ON
A LARGE ANEURISM
OF THE
AORTA, INNOMINATE, SUBCLAVIAN,
AND CAROTID ARTERIES,
TREATED SUCCESSFULLY BY DOUBLE DISTAL
LIGATURE.

BY
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ROBERT W—, æt. 45, labourer in a foundry, was admitted into the Charing Cross Hospital, under the care of Dr. Pollock, 24th July, 1877, suffering from aneurism at the root of the neck.

Previous history.—The man has served in the Rifle Brigade in India, and in the Hussars in the Crimea; he has led a hard, rough life, he has had ague, cholera, and dysentery, and has occasionally drunk hard. Although twice affected with gonorrhœa, he appears never to have had syphilis; no scars of chancre or of bubo are detectable. His father and mother are alive and healthy, as are also five sisters and three brothers. There is no family history of heart disease or of aneurism.

Since leaving the army he has worked in a foundry—the

labour chiefly consisting in lifting and carrying heavy weights. With the exception of the above-named acute diseases, he has enjoyed very good health, until November, 1876, when vomiting and purging followed a drinking bout; after that he had pains in all his limbs, back, and shoulders, which were attributed to rheumatism; these all disappeared after a short time, except the pain in the right shoulder. He first noticed a swelling on the right side of the neck in March, 1877; soon after he had occasional swelling on the right side of the head and neck, his right arm became weaker, and was not unfrequently numb. His breath was less good, when he had hard work to do, and he felt his heart beat a good deal.

Present state.—At Dr. Pollock's kind request I examined the man with him. The patient looks more than his age, and has a commencing *arcus senilis*. The aneurismal tumour is situated at the right root of the neck, is oval in shape, with the long axis horizontal above the clavicles; it extends from the left of the middle line from beneath the sternal part of the left sterno-mastoid muscle to near the outer border of the companion muscle of the opposite side; its highest limit is on a level with the upper edge of the cricoid cartilage; its lower boundary, lying behind the clavicle and ribs, cannot be felt. This tumour is pulsatile, with very characteristic expansion, but without any vibratile thrill. Pulsation can be felt in the first intercostal space as low as the border of the second rib, and occasionally through the rib itself for two inches outside the sternum. The radial pulse seems rather weaker on the right than on the left side, but if there be any difference it is hardly perceptible.

Over the tumour no *bruit* is to be discerned, but the two sounds of the heart are readily heard, though muffled; they are audible as heavy dull thuds; the same sounds are also to be heard on the clavicle, first and second rib, and first intercostal space. There is dulness of the upper right chest as far out as the inner third of the clavicle, its outer and lower limit may be traced, in a semicircular direction, from that place over the first intercostal space and second rib.

Internally this area mingles with the cardiac dulness, which extends abnormally far, namely, about an inch and a half to the left, while the apex beats strongly quite half an inch outside the nipple line; probably the heart is also displaced somewhat downward, as there is strong epigastric pulsation. There is no cardiac bruit, but the sounds, more especially the second, are dull and muffled. The heart beats strongly with a heavy thud.

The man has a cough, hardly laryngeal in sound, with copious, diffuent, muco-purulent expectoration. Resonance, except over the above mentioned space, is fair; liquid râles are heard more or less over the whole chest.

The right external jugular vein is distended, as also are the veins of the arm, but in a lesser degree, while those over the sternum and right pectoral muscle are strongly marked. In spite of this affection, the man's constitution seems sound and unbroken; his appetite is good, and he sleeps well if the head and shoulders be considerably raised. The urine, though loaded with lithates, is free from albumen.

Dr. Pollock treated the man with low diet, digitalis, an occasional hypodermic injection of morphia when he was restless, and ice bags to the tumour; but the aneurism increased. Deligation was proposed to him; he accepted readily and at once. On going to the hospital on the following day, I found the man just leaving, and declining any interference. However, I did not lose sight of him, and he, finding the tumour still increase, and reconsidering what I had told him, spontaneously asked me to take him in again and operate. He was readmitted by Dr. Pollock's sanction, under my care on the—

13th August.—In the interval the tumour had increased in size, and somewhat altered in shape, having, like an abscess about to point, become somewhat conical, the blunt apex of the cone lying about two thirds up the tumour, the upper margin of which now reached above the middle of the thyroid cartilage. The pulsation, also, was nearer to the surface, giving the impression of being immediately beneath the skin. The veins of the thorax, upper arm, and the

external jugular were more full and prominent (Plate II, fig. 1). A flexible wire was passed horizontally round the tumour and front of the neck, another perpendicularly from the chest upwards; the tracings thus obtained are subjoined. A compass measurement from the most internal to the most external point of pulsation attained four inches and a half, while tape measurements between the same points amounted

to a little over six inches. From the clavicle to the highest point of pulsation, measured three inches and three quarters by compass, and four inches and a half by tape. These measurements, the wire tracings, and the photographs, furnish all possible means of estimating the size, projection, and appearance of the tumour.

The intra-thoracic portion of the aneurism seemed also

increased as the pectoral dullness extended further to the right, that is, to the middle of the clavicle and to that level in the intercostal space. I consider, also, that the apex of the heart beat still further to the left of its normal position.

On account of this rapid increase in the size of the aneurism, and also on account of the apparent proximity of pulsation to the finger, I judged that there was no time to lose, and I determined to operate on the day after the man's readmission. I felt, however, by no means sure that there was room to place a ligature on the common carotid between the sac and the bifurcation; expecting, indeed, that I might find it necessary to tie both the external and internal trunks.

Operation.—14th August.—Mr. Braine administered ether, and under the carbolic spray, I made a rather smaller incision than usual along the margin of the sterno-mastoid muscle. As soon as the platysma myoides muscle was reached, I became aware of large pulsation inside and close to the carotid artery, occupying an oval shaped space convexity upward. This, I feared, was a prolongation of the aneurism by rupture, in that situation, of all the coats, a new sac being formed merely by condensed surrounding tissues. I therefore felt bound to proceed with the utmost caution, and it was not until a careful dissection of the part showed the cause of the pulsation, that I felt justified in proceeding with greater freedom. This pulsation was produced by a tortuous superior thyroid, so greatly enlarged as to be as big as an external carotid at the level of the lingual. As soon as this condition of the parts was ascertained, I opened the carotid sheath, and found just room enough to pass an aneurism needle below the bifurcation. My first ligature, a catgut one, broke; but a second held, and the isolation of the vessel being verified, was tied, pulsation in the artery above and in the temporal immediately ceased; no difference in the condition of the tumour was observable.

I now proceeded to lay bare the subclavian in its third part; avoiding a greatly enlarged external jugular vein, I reached the vessel rapidly and with remarkably little bleeding and passed an aneurism needle beneath it. Pressure in

the hollow of the instrument caused cessation of the radial pulse. In pressing the needle a little further onward in order to disengage the catgut a gush of venous blood came from the neighbourhood of its point, I brought out one end of the ligature, withdrew the needle and proceeded to search for the bleeding vein. Pressure, backward, above and outside the brachial plexus, commanded the hæmorrhage; but when the finger was withdrawn the cup-shaped wound filled rapidly, rendering it impossible to see the bleeding vein. I therefore thought it inadvisable to make any attempt to tie it or to lose time in ascertaining if the artery alone were included in the ligature, but asked Mr. Godlee to knot the catgut loosely and to leave the ends uncut as a future guide and then with my finger still upon the vein—probably the posterior scapular—stuffed the wound firmly with antiseptic gauze, bandaged it, and allowed the patient to be carried to bed, the radial pulse still beating.

15th.—The patient passed a good night suffering only from occasional tingling in the clavicular wound, to-day he is in excellent condition without fever or pain worthy of notice; pulse 90; temp. 99.2°.

Under the antiseptic spray I removed all the stuffing from the wound, which was dry and fresh-looking, no bleeding or even oozing took place. I traced down with my finger the ends of the ligature and found it round the artery but it also included a branch of the plexus which lay so near the vessel as to seem to the finger in front of it. I determined therefore to leave this loosely tied ligature *in situ*, passed another round the artery, whose isolation was verified and tied the catgut firmly. All this was done without any use of the knife. Although now both radial and carotid pulse were stopped, no change in the condition of the tumour was perceptible, but I observed a marked diminution in the pulsation in the first intercostal space. He was ordered to have No. 1 diet, namely; for breakfast and supper, gruel 1 pint or milk $\frac{1}{2}$ pint, bread 4 oz., butter $\frac{1}{2}$ oz.; dinner, rice milk $\frac{1}{2}$ pint, bread, 4 oz, as an extra, fish.

16th.—Patient in excellent condition, pulse 90, tempera-

ture, morning 96.4° ; midday 98.8° ; evening 98.2° ; he complains of no pain, but on questioning he mentions a dull heavy sensation in the arm. The pulsation over the chest is certainly less and appears to occupy a smaller space.

21st.—Patient's condition is very good, the temperature has never risen above the normal; the pulse varies between 84 and 96; the wounds are healing rapidly without suppuration. Intra-thoracic pulsation greatly decreased, and the apex of the heart is more near to its normal place. The tumour has become firmer, the pulsation less powerful and more distant, it measures by—

Tape	.	.	.	.	$4\frac{1}{2}$
Compass	.	.	.	.	$3\frac{1}{4}$

Two eggs are substituted for the fish.

25th.—He is less comfortable and somewhat irritable; temperature still below normal; pulse varying from 76 to 84; tongue rather furred. Intra-thoracic pulsation and area of dulness has decreased a little since last report; action of the heart less violent; epigastric pulsation has nearly disappeared. The tumour, however, remains of the same size and the pulsation appears to my finger rather nearer. As this progress is not so rapid as it was at first I determined to try a very dry diet, and ordered for breakfast and supper, bread 4 oz., butter $\frac{1}{2}$ oz., milk 2 oz.; dinner, meat 3 oz., bread 3 oz., water 4 oz.

26th.—Slight pulsation, evidently collateral in the radial artery.

28th.—The patient is much annoyed by the restrictions of his diet table, and his thirst is considerable. I have allowed him to take a little more fluid; but the desirability of continuing the starving system is doubtful; the man rebels against it, his heart-action is excited, and his temperature has become irregular.

The pulsation in the radial has ceased again, that in the tumour is increased, and that on the thoracic parietes is also more perceptible, although the area still seems to diminish. As the pulse was 102 I ordered him to have 15

NAME

ROBERT. W

AGE

45.

DISEASE

ANEURISM OF AORTA

minims of tincture of digitalis every six hours, the dose to be increased until the pulse became somewhat reduced.

30th. The heart's action is still quick, from 96 in the morning to 114 in the evening. The temperature is very variable, the highest has been $100\cdot6^{\circ}$ the lowest 97° , namely on the evening of the 28th, and morning of the 29th respectively. As the digitalis nauseates without diminishing the pulse it is to be discontinued. Measurement of tumour by

Tape	.	.	.	.	$5\frac{1}{2}$
Compass	.	.	.	.	$3\frac{1}{2}$

an increase in breadth of $\frac{1}{2}$ inch, but no increase of projection.

September 3rd.—The patient's temperature and pulse remain in much the same condition; the skin is rather dry and hot; the man appears in an irritable state. The heart beats much nearer its normal place and its impulse is violent. The area of dulness in the right chest has somewhat declined, but the visible tumour is much the same in size, and the pulsation seems as near. I changed the diet to No. 3, namely, for breakfast and supper, gruel 1 pint, milk $\frac{1}{2}$ pint, bread 4 oz., butter $\frac{1}{2}$ oz. As an extra at breakfast 1 egg. Dinner, meat (cooked) 4 oz., bread 4 oz., potatoes $\frac{1}{4}$ lb., he also had beer, 1 pint.

I also prescribed of Liquor Ferri Perchloridi 12 minims, and of dilute Hydrocyanic Acid 3 minims every six hours.

5th.—Yesterday the patient seemed better although the temperature rose in the evening to $100\cdot2^{\circ}$. The pulsation has receded and the tumour is smaller. Measurement—

	Tape	.	.	.	.	$4\frac{1}{2}$
	Compass	.	.	.	.	$3\frac{1}{2}$
8th.—						
	Tape	.	.	.	.	$3\frac{1}{2}$
	Compass	.	.	.	.	$2\frac{3}{4}$
9th.—						
	Tape	.	.	.	.	$2\frac{7}{8}$
	Compass	.	.	.	.	$2\frac{1}{4}$
10th.—						
	Tape	.	.	.	.	$2\frac{1}{2}$
	Compass	.	.	.	.	$2\frac{1}{8}$

These measurements are given consecutively that a succinct view of the decrease in size of the tumour may be obtained. During the same time in the upper part of the chest, the area of dulness and of pulsation, whose diminution had up to the 28th been more regular than that of the visible tumour, and in which no period of increase could be detected, rapidly became smaller, and respiratory murmurs were taking the place of the dull thuds over the greater part of the space; cough had almost disappeared, as also the liquid *râles*.

There remains to remark that, on the evenings of the 4th, 6th, and 8th, the temperature rose up to $102\cdot4^{\circ}$. After that, viz., on the 9th, it went down to $96\cdot4^{\circ}$, and has since remained normal. On the 9th he complained of peculiar hot tingling pain from the shoulder to the hand. The limb is not swollen, but the skin chiefly along the course of the vessels is marked with interrupted broad pink lines. These are certainly not due to phlebitis, but I believe to an inflammatory condition of the empty arteries, there being no pulse in any of the brachial vessels. I ordered stimulation of the skin with a diluted ammonia liniment; and as the pain interrupted his usually excellent sleep, a small dose of the *Liquor Opii Sedativus*. The pain and redness disappeared in two days, and the opiate was discontinued. A slight enlargement, more perceptible to touch than to sight, remained. Measurement by

Tape	.	.	.	.	$1\frac{1}{2}$
Compass	.	.	.	.	$1\frac{1}{2}$

On the 11th I left town, and the case fell under the care of my friend, Mr. Bellamy. I find noted, on the 13th, the tumour is about the size of an average walnut, very hard on its inner side, and above the sterno-clavicular joint; it still, however, pulsates.

23rd.—Axillary and brachial arteries are swollen, hard, and excessively tender; their enlargement is even visible; they were painted with iodine.

30th.—The pain and swelling mentioned in last report disappeared in three days; the tumour has still further diminished.

October 1st.—On my return I found the man apparently in very good health, and without any visible enlargement at the root of the neck. On passing the finger behind either edge of the sterno-mastoid muscle, and pressing gently downward, one feels a tumour about the size of a pigeon's egg, which, although quite hard, pulsates; it is doubtful if the pulsation be at all expansile, or if it be not simply communicated by the aorta. I myself consider it somewhat expansile. There is neither radial nor ulnar pulse; nor, indeed, any arterial pulsation in brachial or axillary artery, yet the limb is warm and well nourished. A feeble pulsation may generally, but not always, be felt in the temporal.

The condition of the chest, as kindly furnished me by Dr. Pollock, is as follows:—There remains a slight cough, but not, the man says, as much as he has had ever since he returned from the Crimea; the mucous *râles* have disappeared. Over the right side of the manubrium sterni, and about half an inch outside it, there is some dulness, and over this, and a little further out, the heart-sounds, more especially the second sound, are too distinctly heard, and with a slight ring: no pulsation is to be felt at this part. The heart has returned to its proper place, its beat is of normal force; the second sound is somewhat dull and muffled, in all probability from thickening of the aortic valves.

Dr. Green, I may remark, thought the physical signs indicated contraction of the lumen of the aorta rather than increase.

The man was taking no medicine, but has been put on No. 4 diet, and was given one pint and a half of beer daily, this I diminished to one pint. No. 4 diet consists of the same as No. 3, but with six ounces instead of four ounces of meat at dinner.

On 12th October I had the man photographed; by an error he was allowed to get out of bed and sit up for two hours, walk the length of the ward some twenty-five yards, and undergo the fatigue of sitting for the likeness. When I saw him the pulsation seemed more expansile—the heart's action

was considerable. This condition led me at that time and during the few following days to investigate the condition with even more care; I believe the sense of an expansile pulsation to have been deceptive.

At this date of writing, 20th, the tumour in the neck rises only just above the sterno-clavicular joint, and can only be felt by passing the fingers behind the sterno-mastoid; it is rather conical in shape, and the impulse communicated from the aorta pushes the cone upward between the fingers like a wedge, and by thus separating them gives a false idea of expansile pulsation; by taking the tumour a little firmly between finger and thumb, and lifting it ever so slightly, pulsation ceases. Nevertheless, I deemed it the better plan to keep the man in bed until the 22nd, although I believe the whole aneurism to have become filled with firm clot, and that the innominate, carotid, and subclavian arteries are entirely obliterated.

REMARKS.

The notes of this case have occupied so much time, since a somewhat detailed report appeared to me desirable, that the few remarks I have to make shall be compressed into the smallest possible space.

Nature of the aneurism.—The generally healthy condition of the man's circulatory system, and the history of work involving frequent and violent efforts, lead to the belief that the aneurism was traumatic in origin; produced, that is to say, by some great exertion when the system was depressed by a period of hard drinking.

The shape and position of the tumour show clearly that the innominate, together with its two great branches, was involved in the aneurism, moreover, the pulsation felt in the first intercostal space, even occasionally through the second rib, and the extent of pectoral dulness point strongly to the conclusion that the aorta also was implicated. It was impossible to trace by percussion the cardiac side of the tumour,

but the very considerable displacement of the heart, namely, from one inch and a half to two inches to the left, would show that the intra-thoracic portion of the aneurism must have been very large. I know perfectly the difficulties which surround clear diagnosis of these conditions, but I can entertain no shadow of doubt that the first part of the transverse aorta, the innominate, nearly all the common carotid, and at least, the first part of the subclavian arteries had opened out into a large blood-filled cavity, whose dimensions have been given with all obtainable precision.

Operation.—Of the operation I would only remark that although the unfortunate rupture of a vein caused me to forego for twenty-four hours the definitive deligation of the subclavian, yet the tying of the two vessels must be ranked as simultaneous.

Diet.—The regimen, upon which my patient was at first put, resembled very closely that on which a patient of Mr. Stanley's, with large aortic aneurism, recovered.¹ On the tenth day, although the relief to the circulation was progressive, as the diminution of the tumour seemed at a standstill, a very dry diet was prescribed. On the third day of this system, the heart and arteries generally took on an excited action, and the temperature became disturbed; nevertheless, the same regimen was continued for nine days, when a fairly nutritious diet with a little stimulus was substituted, yet the excited heart-action and irregular temperature continued for five days after this change.

The relation between diet, temperature, and decrease of the tumour.—During the first five days of dry diet and excited heart-action, the tumour increased half an inch in breadth, it then remained of the same size for four days. Two days after the administration of a fuller diet and a little beer, that part of the tumour which was situated in the neck, began rapidly to diminish. The conduct of the intra-thoracic portion could be less easily verified, it appeared to me that during the phase of vascular excitement its decrease was rather slower.

¹ 'Pathological Transactions,' vol. v, p. 107.

It is to be expected that some divergence of opinion will prevail as to the effect of the whole diet system upon the disease. Some will see in the vascular excitement only a parallel to that phase of increased pulsation, of pain, and of heightened temperature, which, when an aneurism is treated by pressure, often precedes the successful issue.¹ Others may consider that the dry diet abetted, perhaps actually induced an inflammation of the sac, eventuating in coagulation of its contents. Such view would certainly be supported by the occurrence of arteritis in the arm four days after the tumour began to diminish. Again, it may be considered that the diet system had produced in the blood, as I had intended it to do, a highly coagulative tendency. In confirmation of this view it should be remarked, that the inequality of temperature corresponds closely in time with the cessation of radial pulse after its reappearance for two days. Since no pulse can even now (Oct. 21th) be felt in the radial, we must conclude, that the whole subclavian artery became occluded with blood-clot, for it is hardly conceivable that radial and ulnar, brachial, and even axillary pulsation, should remain absent if the first part of the subclavian, with its large scapular branches were patent.

It seems certain that the systemic symptoms noted between the 28th August and 8th September were closely connected with the changes, first increase and then decrease of the sac; also, it seems certain that these symptoms were closely connected with the diet.

Result and Records.—At the time I operated the tumour in the neck was so large, its walls so thin, the circulation and breathing so embarrassed, and the heart so displaced, that a fatal issue, but for the steps taken, was closely impending. Nevertheless, in the absence of any distinctive evidence of general arterial disease, I conceived the case to be a hopeful one. This view was justified by that relief

¹ A description by an intelligent gentleman of his sensations during the last few hours of treatment by pressure, and the sudden cessation of uneasiness when the aneurism became almost suddenly consolidated, was read by me to the Clinical Society, and is published in the 'Transactions' (vol. v, p. 110).

to the breathing and to the circulation which almost immediately followed the operation, showing, even though the cervical part of the tumour was unaltered, that some considerable change of the thoracic portion had occurred. Nevertheless, in speaking of any such case as hopeful I do so with distinct reference to past records. Since the days of Wardrop it has been theoretically held by surgeons that "innominate aneurism is or should be amenable to treatment by ligature of the carotid and subclavian." Mr. Holmes, in his lectures on surgery, gives six cases of the simultaneous deligation of the carotid and third part of the subclavian; from these one must be eliminated, Mr. Heath's, since in his case the aneurism proved to be aortic only. One more case, however, Mr. Ensor's,¹ must be added. Of these six cases one received no benefit, but lived some time; two, who also were not relieved, died in a few weeks; one (Mr. Ensor's) received hardly any, if any, benefit, and lived sixty-five days; two died on the sixth day. My case is then the only one which, having been successful, proves practically the above theory to be correct.

As far as I know, my case is also the only one which has been operated on with all the antiseptic precautions duly observed; and I consider the temperature chart (until the diet was changed) a remarkable fact and one well worthy of notice. Different opinions will doubtless be entertained as to the influence which this method and the absence of morbid temperature may have had on the result. My faith in this absence of wound-fever and in the value of carbolized catgut is very great.

Deductions.—It seems impossible to avoid the following conclusions:—That not only innominate aneurism, but such aneurism when the aorta is largely implicated, is amenable to treatment by the double distal ligature. Moreover, we may conclude—what, indeed, was proved by Mr. Heath's well-known case—that aneurism of the first part of the aorta may be cured by the same procedure. It is true that deligation of the first part of the subclavian would be the more logical

¹ 'Lancet,' 1876, vol. i, Feb. 15, and vol. ii, July 31st.

operation, but it would also, I believe, prove the more deadly one.

SEQUEL.

Robert W—, the subject of the above communication, was exhibited to the Fellows of this Society when the paper was read, 13th November, 1877. He left the hospital on the following day.

On the 20th November he returned to the hospital to present himself at the weekly board, and I, finding him suffering from brouchitis, persuaded him to come in again under the care of Dr. Pollock. At that time the cervical portion of the tumour was no larger than when he was shown in these rooms, perhaps even a little smaller. He had, however, brouchitis over the whole chest and some pneumonia at the back of each lung. He was very morose and indocile, demanding other food and drink than had been prescribed for him, and when on the 22nd the house-physician ordered the discontinuance of a certain allowance of brandy he left the hospital in a rage, although his dangerous condition was fully explained to him. The weather just then was very cold and damp, sleet was falling, and the man was very insufficiently clad. I learnt afterwards that when he reached home his wife was away, there was no fire, and he sat in his thin wet garments in a perfectly cold room for more than four hours. When his wife returned she found him pale, almost blue, and breathing with great difficulty; he did not appear quite conscious. He continued throughout the short remnant of his life to get worse in these particulars.

24th.—Mr. Colquhoun, a late pupil of the hospital, was seeing patients for a friend at a small dispensary in Brompton, when a woman came in and begged him to go and see a man dying close by. He went and recognised my patient W—, moribund, apparently from pneumonic asphyxia; he died in a few minutes. Mr. Colquhoun at once made me

acquainted with the occurrence, and I was able to arrange for a post-mortem examination on the following day.

25th. *Post mortem*, twenty-three hours after death.—The body was well nourished, there was considerable rigor mortis and posterior decubital staining. The tumour just above the right sterno-clavicular joint felt, except, of course, that it did not pulsate, exactly as during the last few weeks of life.

The chest was opened by a crucial incision from the thyroid to the ensiform cartilage, and from one acromion to the other, the ribs being sawn through a considerable distance from the junction with their cartilages, and the clavicles disarticulated. On removing the front wall of the thorax the presence of an aneurismal tumour was manifest. The pericardium was opened, it contained about five ounces of slightly turbid serum. The heart and great vessels were removed entire without further examination. On dividing the left subclavian artery a large quantity of blood, as black and thick as post-mortem venous blood, escaped from its proximal end. Nothing further was remarked at this time except that all the veins were full.

The lungs were markedly œdematous, a quantity of clear but aëriferous serum bubbling forth upon pressure; there was also a good deal of hypostatic pneumonia; the portions of lung so affected felt solid, but broke down readily; there were no cavities, no new deposit, or pathologic breaking down of tissue. The bronchi, even to very minute divisions, were strongly congested and filled with mucus or with mucopus.

Brain healthy, firm, but congested; veins of the pia mater, choroid plexus, &c., very full of dark blood.

Abdominal organs healthy.

The parts removed were taken at once to the hospital and preserved in spirit for subsequent examination.

In the examination of this tumour I was assisted by my friend Mr. Cantlie.

The trachea and œsophagus were pressed by the tumour to the left side, the former being somewhat flattened from the

right, but not enough to cause any obstruction to the entrance of air; it was also pressed backward, so as to lie in a plane a little posterior to the carotids. Moreover, these tubes were twisted, so that about the level of the top of the sternum, where the twist is greatest, the œsophagus lay to the left and a little in front of the trachea, whose non-cartilaginous portion looked wholly to the left.

The aneurismal tumour lay to the right of and above the first part of the aorta; looked at from the front it was seen to extend above the first bend of that vessel, covering the lower part of the carotid and subclavian arteries. Lying against its left side was the left vagus nerve, slightly flattened, and, perhaps, a little deflected. Winding round its lower part was the left innominate vein, elongated and bound to the wall of the tumour by condensed fibrous tissue.

The veins of the right side were peculiar; the subclavian joined, about an inch from the heart, a large venous trunk formed by the right internal jugular with thyroid axis branches, and by the left innominate. Thus, the right subclavian appeared to enter almost at once into the auricle. Whether this was an original peculiarity or a modification by disease I cannot say with certainty, but believe that it was the former, since in this case the right subclavian entered the larger venous trunk on a level considerably lower than that of the left innominate.

The aneurism sprang from the junction of the first and second part of the aorta; extending upwards and to the right, it involved the front wall of the innominate together with the roots of the right carotid and subclavian. It was rather larger than a tennis ball and had a subsidiary projection upwards and outwards, which was divided from the bulk of the tumour by a broad shallow groove, probably the impress of the clavicle. The back part was moulded on the apex of the lung. In texture the whole mass, after a certain immersion in spirit, was as hard and unyielding as a solid piece of leather (see Pl. II*).

The whole tumour was cut through from before backward; it was then seen that a globular cavity, communicating freely

with the aorta, still existed. This was perhaps a little more than an inch in diameter; it was surrounded by very firmly laminated clot of variable thickness. In front, the thinnest part, it measured over a third of an inch. At the back it was an inch and a half thick. The subsidiary part was entirely filled up, constituting a mass of firm fibrin about two inches in thickness. The walls of the aneurism on the section surface were distinguishable.

Below the mouth of the cavity, therefore, on the wall of the aorta itself, the openings of the left carotid and subclavian were seen to be rendered somewhat oblique and elliptical by pressure.

The innominate, subclavian and carotid were obliterated, firmly plugged by coagulum, which on the section of one of them had a pink colour like the lean of ham.¹ On the subclavian the remnants of two ligatures might be seen like delicate shreds of connective tissue; there was no wound or scar on the outer coat of the vessel. The same may be said of the right carotid, except that the trace of only one ligature of course was found.

Remarks.—In considering this case in the light of the conditions disclosed by anatomical examination I must, while drawing attention to the general accuracy of the diagnosis, point out that the aneurism did not involve the carotid to the extent which it seemed to do during life. The part of the tumour which I have, in the description of dissection, called subsidiary, and which is so strongly marked in the first photograph, surged up from lower parts and covered rather than involved any large part of the cervical vessel. The mode by which I accounted for the deceptive sense of pulsatile dilatation in the cervical portion of the tumour during the latter part of the man's stay in the hospital is remarkably borne out by the dissection.

The position of the trachea and œsophagus, together with

¹ By some misfortune, in the very dark room where the post-mortem was made, the subclavian was cut through about the beginning of the second stage, but the rest of the vessel still attached was brought away, and the accident was not discovered till afterwards.

the almost spiral course of the left innominate vein round nearly to the back of the tumour, show that also the thoracic part of the aneurism must have been very much larger before operation than for several weeks previous to death.

Lastly, I may direct attention to the large quantity of firm organized fibrin deposited in the aneurism, to the comparatively small size of the cavity still existing, and to the fact that as no vessel leads out of it there could not be any stream of blood within it. It will therefore be conceded me that had this patient been of more tractable temper, had he either remained in hospital or been moderately prudent out of hospital, the whole tumour, since it had no thoroughfare, and since such strong walls could neither dilate nor burst, would have become, of necessity, filled up. In fact, that although the man died of an intercurrent disease brought on by his own obdurate indocility, his aneurism was to all intents and purposes cured.

DESCRIPTION OF PLATES II & II*.

Aneurism of Aorta, &c. (Richard Barwell).

PLATE II.

FIG. 1. Robert W—, from a photograph taken immediately before the application of the double distal ligature.

FIG. 2. Robert W—, from a photograph taken seven weeks after the operation.

PLATE II*.

Robert W—, Dissection of the aneurism, arch of the aorta, large vessels, and neighbouring parts.

Fig. *a*. Aorta.

b. Aneurism nearly filled.

c. Left carotid artery.

d. Left subclavian vein.

e. Left vagus nerve.

Fig. *f*. Left innominate vein.

g. Trachea
h. Œsophagus } twisted.

i. Right carotid artery.

k. Right jugular vein.