A CASE
OF
ANEURISM OF THE EXTERNAL CAROTID
ARTERY;

LIGATURE OF THE COMMON CAROTID, WITH CURE OF
THE ANEURISM. DEATH FROM PARALYSIS
ON THE THIRTY-FIFTH DAY.

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In the sixty-fourth volume of the 'Medico-Chirurgical Transactions,' Mr. Henry Morris has recorded a very interesting case of aneurism of the external carotid artery, in which, after failure of ligature of the common carotid to effect a cure, the old operation of incising the sac was performed, and ligatures were placed on the facial and lingual arteries and upon the main trunk of the external carotid above the sac, with ultimate recovery. The conclusion which Mr. Morris draws from his case is that "it would be best, in carotid aneurisms near the bifurcation of the common trunk, to ligature simultaneously the common carotid and such branches of the external carotid as are easily accessible, viz. the facial, superior thyroid, and lingual, which may all be reached through one oblique incision, and the temporal." In the discussion which followed the reading of Mr. Morris's paper on 26th October, 1880,

I ventured to dispute the correctness of this statement, and I bring forward the following case in support of the view that ligature of the common carotid alone is sufficient to cure some cases of aneurism of the external carotid.

As regards the position of the aneurism in the following case the diagnosis was much assisted by the fact that the right half of the patient's tongue was considerably atrophied, presumably from pressure by the aneurism on the hypo-glossal nerve where it crosses the artery. It seemed unlikely that the internal carotid could, even if aneurismal, sufficiently stretch the nerve to cause paralysis, and there was no reason to think that the bifurcation of the common carotid was higher than usual. The occurrence of aneurism at the age of twenty-three was sufficiently accounted for by the state of the valves of the heart and the liability for embolism to occur in consequence of detachment of a vegetation. Death was clearly due to embolism through the *left* carotid from this cause, and in no way depended upon the operation, from which the patient had completely recovered, the aneurism being solidified throughout. A carbolised silk ligature was used with antiseptic dressing, and appears to have undergone no change.

For the very carefully recorded notes of the case I have to thank Mr. Stanley Boyd, late surgical registrar to University College Hospital.

Annie K—, æt. 23, a tailoress, was admitted into University College Hospital under the care of Mr. Heath on January 7th, 1882, with an aneurism of the external carotid. She gave the following history :

On December 10th, 1881 (one month prior to admission), she came down in the morning talking indistinctly ; on her mother remarking this she looked at her tongue and found that it deviated to the right, even more markedly than on admission. On the same day she felt something wrong with her throat, not soreness, but chiefly difficulty in swallowing. Her neck was rubbed with oil for four days, when (December 14th) a swelling as large as a

filbert was found near the right angle of the jaw. She then went as out-patient to a hospital, where nothing was done for a week ; but as the swelling continued to increase in size it was painted with iodine, and this treatment was carried out until the patient was admitted to University College Hospital.

When seven years old the patient had an attack of rheumatism, and since then she had had several ; during the last twelve months she had scarcely been free from rheumatic pains, and her joints, especially knees, swelled frequently. She had been losing appetite, flesh, and colour for six or eight months, and sweating much at night, but had had no cough ; vomiting had been frequent for some weeks past, and for some time she had been living on fluids, being unable to swallow solids.

On admission the patient was very thin, weak, and markedly anæmic. There was a smooth, round, pulsating swelling just below the right mastoid process, reaching down to about the level of the upper border of the thyroid cartilage, limited in front by the ramus and angle of the jaw, and overlapped behind by the sterno-mastoid, but no parotid could be felt on its surface. Altogether it had the size and shape of half a small orange, was very tense, and its pulsations were expansile. The right tonsil was pushed somewhat inwards, and pulsation could be felt beneath, but it was not strong. The right temporal pulse was markedly weaker than the left. The tongue deviated much to the right, and the right half of the organ was a good deal wasted. There was more dysphagia than the slight encroachment of the aneurism on the throat would account for ; only fluids could be swallowed, and that with difficulty and pain. No dyspnœa was present.

There was no pain about the aneurism, but the patient complained that the pulsations shook her head. She said that her sight was often hazy, that she could not read for any length of time, and that these symptoms were more marked in the right than in the left eye. The pupils were normal, the optic discs were very pale, and the margins

obscure, especially the right. She also complained of occasional diplopia, but no squint was ever noticed.

The heart's impulse was strong, heaving, extending far outside the nipple line. There was no thrill. At the apex a loud, well-conducted, mitral, systolic murmur was heard; at the base a much fainter double aortic, a distinct second sound intervening between the murmurs. Pulse 100, full and strong. There was a little albumen in the urine. Temperature often 100° — 102° .

On January 11th Mr. Heath tied the common carotid just above the omo-hyoid with a thoroughly carbolicised silk ligature. The right pupil dilated somewhat immediately after the ligature was tightened, but the knot did not completely stop pulsation in the aneurism. The ends of the silk were cut off close, the wound was washed out with carbolic lotion, and closed by four wire sutures. No spray was used, otherwise the operation was done antiseptically. A gutta-percha splint was bandaged on to the head and shoulders to keep the face turned towards the left.

The patient slept well after the operation. On the second day the pupils were of moderate size, equal and reacting readily. A distinct difference in colour and temperature of the cheeks was noticed, the right being the cooler and paler, and this persisted till the third day. It was exaggerated by the left cheek being kept in constant contact with the pillow. The tongue deviated as before the operation, and no change was noted in it before death. The patient complained of rather more pain and difficulty in swallowing, but this soon passed off and power of deglutition steadily improved. The urine was rather dark from carbolic. The temperature was 101.2° on the morning of day of operation, 101° in evening; but on the second day it had fallen to 99.6° , and reached 98.2° in the evening.

On the third day everything was going on well. The dressing was changed under the spray; the edges of the wound were in perfect apposition, there was no redness

tenderness, or swelling. There was distinct pulsation in the tumour; the facial pulse was plain, but the temporal could not be felt. Temp. 100.2° — 101° .

On the fourth day the patient vomited once; her urine was deeply carbolised, and there was one quarter or one fifth albumen in it. The albumen did not diminish in quantity up to the twentieth day, after which there is no note. The bowels were much confined and scybala had to be cleared out of the rectum by finger on the seventh day. At the dressing on this day (seventh) the wound was found to have united completely by first intention; the sutures were causing no irritation, so they were left in beneath an antiseptic dressing, which was renewed on the tenth and thirteenth days. On the seventh day it was doubtful whether any pulsation existed in the aneurism; on the tenth day it was certainly absent; and on the eighteenth the sac was smaller and quite hard. On the twenty-fourth day the right tonsil had fallen back to its normal position; and on this day the superficial temporal pulse was felt for the first time. On the twenty-fifth day the patient got up for a short time; and on the twenty-ninth the splint fixing her head was removed. Her power of swallowing had increased so much that on the ninth day she began taking chicken for dinner; but she vomited almost daily; her temperature was very irregular, being sometimes normal for two or three days and then 100° — 101° —or a little over—for two or three more. The most marked attack of fever during this period was probably due to a subacute cellulitis of the right hand and forearm, which appeared on the fourteenth day and disappeared under fomentations in four days.

The patient continued to get up daily for two or three days; vomiting then became more severe and she was confined to bed. The patient felt pretty well, and continued to take plenty of food, but the vomiting was unchecked by all the remedies tried. Still it was not very severe, coming on only three or four times a day; and the patient did not seem to be losing strength. The

temperature was still irregular, often running up at night to 100° — 101° , and once to 103.2° , whilst, in the morning it was generally 99° or a little over. There was no pain, but slight palpitation was occasionally complained of.

On the thirty-first day a plain aortic obstructive murmur was heard, whereas there was but a faint one on admission.

On the thirty-third day just after noon (12.15 p.m.) the patient was sitting up in bed, supported on pillows, eating some mutton. She suddenly dropped her knife and fork, and leaned back complaining of pain at the back of her neck and down the spine to the sacrum. She used both her hands to show where the pain was. After this she began to cry—a very unusual thing for her. She soon cheered up, but could not be persuaded to eat any dinner. At this time her speech was no worse than usual; but, at 2 p.m. it was unintelligible, though she evidently understood all that was said to her. At 4 p.m. she did not try to speak at all, and two hours later she did not recognise her friends, nor did she take any notice when spoken to, but lay quite still with her eyes partially open. Her temperature was 98.4° — 101.6° . During the night swallowing became difficult, and finally, power of deglutition was lost; the motions were passed in bed. On the following morning (thirty-fourth day) it was found that the right arm was paralysed, and at 11 a.m. the right leg was similarly affected; but it seems certain that three and a half hours previously she had drawn this limb up whilst the bed was made. There was no ocular paralysis and no asymmetry of the face. No convulsions or twitchings had been noticed. The pupils were equal and reacted readily. The pulse was 99, full, compressible, thrill easily developed. Temperature 101.8° . It rose steadily to 105.2° at 7 p.m., and after this varied between 104.8° and 108.6° at which latter point it stood for three hours before death. This occurred at 5 p.m. on the thirty-fifth day. There was no post-mortem rise of temperature.

Post-mortem 19 hours after death. Temperature of room 53° F. Rigor mortis slight.

Brain : too much fluid on surface ; a few small hæmorrhages here and there on the pia mater. No flattening of the convolutions ; no difference in size or appearance of the hemispheres.

In the base of Broca's convolution was a vessel containing a small, firm clot, probably an embolus ; but there was no surrounding hæmorrhage or anæmia. The vessel and clot formed a small patch about the size of a split pea. Five or six small patches of yellow softening were found beneath the grey matter of the surface ; one beneath the right supramarginal convolution was the size of a three-penny piece, and another, rather larger, lay beneath the operculum, just external to the right claustrum—probably results of old emboli. Beyond this, and perhaps some diminution in consistence of the brain substance, the organ seemed normal. The arteries at the base appeared healthy but they were not slit up.

The body was thin and small petechiæ dotted the whole surface. There was some bronchitis, and collapse of the lower lobes of the *lungs*. *Pleura* normal. *Pericardium* normal. *Heart* much hypertrophied on left side. Blood well clotted, no staining of endocardium ; right valves healthy. Mitral valves moderately thickened ; many rather firm vegetations on both surfaces and borders. Each cusp of the aortic valve was studded, on the side towards the lumen of the vessel, by a button of vegetations, one being as large as a fair sized pea. The endocardium of the left auricle was also roughened over a large surface by small firm vegetations. The wall of the left ventricle was two thirds to three quarters of an inch thick, and decidedly too pale ; one miliary abscess was found in it.

There were many petechiæ beneath the parietal peritoneum. *Liver* normal, but for a deep congestion of the hepatic veins. *Spleen* rather large and firm ; many small and two large yellow infarcts in the surface, solid, slightly raised, friable : others, which had softened, in its substance. *Kidneys* : cortex narrow, pale, and firm ; surface

deeply punctured from scarring of old infarcts? In the substance of the left were four or five softening infarcts; in right, one or two, and one on the surface. *Stomach*: many small submucous petechiæ; otherwise normal.

The scar of the wound through which the carotid had been tied was perfect. Immediately the platysma was reflected the sac of the aneurism, of a yellowish-brown colour, was exposed, surrounded by dense fibrous tissue which extended down to the bifurcation of the carotid. It formed a tolerably firm swelling, and on section, was full of red, laminated clot; the wall in parts was nearly one eighth of an inch thick. The shape of the aneurism was oval and its measurements were $1\frac{1}{4} \times \frac{3}{4} \times \frac{3}{4}$ inch. It sprang from the external carotid about half inch above the bifurcation of the main trunk, and the mouth of the sac seemed very wide, nearly half an inch of the wall of the vessel having yielded. The only vessel arising below the sac was the superior thyroid. The facial and lingual came off by a common trunk from its anterior part; they are closed at their origin, for a bristle cannot be introduced along the facial. From the upper and inner part rises the temporo-maxillary trunk. The origins of the other branches were not certainly made out.

The descendens noni ran up beneath the sac and was followed through dense fibrous tissue to its junction with the hypoglossal, which lay below and behind the sac, tightly stretched and of a yellow colour, either from fatty change or blood-staining. The aneurism had evidently risen from the external carotid just above the point of crossing the nerve, which, in its growth, it had pushed downwards and outwards. The sudden onset of the paralysis of the tongue would seem to show either sudden origin or sudden increase of size of the sac.

The ligature lay on the carotid rather above its middle point. Its site was marked only by a slight prominence over the knot, it was covered by loose connective-tissue, and there was absolutely no thickening or matting together of the soft parts about it.

On opening the artery above it a firm red clot was found, about three quarters of an inch long, adherent all round at its base to the walls of the vessel, but at its apex becoming more taper and adhering to the inner side of the vessel only. Below the ligature lay a small clot, not a quarter of an inch long, adherent only to the anterior side of the vessel.

A section through the scar in the skin, subcutaneous tissue, and platysma, enables one to recognise with certainty the line of the incision only in the skin; here, it is shown by a distinct depression on the surface, by the absence of papillæ, by indistinctness of the wavy bundles of connective tissue and by considerable increase in the number of nuclei; in many sections one or two considerable groups of small round cells are cut across, lying just where true skin and fat join. Beyond this point it is impossible to say from any disturbance in the arrangement of the bundles of connective tissue or of muscle, which direction the incision took; and, with the exception of very small collections of small round cells here and there, the appearance of the tissues is normal. It will be remembered that the wound healed by first intention, and that the patient died five weeks after its infliction.

It will be seen from the specimen shown (see Plate I), which has been carefully mounted by Mr. Shattock, that a piece of the ligature including the knot has been removed, but it was taken in such a way that no tissue was left inside the silk. Consequently, in most of the sections prepared, the silk has fallen out; here and there a bit has remained. On the outer side, the ligature is everywhere covered by a thick layer of loose connective tissue, free from signs of irritation, and often containing a few fat-cells close to the point through which instruments must have passed. As seen by a low power, the ligature site looks like the wall of a small abscess, so dense is the surrounding cell infiltration. With a high power it is found that a good deal of fibrous tissue has formed, constituting quite a capsule to the ligature at some points.

Young fibrous tissue, rich in cells, runs into the grooves of the knot, in some sections passing across the cavity between two pieces of silk. The bodies of many of the cells forming the infiltration are of considerable size, though they possess but one nucleus. Large multinucleated cells are by no means uncommon, in fact, all the signs of a chronic inflammation are present. Into the looser parts of the ligature round cells have penetrated some distance, into the tighter, scarcely at all. Fibrous tissue is forming in small quantities between silk fibres at some spots. There is no sign of erosion or absorption of the silk.

The wall of the aneurism consists of parallel layers of fibrous tissue. In many sections these layers are separated by collections of small round cells; and these sometimes are placed so closely and are arranged with such regularity that they might, under a low power, almost be taken for a distinct coat of the aneurism. The thickest point of the wall seen in the specimen, is produced by a large collection of leucocytes separating the inner and outer layers. The line between the wall and the contents is not sharp. The latter seem for the most part to consist of granular material of reddish colour, with leucocytes scattered sparsely through it. Towards the wall they become more numerous, and in some sections the infiltration of the clot by them is both dense and deep. At the line of meeting of the wall and contents, rather large cells of reddish-yellow colour, from the taking up of red granules, are often seen. A careful drawing of the preparation is appended (see Plate I). In Fig. 2 is given the section of the seat of ligature of twice the natural size, for purposes of comparison with a similar section of a carotid artery tied with a tendon ligature, figured by Mr. C. T. Dent in the sixty-fourth vol. of the 'Medico-Chirurgical Transactions.'

DESCRIPTION OF PLATE I.

Aneurism of the External Carotid Artery, ligature of the
Common Carotid, with cure of the Aneurism
(CHRISTOPHER HEATH, F.R.C.S.).

- FIG. 1. A. Internal carotid.
B. External carotid.
C. Common trunk of lingual and facial artery.
D. Seat of ligature, the divided ends of the silk are seen in
the section.
E. Aneurism filled with clot.

FIG. 2. Seat of ligature twice the natural size.