A
CASE OF ANEURISM,
IN WHICH
A LIGATURE
WAS PLACED UPON
THE SUBCLAVIAN ARTERY.

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COMMUNICATED
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THOMAS WARNER, aged thirty-eight, was admitted into our Hospital on the 16th February, 1821, with a pulsating tumour immediately below the left clavicle, which was readily ascertained to be an aneurism of the axillary artery. His employment was that of a fisherman, which was very laborious, and constantly exposed him to the inclemency of the weather. He had enjoyed perfect health, till, about nine months ago, he had a severe attack of rheumatism, which left him subject to pains in his limbs, but more particularly in his left arm ; it was not, however, till about three months previous to the present time, that he perceived the swelling below the clavicle, which he stated to have been small in the beginning, and always pulsating ; the weakness and pain in the arm increasing in proportion to the augmentation of its size.

The swelling, when first examined by myself, was of an oblong form, lying just below and parallel with the left clavicle, and might be covered with the half-closed hand ; it pulsated strongly, but, by pressure upon the artery above the clavicle, the pulsations could be entirely stopped.

February 17th, the day after his admission, he overheard a conversation relative to the necessity of an operation, which induced him to leave the Hospital, and return to his home. Another month passed away before he was prevailed upon to return to the Hospital, when I found that the tumour had extended farther in every direction ; the pulsation in it was very strong, and the artery above the clavicle was compressed with greater difficulty ; yet the clavicle appeared to be but little elevated, and the tumour seemed rather to overlap the bone. The pulse at the wrist was the same as in the sound arm. He complained of severe pain and irritation in the breast, shoulder and arm, which had prevented him from lying down for the last three weeks ; and he was now anxious to submit to any operation. On the day after his arrival, the arm and elbow ached intolerably ; his pulse being 90 and full, I took ʒxviij of blood from the arm, which tranquilized him greatly ; he took afterwards a dose of physic, and an opiate at bed-time. The blood drawn showed no marks of inflammation ; and, on the next day, he became cheerful, and comparatively free from pain.

March 19th.—According to appointment with my colleagues, I performed the operation of tying the left subclavian artery this day at noon. The man was laid on the operating-table, with his shoulders a little raised, and his legs hanging over the table, and resting on a chair. I made a transverse incision, about two inches and a half in length, along the upper edge of the clavicle, and from the middle of this incision I made another directly upwards along the outer margin of the sterno-cleido-mastoideus muscle; I then dissected back the triangular flaps, thereby exposing the edge of the mastoid muscle, and the omo-hyoideus, which crossed the upper angle of the wound. In the space between the latter muscle and the clavicle, I now felt the artery with the end of my finger, and then proceeded to expose it fairly by removing the cellular tissue which covered it. This cellular tissue was partly divided by a few cautious touches of the scalpel, and partly detached from the vessel by the handle of the instrument. I next directed my assistant to draw the nerves a little outwards with a hook, and then, passing my finger into the bottom of the wound, I felt the artery distinctly upon the rib, and, pressing upon it, stopped the pulsations in the tumour. I touched the cellular tissue cautiously on each side of the artery with the edge of the scalpel, but still could not raise it from the rib with my nail; it seemed firmly attached in its situation. I tried to pass probes and other instruments beneath the vessel, but ineffectually. At length,

I insinuated the tip of Desault's elastic needle under the outer side of the artery, and, holding the canula firm upon the rib, I desired the assistant to press down the stilet, which caused the needle to pass under the artery; but I had some difficulty in bringing its extremity up on the other side, as it constantly hitched in the neighbouring fibres of the scalenus and mastoid muscles, the great flexibility of the needle allowing its course to be altered by the slightest obstacles; at last, by catching the point with my nail, I was able to guide it round the vessel, while my assistant pressed it forward; I next threaded the needle with a strong round ligature, and cautiously withdrew it into the canula; then, bringing the double ligature under the artery, I cut it from the needle. The two portions of ligature were now separated from each other as much as possible, and one was tied; then, with the assistance of Mr. Ramsden's iron instruments for tightening the ligature, the knot was drawn, the inner coats of artery were sensibly divided, and the pulsations in the tumour ceased; a second knot was then made, and tightened in the same manner. I now attempted to withdraw the loose portion of ligature, but found that it was so connected with that which had been tied, as not to allow of its being withdrawn without force; therefore I let the whole remain. The ligatures were brought out at the lower part of the wound, the edges of which were approximated by strips of plaster, and over this a light compress was confined. The artery

was more deeply situated, and more difficultly exposed, than I expected ; but the operation was completed in about twenty minutes. The hæmorrhage was trifling : a large vein was exposed just behind the upper edge of the clavicle, which was carefully avoided. The patient was quite easy in the rest of the day after the operation ; but, having some pain in the elbow at night, he took an opiate draught, and some opening medicine was administered in the morning.

March 20.—I found that he had passed a good night, and had suffered very little inconvenience from the wound. The medicine had acted beneficially ; the pulse was about 85, and the temperature of the left arm equal to that of the other ; the tumour was flattened and soft. The dressings were removed, when we found that the wound had united, except where the ligature passed out. In the evening he complained greatly of painful and distressing sensations about the elbow, and was extremely restless ; and I now felt a return of pulsation in the tumour ; it was slow and intermitting, but felt pretty strong when the tumour was firmly pressed : there was also an obscure pulsation in the artery at the wrist. He took tinct. opii m. xlv., and had the arm embrocated with soap liniment and laudanum.

March 21.—He had had a very restless night, and complained bitterly of the pain in the neck, shoulder, and arm. The pulsation in the sac was

stronger ; the pulse in the sound arm was rather weak and intermitting. I took eighteen ounces of blood from the arm, which produced syncope ; but as it flowed at first, the pulse rose, and became more regular. He seemed much easier afterwards, and disposed to sleep. The blood was much cupped and buffed. I ordered him a saline mixture, with small doses of Tinct. opii, every four hours ; in the evening the pains in the arm and elbow again distressed him so much, that I gave him Tinct. opii m. LX.

March 22.—He was, upon the whole, better than yesterday. I dressed the wound ; from which I wiped a small quantity of pus, where the ligature passed out ; and afterwards gave him some opening medicine. The pulsation in the sac was much the same, and the very weak pulse at the wrist remained. In the evening he was again excessively distressed with pain in the arm and back of the shoulder, attended with a burning sensation, as if boiling lead were running down his breast and back. The pulse was weak and intermitting as before ; but, as he seemed relieved by bleeding yesterday, I again took blood from him to the amount of $f\frac{3}{4}xvj$; after which the pulse rose and became regular. On visiting him at midnight, I gave him Tinct. opii m. LX., and waited to see the effects of the dose. In about a quarter of an hour he became restless, and complained of severe pain and uneasiness at the back part of the shoulder. I then applied a dozen leeches

to the painful parts, which relieved him, as did the warm fomentations which I afterwards ordered.

March 23.—He felt much more composed than yesterday. The uneasiness in the shoulder returning, in the afternoon sixteen leeches were applied. He took fifteen minims of the black drop at bed-time, and was ordered a dose of castor oil early in the morning.

March 24.—The pulsation in the sac is more regular and less laboured; the distention of the tumour does not increase. He passed the day in comparative ease, and repeated the black drops at bed-time.

March 25.—In the evening of this day, I was called to him on account of some bleeding from the wound; when I found that the nurse, on changing the wet compress which was laid over both the tumour and wound, observed it to be tinged with florid blood. I removed the dressing and sponged the wound; some small coagula hung about the ligature, but there was no further appearance of hæmorrhage. He said that he felt a hot and pricking sensation about the part, just before the blood was observed; the pulsation in the sac was more violent than it had been since the operation, and indeed was nearly as strong as at any time previous to its performance; the distention was also in-

creased. I did nothing further than replace the compress. On the following morning, he was awakened by the pricking sensations before described, and shortly after perceived something wet and warm running down his side into the bed, which the nurse discovered to be blood ; when I arrived he had lost nearly a pint of blood, which appeared to be arterial ; he was pale and shivering with cold. The nurse had held a compress on the wound according to my direction, and on removing the pressure there was no further hæmorrhage, even after sponging the parts rather roughly ; but the most remarkable circumstance was the complete cessation of the pulsation in the sac, and the reduction of the tumour to one third of its previous dimensions.

March 26.—There had been no return of pulsation in the sac or hæmorrhage from the wound ; a small quantity of bloody sanies was pressed out from the latter every time it was dressed. The tumour is quite flattened and sunk, the arm easy, but a little numbed, though as warm as the other. He feels weak and tired, and has remained in bed all day ; the pulse was ninety-six and soft ; the tongue and skin moist.

March 27.—He is free from pain, and has slept well without his opiate ; he complains of being faint and low ; pulse seventy-eight.

March 28.—He had a severe shivering fit last night, after I left him; for which the apothecary gave him Tinct. opii m. lx. at two doses, which stopped the rigors, and they were succeeded by profuse perspiration; the pulse was 120 this morning, and he had been slightly delirious. The wound looked well, and the tumour seemed to be rapidly subsiding. He dosed a good deal during the day; but, about four in the afternoon, he awoke in such a state of restlessness that it was thought right to give him Tinct. opii f3ss., which had the effect of quieting him; he, however, still complained much of an odd sensation and numbness in his fingers, which he rubbed and scratched violently with the other hand. In the evening the pulse was 108.

March 29.—He had passed but an indifferent night, the fever still continuing, with delirium and much thirst. About eleven this morning he had a slight shivering fit, and soon after a fresh accession of fever; at twelve I took f3xvj of blood from the arm, which made him faint, but produced a very trifling alleviation of his symptoms, and no abatement in the quickness of the pulse. The blood was much cupped. He took calomel and jalap, and afterwards some salts, which produced four or five loose stools. The restlessness not being relieved by these proceedings, he took Tinct. opii f3ss in the afternoon. In the evening he lost about half a pint of blood from the wound. I removed the dressings, and sponged the wound, but no discharge came from

it, even after squeezing it on all sides. He was cold and faint. I laid a compress of lint on the wound, and left one of the pupils to watch him. At eleven I saw him again, he had taken a grain of opium, and was dosing. The pulse had recovered its quickness, but was weaker.

March 30.—The hæmorrhage returned at three o'clock this morning, but was directly suppressed by pressure. He had been pretty quiet during the night, but at intervals was rambling and delirious; the pulse was 120, and the thirst almost insatiable. I ordered him a saline mixture, with small doses of tartarized antimony, which seemed to lessen the frequency of the pulse, but induced so much nausea, that it was discontinued. About two o'clock he had a severe shivering fit; after which he took Tinct. opii m. lxxv. at two doses, which quieted him, and, with the assistance of other stimuli, restored warmth. At eight in the evening he lost some blood from the wound, which, although the quantity was small, produced extreme faintness.

March 31.—He had somewhat revived since yesterday, and had passed a tolerable night, during which he took a mixture, with confectio opii and æther, to relieve flatulency. The pulse at the right wrist was very weak and irregular. Slight bleeding again took place from the wound; he became weak and faint, and the pulse could no longer be felt; wine and other stimuli were given him, but he

did not revive, though quite sensible when roused ; he sunk gradually and died about five o'clock in the afternoon.

April 1st.—Dissection.—The aneurismal sac was exposed by the reflexion of the pectoralis major and minor muscles ; its lower boundary extended to the inferior margins of the third rib ; and above, it extended beneath the clavicle to the first rib ; laterally it reached from the axilla to the sternum. The axillary vein was found exterior to, and firmly united to the sac, at its inferior part. Three or four large nerves of the axillary plexus were stretched over the middle of the sac. In the further progress of the examination, the following circumstances were noticed :—The aorta appeared thinner than usual, and the carotids were in some parts so thin as to be transparent. The left subclavian artery was completely divided at the part where it had been tied, and the two portions of the vessel were separated about a quarter of an inch from each other, the ligature being retained by a few cellular threads in the midspace between them. The extremity of that portion of the artery connected with the sac, was much contracted, and completely filled by coagulum. The portion next to the heart was not in any degree contracted, and its cavity was open to the extremity, which was, in part only, filled by lymph. This lymph closed the orifice of the artery, except at one part, where there was an aperture that would receive the end of a probe be-

tween the lymph and the extremity of the vessel, and leading directly into the cavity of the latter. Five large branches, viz. the vertebral, internal mammary, cervicalis profunda, superior intercostal, and inferior thyroideal, arose from the artery between its origin and the ligature. These branches arose close together, and at a distance of only half an inch from the part where the artery had been tied. The right side of the heart was filled with blood; the lining of the thoracic aorta was partially thickened by a pulpy substance, deposited beneath it. Some small shreds of coagulable lymph were found on the pleura. The upper lobe of the left lung was observed to adhere to the pleura costalis, and when separated from it, I discovered that the posterior part of the tumour had penetrated the chest, so that the sac was here in contact with the pleura. The sac contained about a tea-cup full of recent coagulum, and some large masses of laminated fibrine. The sternal extremities of the three first ribs were in a great part absorbed; the brachial artery was not in any degree contracted, and was quite pervious to its termination in the sac. Immediately below the sac, a large branch arose from the artery, almost equal in size to the trunk, and immediately divided into the infra-scapular and two circumflex arteries.

Remarks :—It remains for me to observe upon the peculiarity of the symptoms which preceded the unhappy termination of this case.

There can be no doubt that the state of the disease, on the patient's first coming to the hospital, was much more favourable for the operation, than on his return, when every symptom was highly aggravated. But although the sac had acquired a much larger size, and the pulsation a greater force, yet the clavicle appeared to retain nearly its natural position, and the difficulties of the operation itself did not, by any means, seem to be increased in proportion to the very urgent and harrassing symptoms which demanded its performance. The happy accomplishment of the operation, and the complete cessation of all pulsation in the sac, and pain in the shoulder, for thirty hours afterwards, had induced me to indulge the most sanguine hopes for its perfect success; these, however, were speedily checked by the return of the pulsation, and the distressing pains and irritation in the shoulder and arm. These pains seemed clearly referable to the stretching of the nervous cords spread over the sac; and the early return of the pulsation in the sac, and at the wrist, can only be attributed to the free passage of blood into the arteries of the arm, by means of the anastomoses of the vessels ramifying about the scapula. From the entire cessation of this secondary pulsation, after the first hæmorrhage, I at one time thought it probable that the artery had given way on that side of the ligature nearest the sac, as the ligature remained firm in its situation; and I thought that a hæmorrhage from the aortal side would not be so long, and so easily repressed. The

contraction of the sac, and the coagulation of its contents may however be accounted for by the great faintness produced from the sudden loss of blood ; the extent of the artery implicated in the aneurism, comprising all that part of the vessel between the first rib, and within half an inch of the origin of the infra-scapular branch ; and there being not more than an inch of the artery between the sac and the origin of the five large branches of the subclavian, which have been enumerated, the ligature was consequently applied under the great disadvantage of a morbid condition of the artery, so near the aneurism ; and we must not overlook the circumstance of the artery being tied so near the origin of a considerable branch, that there was no internal coagulum to arrest the impulse of the blood, against the lymph, which had closed the orifice of the vessel. The appearance of the parts clearly showed that the lymph had been detached from the extremity of the artery, and that from the aperture thus produced, the several discharges of blood had arisen.

The repeated attacks of rigor, clearly indicated some internal mischief of an inflammatory nature ; and the appearances after death proved that recent inflammation had existed in that part of the pleura covering the posterior parietes of the sac, and causing its adhesion to the lungs. Whether this inflammation and adhesion were produced by the pressure of the sac, or were the consequence of

irritation, brought on by the operation, is in some measure doubtful; but it seems more probable that it may be referred to the latter cause, as the pressure existed in a much greater degree before the operation, when the blood drawn showed no marks of inflammation, while it was very highly cupped and buffed at every venæsection afterwards. The preceding history seems to warrant the opinion, that the unfavourable issue of the case was more decidedly owing to the general irritation of the system, partly induced by the operation, and partly caused by the implication of the aneurism with the axillary nerves, and by its extension into the chest, than to the quantity of blood lost in the several hæmorrhages.

The morbid parts are preserved in the Museum of St. Bartholomew's Hospital, by my friend Mr. Stanley, to whose assistance I am much indebted for the elucidation of their anatomical peculiarities.

Winchester, May 1st, 1821.