EXPERIENCE AND SPECIMENS
OF
OX-AORTA LIGATURE,
AND SOME
REMARKS ON THE VARIABILITY OF CATGUT.

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Two years ago, namely, on 10th March, 1879, I had the honour to read before this Society a paper, the object of which was threefold.

First.—To point out that certain cases of aortic aneurism might be benefited by deligation of the right carotid and subclavian arteries—an operation which had not previously been proposed or practised for that purpose.

Secondly.—To insist upon the advisability of leaving the inner and middle coats of arteries tied in continuity intact.

Thirdly.—To introduce a form of ligature which in deligation would not cut those tunics.

At that time the experience which I could place at the service of the Society was limited to the one example, which illustrated all those requirements. Even now cases, which

vindicate all the three points I then advanced must in the nature of thing be few.

Since the publication of my paper there have been two cases of deligation of the right carotid and subclavian for aneurism of the aortic arch with the ox-aorta ligature, making in all three such operations.

The first one by myself, on the 14th February, 1879, (the subject of my former communication). The second by Dr. Lediard, at that time of the Cleveland Street Infirmary, operated 26th March, 1880. The third by Dr. Wyeth, of New York, operated September 29th, 1880.

My patient lived sixteen months in fair health and comfort, dying in May, 1880. Dr. Lediard's patient survived rather more than nine months, dying on 22nd December, 1880. Dr. Wyeth's patient is alive. "She is up and able to move about without distress or difficulty. Has no dysphagia or dyspnoea, and no pain in the tumour, which still rapidly diminishes." (Report on Christmas-day, 1880.)¹

This is the list of the right subclavian and carotid vessels hitherto tied with ox-aorta ligature :

On October 27th I tied the vessels on the left side of the neck of J. K—, æt. 37, suffering from a large thoracic aneurism springing from the transverse arch of the aorta, beyond the origin of the innominate. The man was, previously to operation, evidently approaching death. It was thought that deligation of those vessels might give some

¹ See 'American Journal of Medical Science.' Dr. Wyeth writes: "I am of opinion that the danger of secondary hæmorrhage is greatly lessened by the use of this ligature and believe that its introduction will prove of great benefit to surgery." It ought, however, to be said that he managed the material in a manner rather different from that which I have recommended. He cut the ligatures out of the whole thickness of the vessel lengthwise, stretched the bands half their length, and left them to dry. In operating "he threaded the needle with ordinary catgut, and by tying the flat ligature to this easily drew it beneath the arteries." Doubtless this mode of making the ligatures saves some time, but an unnecessary amount of common areolar tissue is introduced into the patient's body. To a cord cut in that direction the middle coat adds no strength.

chance of prolonging life; it failed however to do so, but I do not think it hastened death, which occurred thirty hours after from pneumonia.

The parts of my first named case, J. S—, are on the table, as also, by the kind permission of Dr. Hopkins, of the Cleveland Street Infirmary, are the aorta, aneurism, &c., of Dr. Lediard's patient, while of my last-named patient I have brought only part of one vessel and the ligatures used.

I will now describe the condition of things found in my patient J. S—, sixteen months and a half after operation.¹

On the aorta are two aneurisms. A large one in front on the transverse aorta, and slightly involving the innominate, is filled with solid clot. Behind and springing from the ascending trunk is another aneurism, about the size of a walnut, exactly in the situation, where I, during the patient's life defined it from the peculiarly isolated pressure which bore on the right bronchus. The carotid of this man was the first vessel that I had tied with the aorta ligature, and it is clear that I tied it too loosely. The temporal pulse could be felt almost immediately after the operation; this I at the time attributed (but evidently by error) to freedom of collateral circulation. The ring of cellular tissue which the College of Surgeons' dissector has left on that vessel is probably the remains of the ligature.

On the subclavian, at the place of constriction, a few faint transverse striæ could be seen—the vessel is collapsed—it has been opened by a lengthwise slit in order to show the clot which fills it for a certain distance on each side the constriction. The collateral circulation is well established.

The description of parts from the next case I take from a letter addressed to me by Dr. Lediard:

"The aneurism is filled up with very firm clot. Nothing

¹ This preparation, which by the kind permission of Professor Flower I was able to bring with me, has since been placed in the College of Surgeons' Museum, Path. Series, No. 1596 D.

could have been more satisfactory than the action of your ligature in this case. The vessels were entirely occluded, there being no trace of the bands seen but a firm clot above and below the seat of constriction, such as is usually met with in vessels ligatured in their continuity."

The other specimens on the table, those of J. K—, are : —1. The part of the subclavian artery which was tied ; it is laid open to show the inner and middle coat entirely unhurt. 2. The ligature itself, which was divided in removing the parts. 3. The other ligature, kept with the knot entire in its tied condition ; it has been removed by dividing the vessel. Evidently there is no tendency of the knot to slip, nor of the ligature to become rapidly softened.

Certain other vessels have been tied with this ligature, viz. the external iliac twice, by Mr. Holmes and Mr. Johnson Smith. Both those aneurisms progressed well, and the surgeons reported to me very favourably of the ligature. Also, femoral arteries have been tied by Mr. Bellamy twice, by myself once, and one brachial also by me. In all these cases the wound did well, nothing more having been heard or seen of the ligature ; indeed, in the last four very rapid cure followed. In the brachial case the vessel was retied with ox-aorta after failure from rapid softening of catgut and secondary hæmorrhage.

Thus I am able to report to this Society fourteen deligations, which being varied, are more than sufficient to prove the solubility of the ligature which I introduced two years ago, and also to show that it is not absorbed too soon. Hitherto no instance of tying either the innominate or the first part of the subclavian has presented itself. I would wish, however, to repeat that the deligation of such large vessels so near the heart can only be safely undertaken with a ligature, which leaves all the arterial tunics entire and unwounded, a result only to be obtained by using a flat or ribbon-like band.

The specimens which I have placed on the table, six in number, especially the last described, show how the liga-

tures have acted. Let me very specially call attention to the fact that ox-aorta requires no preparation; it is simply cut, while fresh, into strips and dried; therefore all these ligatures are in their constitution alike. What these have done all others may certainly be expected to do.

I do not for one moment suppose that this power of absorption by the living human tissues is peculiar to arterial tunics, we know that all the soft connective tissues, as tendon and cellular membrane, possess this faculty, provided they are perfectly fresh, that is to say, not decomposed.

The extensor or suspensory tendon of the kangaroo's tail, tendons from the whale, decalcified bone from quadrupeds and birds, have all been introduced into the human body and have become absorbed or incorporated with the tissues. The (fibrous) structure which intervenes between the mucous and muscular coat of the sheep's intestine, the substance of which catgut is made, would doubtless act constantly and always in the same way were it not that a certain, or rather an uncertain, amount of putrefaction is essential in the primary manufacture; it is this that renders a long and elaborate preparation necessary,¹ and the ultimate result uncertain. To me the important points appear to be that the substance used should be absolutely free of all taint of decomposition, and that it should be cleansed from any accidental impurity by a short immersion in some antiseptic fluid. If these essentials be secured the choice of particular substance is immaterial; sufficient strength, persistency, ability to keep a safe knot, as also facility of acquisition, are the main considerations for an ordinary ligature. But for safe deligation of the larger arteries in continuity a flat form such as will not divide the tunics, is a great desideratum.

¹ That the preparation is not absolutely an essential may be gathered from the fact that of 80 unprepared catgut ligatures introduced experimentally by Porta 33, *i. e.* 41.25 per cent. were absorbed. ('Delle Alterazioni patolog. delle Arterie per la legatura,' &c.)