bellows murmur.

It has already been shown that there was a definite relation between the condition of the bowels and the occurrence of pain in the aneurysm. Both constipation and the effect of purgatives evoked pain. We think this to be of importance as a diagnostic sign, as the same has been described in the classic case recorded by Beatty in 1829,⁴ and referred to in Stokes's book.

On May 5th the patient was still vomiting, though to a lesser extent, and said he felt much better. Thinking the vomiting might be due to dilatation of the stomach one of us tried to pass a soft tube to wash the stomach out, but this caused so much discomfort and retching that we deemed it wiser to stop lest the aneurysm should rupture. On May 6th the patient was distinctly weaker, the vomit a dirty brown colour but without faecal odour. We transfused 2 pints of saline, but the patient sank in the evening.

Post-mortem Examination.

There was no peritonitis. The aneurysm extended from the right renal artery to the bifurcation of the aorta. The sac came off the right side of the aorta, and lay wholly to the right of the middle line. The external measurements of the aneurysm were $4\frac{1}{2}$ in. in length by 3 in. in breadth. There was an oval opening from the aorta into the aneurysm, 2 in. by 1 in., on its right wall, filled with firm clot. There was a further opening on the left and lower extremity, directed down outside the bifurcation of the left common iliac, encircling three quarters of its circumference. The upper end of the wire was found projecting through a point $\frac{1}{2}$ in. above the centre of the oval opening on the right side, having torn its way through the aortic wall. The lower end of the wire was tucked away inside the aneurysm immediately outside the end of the liver, which tore on handling.

It was now seen that the wire had not opened into a cage form, but was lying with the component wires close together, embracing the anterior border of the opening into the aneurysm. The site of the puncture made by the trocar was $\frac{1}{2}$ in. behind the centre of the aneurysm.

The vena cava lay immediately below the aneurysm; on slitting it up, the union of the two iliacs was seen to be at the junction of the lower and upper three-fourths of the aneurysm. The way in which the aneurysm overhung the right iliac vein offered an explanation of the fact that the oedema of the right leg preceded that of the left. Small patches of atheroma were present in the aorta and common iliac vessels. The transverse colon was lying over the upper half of the aneurysm. The left renal vein was seen running just above the superior border. The duodenum and pancreas were very closely adherent to the sac.

It was interesting to note that, in spite of the fact that the man suffered from intense pain, there was no erosion of the vertebrae, and we suggest that the pain was caused by the dissecting aneurysm along the left common iliac artery. The stomach was very dilated, its lower border reaching to the umbilicus. The thoracic viscera were normal.

In criticism on this method of treatment we submit the following:

1. The wire did not form in a cage as it is supposed to do.
2. The wire that we used was too strong.

After seeing the result of the *post-mortem* examination we made some experiments on tennis balls with Colt's apparatus. We noticed that when the wire came in contact with the wall it failed to spread out in the same way as it had failed in the aneurysm. Apparently, in order that the wire should spread out into a cage form, it is necessary that it should have sufficient room to do so without encountering much peripheral resistance.

We suggest that it might be an advantage if the ends of the wires were turned in, forming when closed a cartridge resembling the folding of an umbrella probang; and, when opened out, a cage like a ball of string. We also suggest that if the component wires were roughened it would lead to more rapid clotting in the sac.

REFERENCES.

- ¹ *The Diseases of the Heart and Aorta*, by William Stokes, 1854, p. 647.
- ² *Ibid.*, p. 649.
- ³ Wheeler, Annual Meeting, British Medical Association.
- ⁴ Stokes, p. 610.

THE Russian Duma has petitioned the Government to establish some new medical faculties in different parts of the empire.

THE twelfth International Congress of Ophthalmology will be held at St. Petersburg in August next, under the patronage of the Czar. The official languages will be French, English, German, Russian, Spanish, and Italian. The subjects proposed officially for discussion are the etiology of trachoma and the nutrition of the eye.