TWO CASES OF ANEURISM OF THE ABDOMINAL AORTA;

ONE CURED BY THE ADMINISTRATION OF IODIDE OF POTASSIUM, THE OTHER BY ARTERIAL COMPRESSION.*

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DURING the year 1876, two hundred and sixty-seven patients were admitted at the Newcastle-upon-Tyne Infirmary, under my care, of whom one hundred and eighty-three were in-patients and eighty-four were out-patients. Of the whole number, four were suffering from aneurism; one of the arteria innominata, and three of the abdominal aorta. Of the three cases of abdominal aneurism, I propose giving the particulars of two; the third patient was only eight days in the hospital. For comparison, therefore, this case is of little value, and, consequently, will not be recounted.

CASE I.—Robert K., aged 26, labourer, married, living at Crook, in the county of Durham, was admitted on June 8th, 1876. He stated that he had been unable to follow his employment for nine weeks, in consequence of pain in the back, which pain was severe and passed round the abdomen to the region of the umbilicus, where, at times, it was excruciating. Upon carefully examining the abdomen, a faint pulsatile prominence was seen near the umbilicus, at which situation, upon placing the hand flat, yet firmly, a pulsation was felt, more to the left of the umbilicus, which pulsation was expansile in character. At the spot where the pulsation existed, there was dullness upon percussion, and a blowing systolic murmur was heard. Upon auscultating the left vertebral groove, a distinct systolic murmur was heard. The respiration, over the whole of the chest, was of natural frequency and character. The heart-sounds were normal. He was of sanguineous temperament, and in good nutrition. He had no knowledge of having sustained a fall, blow, or strain, and denied ever having suffered from syphilis. The case was regarded as one of aneurism from the following physical signs: the pulsation visible, perceptible, and expansile; the dullness upon percussion; and the murmur heard at the site of the pulsation in the abdomen and in the left vertebral groove. And further, it was inferred that the aneurism was of the abdominal aorta, from the situation of the pulsation, and of the variety, lateral, sacculated, and not peripheric, dilating, from the pulsation and the dullness being to the left of the umbilicus.

The patient was selected for the clinical medical examination for degrees in Medicine of the University of Durham. The diagnosis was confirmed by my colleague Dr. Arnison.

The patient was ordered to maintain the horizontal position in bed, to take ten grains of the iodide of potassium in one ounce of water three times each day, and to have the ordinary meat diet.

June 15th. Of his own accord, he mentioned that he was sensible of a beating in his abdomen, and that he had experienced a beating for fully six weeks previous to his admission. The iodide of potassium was increased to fifteen grains.

June 24th. The pulsation was decidedly less forcible. The iodide was increased to twenty grains.

July 1st. He still complained of pain in the back and round the abdomen. The pulsation was less expansile. No murmur was heard. The iodide was increased to twenty-five grains.

July 8th. There were still paroxysms of pain, accompanied with difficulty in micturition. The iodide was increased to thirty grains.

July 15th. The pain was less severe, more continuous. Upon careful palpation, scarcely any pulsation was felt. The iodide was increased to thirty-five grains.

July 22nd. There was now very little pain. The iodide was increased to forty grains.

July 29th. No pulsation was visible or perceptible; no murmur.

August 12th. As no pulsation had returned, or murmur was to be heard, the patient was permitted to leave his bed for a portion of the day. The iodide of potassium was continued in doses of forty grains.

The condition of immunity from pulsation and from murmur continued, and he left the hospital on October 7th, 1876, to resume his occupation. He was instructed to present himself after an interval of two months, which he did on December 20th, 1876, when after very careful examination, no pulsation was detected, nor was any murmur heard. He expressed himself as feeling well, free from pain, and had been able to continue at work as a general labourer.

CASE II.—John H., aged 25, married, a shingler at the Ironworks,

living at Stockton-on-Tees, was sent to me by my friend Dr. R. W. Foss of that town on October 28th, 1876, as a patient suffering from abdominal aneurism, to be placed under treatment in the Newcastle Infirmary. After careful examination, I coincided with Dr. Foss in the opinion expressed, and gave instructions for the patient to be admitted into the Infirmary.

On October 30th, my colleague Dr. Embleton, the Senior Physician to the Newcastle Infirmary, being at that time engaged in delivering the clinical medical lectures, selected this patient for examination and consideration by the class of students in medicine, as a case exemplary of abdominal aneurism. The patient stated that for four months he had been unable to follow his employment, on account of pain in the back, more especially in the lumbar region, and at times round the lower part of the abdomen and the inner surface of the thighs. He described the pain as "burning" and "plunging". For five weeks, he had been sensible of a beating in his abdomen near the umbilicus. On the abdomen being uncovered, it was noted that there was a prominence, which pulsated. The site of the pulsation was to the right of the umbilicus, and for about one inch above the umbilical line. The pulsating surface was smooth to the eye. When the hand was placed on the prominence, a tumour was distinctly felt, equal to an ordinary orange in size, which pulsated out of proportion with the moving mass. On the anterior prominence, the hand received a single systolic impulse of considerable force. The hands placed on each side of the mass received an impulse laterally as well as anteriorly, which impulse was distinctly expansile. The chief pulsation was to the right of the spine. The tumour was immovable, and was dull upon percussion. A slight thrill was perceptible, which was systolic; a second impulsive or shaking action, diastolic in time, was also felt. Upon auscultation, a systolic murmur was heard. Upon applying pressure to the abdominal aorta, between the tumour and the ensiform cartilage, the pulsation in the tumour and in the femoral arteries was arrested. Upon being interrogated respecting syphilis, he admitted that, five years ago, he had suffered from gonorrhoea, and from a bubo which had suppurated; but had not suffered subsequently from sore-throat or eruption. In his occupation, he had been exposed to great heat, and had been accustomed to drink largely of ale, some days taking as much as ten pints, and, at times, spirit in addition. He was fair in his complexion, and of a spare build. The case was regarded as one of aneurism of the abdominal aorta, situated just above the bifurcation, and in variety as lateral, sacculated, and enlarging to the right. He was ordered to remain quiescent in bed, in the recumbent position, to take ten grains of the iodide of potassium in one ounce of infusion of quassia three times each day, and to have the ordinary meat diet.

November 8th. He complained of having a troublesome cough. Upon careful examination of the chest, sonorous rhonchi were heard on both sides, but nothing more abnormal. He was ordered the customary cough-mixture each night.

November 11th. He stated that his cough was much relieved, but that the pain was still severe in the back and loins. Upon inspection, no pulsation was recognised. Upon auscultation, no murmur was heard. Upon palpation, the pulsation was less forcible, and the tumour was smaller. The iodide was increased to twenty grains.

November 18th. The pain in the back had been less severe. The pulsation was more evident to the eye, and was more perceptible to the hand. It was elicited that the patient, against the instructions given, had been leaving his bed each day. Quiescence was again strictly enjoined. The iodide was increased to thirty grains.

November 25th. The pulsation was very slight. The iodide was increased to forty grains.

November 29th. A pustular eruption had appeared on the forehead and chest.

December 1st. The pulsation had continued very slight. After consulting with Dr. Embleton, it was determined to employ arterial compression on the cardiac side of the aneurism.

December 2nd. The patient being uninfluenced by chloroform or other anæsthetic, Lister's abdominal tourniquet was applied to the abdominal aorta, four inches above the umbilicus, by Mr. G. E. Williamson, senior house-surgeon, who was aided by Mr. J. D. Dixon, junior house-surgeon; Mr. G. B. Craig, clinical clerk; and Mr. A. M. Goyder, clinical clerk. I readily avail myself of this opportunity of acknowledging the kind and valuable assistance of these gentlemen, and of expressing my appreciation of their willingness to carry out my wishes. The compressing pad was firmly screwed down, but the patient complained of such extreme pain, that the administration of an anæsthetic was necessitated. He was at once placed fully under the influence of chloroform, and the compressing pad was screwed down until pulsation was arrested in the aneurism and in both

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femoral arteries. The pressure was continued for half an hour, and upon being removed, the pulsation in the aneurism immediately returned.

December 5th. The patient was placed fully under the influence of chloroform, and the pressure was applied in the same manner as before stated, and was continued for three-quarters of an hour; and upon its removal, the pulsation returned as before.

December 8th. When the patient was fully anaesthetised by chloroform, the pressure was applied in the same manner as on the two preceding occasions; and while it was being continued, the radial pulses became so feeble that it was deemed expedient to discontinue the administration of chloroform, and to maintain the anaesthesia by ether, under which the circulation revived. The pressure was maintained for one hour and a half (from 8.30 P.M. to 10 P.M.), and upon its removal, the pulsation in the aneurism returned as before.

At 1 A.M., on December 9th, the clinical clerk was hastily summoned, and found the patient restless, complaining of pain in the abdomen, which was general and not fixed to one spot, and passing bloody mucus from the bowels. A hypodermic injection of morphia (one-third of a grain) was administered, and a draught containing thirty minims of the tincture of the perchloride of iron in water was given internally.

December 9th, 11 A.M. The patient was still restless, passing bloody mucus from the bowels, vomiting and retching continuously, and complaining of general pain in the abdomen. He had passed urine, which was of specific gravity 1020, and contained no albumen. Upon very careful examination of the aneurismal tumour, the pulsation was considered to be more marked than it had been previously to the application of the pressure. He was ordered to take milk with potash-water, to have a morphia suppository (one-third of a grain) administered in the evening, and to continue the iron draught every four hours.

December 10th. Mr. Williamson, at his morning visit, observed that the aneurismal tumour felt harder, but was still pulsating; and at his evening visit, found that there was no pulsation in the tumour or in the femoral arteries. The patient still complained of pain and uneasiness in the abdomen, and was occasionally troubled with vomiting, and voided bloody mucus *per anum*.

December 11th and 12th. The patient's condition had remained unchanged, excepting that the temperature of the lower extremities had been perceptibly diminished, and had required the application of additional blankets and the hot-water tin for the maintenance of warmth.

December 13th. The vomiting had ceased and the passage of bloody mucus had stopped. The radial pulse was 60 and steady. At the site of the former pulsation, in the abdomen, there was a hard tumour, of about the size of a cricket-ball. There was no pulsation visible or perceptible to the hand, and no murmur was heard. Upon careful palpation in the line of the abdominal aorta, on the cardiac side of the aneurism, no pulsation was discernible. At the ensiform cartilage the heart-sounds were distinctly heard; but, about one inch and a half below the ensiform cartilage, no sound was heard, and no sound was recognised in the line of the abdominal aorta. The heart-sounds were normal both at the base and the apex. There was no pulsation in either femoral arteries. There had been no suppression of urine, and the urine in character had been normal, of specific gravity 1020, and had contained no albumen. There had been no complaint of headache or of change of vision, or alteration of any of the special senses.

Perfect repose was enjoined, and he was ordered to continue the milk and potash-water.

December 16th. The patient had continued easy. The radial pulse was 72, and regular. The bowels have acted naturally, and the evacuation was free from blood. The tumour was decidedly smaller and was less hard.

December 20th. In both groins some pulsation was noted, weak but distinct, and not in the situation of the femoral arteries. Upon deep pressure, a cord could be felt on each side, which was regarded as the femoral arteries. The cord did not pulsate. In the posterior-tibial arteries slight pulsation was perceptible.

December 23rd. The tumour had considerably diminished in size. The patient was permitted to be raised in bed upon the rest, and was allowed the ordinary meat diet.

December 27th. The temperature of the lower extremities had increased, so that the hot-water tin had been dispensed with.

December 30th. At the site of the aneurism, there was not anything to be seen, felt, or heard. The condition of the abdominal aorta remained as last stated, and there was no pulsation in the femoral arteries.

January 10th, 1877. For the last fortnight the patient had been walking about in the ward. When interrogated, he answered that he was quite free from pain or other discomfort, and that "he felt as well as

he had ever done in his life". He expressed himself as wishful to return to his home; but when informed that it was important for him not to resume his previous occupation, he readily consented to remain.

At the monthly meeting of the Northumberland and Durham Medical Society, held on Thursday, January 11th, 1877, the patient was introduced, the site of the aneurism was pointed out, also the position where the compression had been applied; and it was demonstrated that there was no pulsation in the aneurism, in the abdominal aorta, or in the femoral arteries.

January 31st, 1877. The patient was placed under the influence of ether, and a careful examination was instituted. At the site of the aneurism, no tumour was distinguished. Some arterial pulsation was felt to the left of the umbilicus, which was regarded as the enlarged colica sinistra branch of the inferior mesenteric artery. In all respects the condition was satisfactory.

On February 1st, 1877, the patient left the Infirmary to return to his home.

As Case No. 11 undoubtedly was cured by the compression of the abdominal aorta, it will be desirable that reference should be made to the first recorded case of the cure of an aneurism of the abdominal aorta by pressure, which case occurred in the practice of Dr. William Murray of Newcastle-upon-Tyne, in the year 1864. The interest and value of the case are enhanced by the importance of its verification on necropsy.

The following outline of the case is taken from Mr. Timothy Holmes's Lectures on the Surgical Treatment of Aneurism, delivered before the Royal College of Surgeons of England, in the year 1872, and reported in the *Lancet*. "The patient was a spare young man, aged 26. The tumour was situated so high that the aorta was believed to be felt below it, pulsating naturally. It extended up to within three inches of the margins of the left ribs. Still there was room between the umbilicus and the ribs for the pad of the tourniquet, which was applied on the first occasion (April 16th, 1864) for two hours, and on the second occasion (April 19th, 1864) for five hours. On neither occasion was the circulation completely and permanently suspended, except for the last hour of the last and successful attempt. At the end of the second application of pressure, 'very slight pulsation was felt, and hopes were entertained that some advantage had been gained'; but, to the operator's surprise, the pulsation in the tumour altogether disappeared that evening, and the cure was complete and permanent. The man remained well, gaining his livelihood by a 'variety of labouring occupations', till the year 1870, when, having resumed his original occupation of a pavior, he again presented symptoms of aneurism of a higher part of the abdominal aorta, and died on July 1st, 1870, from rupture of this aneurism, which affected the vessel near the coeliac axis. The preparation which was removed from the body showed the first aneurism perfectly consolidated, and seated in the abdominal aorta, extending from close above its bifurcation to about an inch above the origin of the inferior mesenteric artery. The aorta was occluded above the aneurism and its walls atrophied. The aneurism itself was also converted into a fibrous mass. The aorta was largely dilated up to the new aneurism, which had become 'diffuse' before death. As regards the collateral circulation, outside the abdomen, 'it was carried on between the internal mammary and the deep epigastric; between the hepatic artery and a branch of the epigastric; between the intercostals and the deep epigastric; between the intercostals and the superficial epigastric; and between the lower intercostals with the superficial circumflex iliac'. Within the abdomen, 'the circulation was carried on between the colica media of the superior mesenteric artery and the colica sinistra branch of the inferior mesenteric, including its sigmoid and hæmorrhoidal branches; between the upper lumbar arteries and the ilio-lumbar; and between the lower lumbar arteries and the circumflex ili'. The superior mesenteric artery was dilated to nearly the size of the aorta itself, and the trunk of the inferior mesenteric was so much dwindled that its trunk was hardly half the size of its branches, in consequence of its supply of blood being cut off by the consolidation of the aneurism from which it springs."

REMARKS.—In contrasting the two cases that have been recounted with each other, and Case No. 11 with Dr. Murray's case, it would appear that the establishment of the diagnosis of aneurism, the correctness of the situation fixed upon of the aneurismal tumour, the etiology, the anatomical or specific character of the aneurismal sac, the treatment that was employed, the changes consequent upon the treatment, and the deductions inferable from the treatment, are the points for critical disquisition.

Diagnosis.—In both cases there was a tumour, which was immovable, which pulsated to the eye and to the hand, which was dull upon percussion, and upon auscultation of which a murmur was heard. Now,

such physical signs, when in association, are evidence of aneurism, and of no other kind of tumour, let it be glandular, cancerous, hydatid or other, or of psaos or iliac abscess.

Situation of the Aneurism.—In both, it was looked upon as of the abdominal aorta, near its bifurcation. The position and the immobility of the pulsating tumour, together with the neuralgic pains in the spine, pointed to the correctness of the supposition; while the fact that the cure of the aneurism, in Case No. II, was accompanied by the disappearance of the pulse in the femoral arteries, rendered the possibility of the aneurism being situated in the inferior mesenteric artery, or in one of its branches, as highly improbable.

Etiology.—Both patients were under thirty years of age. The history of previous syphilis in the second was clear. The supposition, therefore, that in both the lesion of the arterial coats was inflammatory in nature, and not atheromatous, was rendered very certain. If it be true that, in this lesion, an inflammatory process commences just external to the lining membrane, leading to a deposition of lymph there, producing elevation of the internal surface, and, as a consequence of the pressure and of the interruption of the nutrient supply, atrophy and erosion of the endarterial membrane, it may readily be understood how easily the already thinned arterial wall will dilate, and become in time converted into a lateral sacculated aneurism.

Anatomical or Specific Character of the Aneurism.—In both, it was observed that the aneurism was of the lateral sacculated variety. In the first case, the sac was enlarging to the left; in the second, to the right. Whilst coagulation of the blood within the aneurism is scarcely obtainable in the peripheric dilating aneurism, in the lateral sacculated variety there is a natural tendency to such coagulation, and coagulation does actually promote anatomical cure. Hence, it would seem that the clinical distinction of these two great varieties of aneurism is not mere scholastic refinement, but of practical importance. For this reason, therefore, is the value of estimating the physical condition of the aneurism; for upon such determination is the treatment to be decided upon.

In the treatment, whether constitutional or mechanical, the principle was recognised that it is necessary for the circulation to be enfeebled or impeded, in order that the aneurismal sac may become filled with the constituents of the blood, and in process of time rendered impervious; the term constitutional treatment being regarded to include the dietetic, medicinal, and postural requirements. In the first case, the object was gained by constitutional treatment alone; in the second, by mechanical treatment, after the constitutional treatment had been unprofitable. The effect, then, of the administration of the iodide of potassium, in association with the rest and the regulated diet, in the first case, may be conjectured to have been the gradual filling, with the constituents of the blood, and the subsequent shrinking of the aneurismal sac, but without obliteration of the aorta, on the cardiac side of the aneurism, the circulation in the arteries on the distal side of the aneurism continuing uninterrupted. In the mechanical treatment, that by the application of pressure, more than this is effected; for it may justly be assumed that the current of the blood along the aorta, and thence into the aneurism, is either wholly or in a great measure arrested. This temporary condition of the aorta and of the aneurism being the same, or nearly similar, to that which arises when a ligature is applied to a large artery on the cardiac side of an aneurism, namely, upon the drawing tight of the ligature, there would be a cessation of the pulsation and of the murmur in the aneurismal tumour, which would at the same time subside, becoming partially emptied of blood. Though the direct flow of blood is arrested by the ligature, after a varying interval of time, blood will enter the aneurismal sac by the interostulating circulation; and it is from this blood that the sac becomes filled, it is supposed, by fibrin, deposited in stratified layers, as in spontaneous cure of the disease. So far, therefore, the mechanical treatment of aneurism by arterial compression, and that by the application of a ligature on the cardiac side of the aneurism, may be compared, and may be regarded as analogous; but, when the compression is removed and the blood again circulates, the condition is very different—in that, where the compression has been employed, the blood circulates directly, passing to the aneurismal sac in its usual channel; but where a ligature has been applied, the blood comes indirectly to the aneurismal sac, passing in a circuitous route. The question presents itself: is this difference such as to determine the deposit of the constituents of the blood, either in laminated fibrin or in coagulum? The interval of time that elapsed between the compression and the consolidation would be in favour of laminated fibrin being first deposited, and subsequently that a coagulum was superadded, filling the aneurismal sac and blocking the aorta. This is the explanation that is offered. The difference of time in Case No. II, in Dr. Murray's case, and in others, for the process to be accomplished, possibly was dependent upon constitutional differences,

more especially upon a difference in the quality and plasticity of the blood.

If it be admitted that the supposition is the correct one: that the filling up of the aneurismal sac is by stratified fibrin, and finally by coagulation of blood, it is unnecessary to apply pressure to wholly interrupt the circulation; but rather moderate compression only is necessary to lower the force of the circulation, and the mechanical treatment should be in accordance with the constitutional treatment.

The channel through which the blood was carried, after the cessation of the circulation in the abdominal aorta, in Case No. II, for the present is visionary; but, from the similarity of the position of the aneurism to that in Dr. Murray's case, which was disclosed on necropsy, and which it was deemed expedient to give when the case was referred to, it may be presumed that the circulation was similarly carried on.

The bloody mucus that was passed *per anum* was regarded as the result of the congestion of the intestinal vessels, following upon the pressure—not the consequence of rupture of the vessels produced by the compressing pad; for, if such had been the condition, blood, either liquid or in the condition of coagulum, would have been voided.

The conclusion deducible from this consideration is, that aneurismal tumours of the lower portion of the abdominal aorta may be successfully treated by arterial compression on the cardiac side of the aneurism; but that this method is a dangerous one, and should not be employed until the constitutional treatment has failed; and that, if arterial compression be employed, it should be moderate and prolonged, rather than complete and of short duration.

A CASE OF CONGENITAL CYANOSIS, IN WHICH A PATENT FORAMEN OVALE WAS ASSO- CIATED WITH A PRESYSTOLIC BASIC MURMUR.

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ON June 1st, 1870, I had, through the kindness of my friend Mr. Charles Hood, the opportunity of examining an inmate of the British Home for Incurables, who from his birth had been cyanosed. I copy *verbatim* the notes which I made on the day of the examination.

"Henry Burgess, aged 27, has been blue from birth; has spat blood; legs cedematous and purple; thumbs and fingers clubbed; pulse feeble, rather small. A bellows-sound over base, alternating with the impulse, rather presystolic than diastolic. The probable cause is a current of blood from the stronger left to the weaker right auricle through the open foramen ovale during the auricular systole. The blueness, the hæmoptysis, and the oedema of legs, are consequences of overfulness of veins, the result of arterial blood going from the left to the right side. He often has headache and giddiness. The normal second sound (valvular click) scarcely audible."

I saw the patient only on that one occasion; and I heard no more of him until the 23rd of last November, when I received a note from Dr. Fairfield, the Medical Officer of the British Home for Incurables, informing me of the man's death, and inviting me to attend the inspection of the body on the following day. Unfortunately, I was unable to attend; but Dr. Fairfield did me the favour to send me the following "Notes of the *post mortem* appearances. Henry Burgess, aged 35. Cyanosis. November 24th, 1877. Lungs healthy. Liver and spleen much enlarged. Heart of an extraordinary size, with open foramen ovale about as large as a five-shilling piece. The hypertrophy general, but especially the right ventricle. The walls of great firmness when cut through, measuring an inch in thickness. Chambers much enlarged. Weight of the heart estimated at twenty ounces. Pulmonary artery natural size; valves properly formed; ventricular septum complete; mitral and aortic openings natural; valves healthy; large vessels in connection with the heart regularly distributed."

I regret that I have not a more complete history of this interesting case of uncomplicated patulous foramen ovale; but there is, I think, conclusive evidence that the presystolic basic murmur was the result of a current of blood through the foramen ovale during the auricular systole; and that the current was from the left to the right auricle is rendered nearly certain by the evidence of systemic venous fullness, with comparative arterial emptiness. The general lividity, the enlargement of the liver and spleen, and the oedema of the legs, are all results and evidence of systemic venous engorgement. The hæmoptysis, too, was probably a result of bronchial venous and capillary congestion; the bronchial veins forming part of the systemic venous system, and opening through the vena azygos and the left superior