

A CASE
OF
LEFT SUBCLAVIAN ANEURISM
TREATED BY TEMPORARY COMPRESSION APPLIED
DIRECTLY TO THE ARTERY IN THE FIRST
PART OF ITS COURSE; WITH REMARKS.

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ELLEN L—, æt. 35, unmarried, a laundress, first came under my notice in August, 1872. She was at that time a patient in the Leeds General Infirmary. She was suffering from a subclavian aneurism on the left side, which she had noticed the previous May, and which she attributed to a blow received on the shoulder the previous Christmas (1871). The treatment adopted was digital compression applied to the third part of the subclavian artery for twenty-four hours consecutively. No improvement followed this treatment. In April, 1873, she placed herself under my care. The aneurism had increased in size, and she suffered much from pain in the shoulder and arm. I determined to treat her by galvanopuncture, and followed the plan recommended by Dr. John

Duncan, of introducing both the negative and positive needles into the sac. As the details of this treatment have been already published,¹ it is unnecessary for me to repeat them here. It is sufficient to remark that the operation was repeated five times with great temporary benefit, but without permanent cure. On the last occasion, February 24th, 1874, I combined the treatment with manipulation, but without any apparent result.

In November last she again applied to me. She complained much of a return of pain in the shoulder and arm. On examination it was seen that the position of the aneurism had considerably altered, that it had extended upwards above the clavicle into the neck, and that in that position it was approaching the skin. Below the clavicle, at the seat of the former operations, the pulsation was slight, and the tumour felt hard. Her general health was beginning to suffer. she was losing flesh, her appetite was bad, and she never slept without the aid of an opiate. Wishing to watch the further progress of the case, I advised delay, but at the end of a month, as her condition was getting worse, I requested my colleagues, Messrs. Wright and Horsfall, to see the patient with me. At that time pulsation could be felt extending upwards from the centre of the clavicle for an inch and a quarter, and downwards and outwards from the same spot for two inches and a half; the border of the tumour could be plainly felt internally above the clavicle, extending inwards under the outer part of the sterno-mastoid muscle, while outwards there was not a distinct spot at which the swelling stopped, but it seemed to extend towards the axilla, and to be lost in the upper part of that space. I proposed the operation of temporary compression of the artery in the first part of its course (*i. e.* internal to the scaleni muscles) and my colleagues, after careful examination and discussion, although by no means sanguine as to the result, agreed with me that the operation was justifiable, and promised me their assistance should I determine to undertake it. For the

¹ 'The Lancet,' July, 1874.

reasons stated below I made up my mind to give the patient this last chance of life, and on January 2nd of the present year (1875) performed the operation.

The patient being placed under chloroform, and having her shoulders supported by pillows and her head thrown back, an incision was made along the anterior border of the sterno-mastoid from the centre of the sternum upwards for two inches; this was joined by another of the same length along the clavicle. The flap thus formed, consisting of skin, superficial fascia, and platysma, was reflected; a small vein above the clavicle was ligatured, and, a director being passed under the sternal origin of the sterno-mastoid, this part of the muscle was divided. In doing this a large vein, the anterior jugular, was opened, and was secured by a ligature. The inner half or more of the clavicular origin of the muscle was then divided. The sterno-hyoid and sterno-thyroid muscles were thus exposed, and the internal jugular could be seen on the outer side of these muscles. The knife was now abandoned. Helping myself with a director, I slowly passed my finger through the fat and cellular tissue situated on the outer side of the vein, and reached the inner border of the anterior scalenus. Introducing a retractor into the wound, I hooked the jugular towards the middle line, and saw a large vein and what was apparently a small empty vein (thoracic duct?) passing over the aperture made by my finger; these were then placed under the retractor. The finger was now passed downwards, following the scalenus muscle; the phrenic nerve was reached and then the first rib. I now expected to find the artery directly behind the muscle, but on feeling was unable to detect any pulsation. The artery was obviously displaced from its normal position, and it was necessary to search for it. This was a somewhat tedious process. The carotid artery, the subclavian vein, the internal mammary artery, the transverse process of the seventh cervical vertebra, the aneurism itself, and the pleura were all reached in turn. At last, when my finger was inserted for its whole length, I felt obscure pulsation, apparently through a layer of pleura; by the help

of a director the artery was exposed and an aneurism needle (Gibson's) was passed round it. Pressure on the artery now stopped all pulsation in the aneurism. In passing the needle a small opening was made in the pleura. I now attempted to apply to the artery a pair of forceps which I had had made for the purpose; they, however, were not long enough, but a pair of ordinary torsion forceps were applied with ease. The wound was brought together by a few points of suture, and the operation completed at 2 p.m. One third of a grain of morphia was given hypodermically.

At 5 p.m. the pulse was 130, small, and irregular; respirations 44, the air passing in and out of the pleura at each breath. The left side of the chest was hyper-resonant, the breathing distant; on the right side loud mucous râles were heard. She rallied somewhat by 8.30, the pulse having a better character.

At 12.20, midnight, owing to her feeble condition, it was deemed expedient to remove the forceps and close the wound, thus preventing the ingress of air into the pleura. This was easily accomplished; the aneurism felt quite hard and contracted; no pulsation could be detected in it or in the left radial artery.

January 3rd, 9 a.m.—The general condition is improved. Pulse 116; temperature 102.8° ; respirations 36. The aneurism felt hard; slight pulsation is detected in it above the clavicle. She passed a restless day, being troubled by a continuous hacking cough. In the evening the pulsation could still be felt in the aneurism, and also feebly at the wrist.

4th.—Has passed a quiet night; the pulsation has disappeared, both in the aneurism and at the wrist. From this time till the morning of the 7th she gradually improved. Her pulse varied from 112 to 130; temperature from 99.6° to 101° ; respirations from 25 to 40. There was no return of pulsation in the aneurism or at the wrist.

On January 7th severe pain in the side supervened; her cough became more troublesome, and she expectorated large quantities of bronchitic sputa. She died at two

o'clock on the morning of the 8th, having lived five days and a half.

The friends strongly objected to a post-mortem examination. After much difficulty I obtained leave to examine the wound. The incision was prolonged along the clavicle, and this bone, being disarticulated at the sternal end, was thrown outwards; the cartilage of the first rib was then divided. The wound had united in the greater part of its extent. On opening the pleura behind the first rib about a pint of serum escaped from its cavity. Passing the finger upwards and backwards, a small opening, which would not admit the tip of the finger, was detected at the apex of the membrane. The artery had been compressed just before the origin of the vertebral; it was patent and in a perfectly healthy condition. The aneurism was long and fusiform, commencing a quarter of an inch from the thyroid axis, and extending outwards for three inches and a half. The artery on the cardiac side was of normal size, but at the peripheral extremity was somewhat dilated. The whole was filled with a hard firm clot, and it was, in fact, cured.

Remarks.—Before determining to perform the operation described above, I felt it was necessary to determine three points:—(1) Was there no other method of treatment that could be adopted? (2) Was the proposed operation practicable? and (3) Was there a reasonable prospect of success?

(1) There are numerous methods by which an aneurism of this description may be treated. The chief are pressure, manipulation, galvano-puncture, distal ligature, distal ligature combined with amputation, medical treatment, and ligature on the cardiac side. Of these, pressure, manipulation, and galvano-puncture had been tried, the two former without result, the latter with great benefit, which, unfortunately, was only of a temporary character, and which did not result in a permanent cure. Distal ligature without amputation would give small prospect of success; the patient would not hear of amputation, though at one time I thought seriously of the operation, encouraged by the case

of partial success recorded by Professor Spence. Medical treatment could not be tried, as the patient's position would not allow her to take the requisite time which must of necessity be spent over the method of treatment. Nothing then was left but to apply a ligature or some substitute for it to the artery on the cardiac side of the aneurism, that is to say, internal to the anterior scalenus in the first part of its course.

(2) The opinion expressed by the majority of surgeons is that this operation is "impracticable." For instance, M. Erichsen says,¹ "On the left side this operation (*i. e.* ligature) is not practicable on account of the depth at which the artery is situated;" again, Mr. Colles,² who was the first surgeon who tied the subclavian artery in the first part of its course, says, "This operation, difficult on the right side, must be deemed impracticable on the left." Many other authors could be quoted who express the same opinion. As, however, Dr. Rodgers, of New York, performed this operation in 1846, it was plain that these opinions were fallacious. After making many dissections of the part on the dead subject, both injected and uninjected, I came to the conclusion that the operation on the dead body was attended by no great difficulties. The thyroid axis was easily found in the interval between the anterior scalenus and internal jugular vein, and this served as an excellent guide to the artery, which could in a few minutes be exposed without injury to any important structure.

(3) The operation being practicable, was there then a fair prospect of success? If the ligature were applied in the usual manner the answer would be distinctly No. The one case in which this operation was performed died of secondary hæmorrhage on the fifteenth day. The ten patients on whom the right subclavian had been tied in the first part of its course all died. These results were not encouraging. The cause of death in ten out of the eleven cases is recorded

¹ 'Erichsen's Surgery,' vol. ii, p. 83.

² Quoted in 'Holmes' System of Surgery,' vol. iii, p. 618.

as due to hæmorrhage,¹ but no less than nine of the cases lived for ten days and upwards, one reaching the beginning of the sixth week. It was not unreasonable, then, to conclude that if secondary hæmorrhage could be avoided the operation, instead of being universally fatal, would present a fair proportion of successful results. The ligature being, then, inapplicable, I determined to try the effect of direct pressure on the artery, intending to keep up this pressure for twelve hours, or possibly for a longer time. The experience of Dr. Murray, of Newcastle,² seemed to show that the treatment held out every prospect of success, and a case which I had the advantage of seeing in the Leeds Infirmary, under the care of Mr. Wheelhouse, confirmed me in this opinion. This case was reported to the Clinical Society during their last session.³ The patient was cured of an inguinal aneurism by six and a half hours' pressure on the abdominal aorta under chloroform. The patient died some months after of another disease, and it was found that the aneurism was quite solid, and was fast being removed by absorption, while the aorta at the point of pressure was in its normal condition. It was shown by this case that to cure an aneurism it was unnecessary to occlude the artery. The complete temporary arrest of the circulation through the aneurism was sufficient to effect a cure, and this might, I thought, be effected without making the pressure so tight as to endanger sloughing at the point of application.

The *modus operandi* of this method of treatment deserves a careful consideration. It is evident that the cure is not effected by the gradual deposition of fibrin on the walls of the sac, the slow deposit being due to the passage of a small quantity of blood through the tumour. In a case of this sort the coagulation is sudden, and probably commences soon after the application of the pressure. The aneurism is filled by a clot formed out of the blood that was in it at the

¹ Erichsen, *op. cit.*, p. 83.

² 'Medico-Chirurgical Transactions,' vol. xlvii, p. 187.

³ 'Clinical Society's Transactions,' vol. iii.

time the pressure was applied. This clot, like any other in or out of the body, slowly contracts; for a time the walls of the sac contract round it, but in some cases it will shrink more quickly than the walls, and the pressure being removed from the supplying artery, the blood will pass between the clot and the wall, causing a return of pulsation similar to that which occurred in the case under consideration.¹ The blood will, however, have much difficulty in passing through the limited space left in the sac; fibrin will be deposited from it and the cure completed.

The death of my patient is to me a source of much regret. It was undoubtedly caused by the wound in the pleura, and this, owing to the displaced position of the artery, was, I believe, unavoidable.² If this wound had not been made, there seems every probability that the patient would have survived the operation, and if so the aneurism would have been certainly cured. Notwithstanding the unsuccessful result, I still believe this operation to be right in principle and likely to be successful in practice. By applying temporary compression in the place of the ligature it is at any rate possible that these operations for subclavian aneurism may become more successful in the future than they have been in the past. For my own part, I shall seize any opportunity that may occur of again putting this method of treatment into practice, and that not only on the subclavian arteries, but on any of the larger arteries of the body. I can only trust that on the next occasion I may meet with a more successful result.

¹ In Mr. Wheelhouse's case a similar pulsation was observed.

² Dr. Rodgers also made a wound into the pleura; it was not apparently followed by evil consequences.