TWO CASES OF THORACIC ANEURISM IN WHICH GALVANO-PUNCTURE WAS USED.

By HENRY SIMPSON, M.D.Lond.,
Physician to the Manchester Royal Infirmary, etc.

CASE I.—In the spring of 1875, John Riley, aged 24 years, was admitted to the Manchester Infirmary under my care. He had worked as a collier for eleven years, had lived well, was muscular and active; his complexion was pale and his stature short. So far as could be ascertained, he had not had syphilis. He had fought sundry up-and-down fights, but there was no history of marked injury resulting. His family history was fair, and his own health good till March 1875, when his shoulder-blades began to ache, and he had a cough with some tickling in the throat. On admission, the chief signs were somewhat tumultuous action of the heart, with a systolic murmur. The notes taken at this period are unfortunately lost, but according to my recollection there was no marked increase in the cardiac dulness, nor was there any impulse apart from that of the heart itself. After a time, however, a prominence appeared in the second left interspace close to the sternum, where pulsation was evident both to touch and sight. He was kept quiet in bed and treated with large doses of iodide of potassium, but with no apparent good resulting. He was then put on Tufnell's diet. This was carried out on the whole well, but it is often difficult to get hospital patients to cooperate with you in treatment, and at times, in spite of watchfulness, he transgressed; *e.g.*, on one occasion he was discovered indulging in black-puddings. Perfect quiet also in the horizontal position was of course enjoined, and fairly enforced. The prominence gradually enlarged, and distinct fluctuation was very evident for a long time; but towards the end of October 1875 it became much firmer, and there was scarcely any trace of fluctuation. His general condition was better, and he was comfortable, except that from time to time he was distressed with cough; indeed, he suffered more or less from bronchitis during the greater part of his illness. After the solidification of the superficial portion of the aneurism, a change gradually took place in its position. It sank lower down the sternum, leaving its original site resonant on percussion, and, passing somewhat under the sternum, eroded that bone and formed a pulsatile tumour nearer the middle line, and overriding a considerable portion of the heart. There was no dulness on percussion over the back. Both cardiac sounds were heard; the first being accompanied by a murmur.

In January 1876 it is noted that, "in front a prominent pulsatile eminence occupies the lower portion of the chest, extending from the level of the nipples to the ensiform cartilage. It rises gradually above the general surface, but at a point one inch to the left of the middle line and one inch below the level of the nipple is a small conical elevation, where a distinct sense of fluctuation is felt over a space of the size of a shilling. Around this there is a rigid edge, well marked, except at the outer side, whence fluctuation extends in a horizontal line for about two and a half inches. Heaving pulsation is felt over the whole of this prominence. Over the tumour the systole is felt without thrill. The diastole commences with thrill and is accompanied with a sense of shock to the hand. In the early stages of the case, the most prominent point was in the second left interspace, where the pulsatile impulse was also most marked. Now over this spot a resonant pulmonary note and respiratory murmur are distinctly heard. Very marked pulsation is now felt at the epigastrium, where a murmur synchronous with the diastole of the tumour can be traced upwards to the level of the third rib." About this time, the pulse was from ninety to one hundred: he had more or less cough, with expectoration often tinged with blood. His sufferings were not great, but he had pain in the chest and between the shoulder-blades.

On January 17th, he complained of pain and soreness over the prominent point of the tumour.

On January 22nd, it was noticed that the skin at this point was changing colour, and moistened tannin was applied.

On February 3rd, the swelling had increased considerably in size: it was broadly conical or almost globular in form, fluctuating distinctly at the summit, but firm on the sides. The physical signs were much as previously described, but the discoloration of the skin had gone, and the man said he felt very comfortable. The pupils acted well, but were rather widely dilated; the left more so than the right: the expectation was abundant.

On February 5th, two needles connected with the positive pole of a Foveaux's battery were introduced into the tumour, and a weak current, first from five and then from eight cells, was passed through it for about a quarter of an hour. A sponge, connected with the negative pole, was

applied to the chest. This proceeding gave him no pain except from the passing of the needles through the skin, but it was not followed by any marked change in the condition of the aneurism.

On February 8th, three needles were introduced, and a current from the same number of cells was kept up for forty minutes: but though the tumour felt somewhat firmer after this, it must be confessed that no marked change was apparent.

On the 17th, wet sponges, connected with the battery, thirty and then thirty-five cells of which were in action, were applied laterally to the tumour, and the current passed through for three hours. This was not disagreeable, but seemed to soothe the patient till more than thirty cells were used; but no change was produced in the tumour. A little oozing of blood had taken place from one of the punctures the previous evening, and this occurred again on the 19th, but was easily checked by the application of the perchloride of iron.

On the 20th, two needles connected with the positive pole of the battery were inserted into the aneurism, and thirty-five cells set in action. The current was maintained for forty minutes. It gave no appreciable pain.

On the 24th, at 8.15 P.M., hæmorrhage to about five ounces took place from the punctures. The pulse rose from 108 to 125, and there was some difficulty in arresting the bleeding. Next day he was paler, and a good deal troubled to get rid of the greenish-grey offensive expectoration which had for some time been abundant. The notes say that the tumour was much enlarged, and that ice-bags were applied. The day after (26th) the increase of the aneurism is again mentioned; and he died at 6 A.M. on the morning of the 27th, from syncope after hæmorrhage to the extent of a few ounces.

The aneurism was found after death to be altogether within the pericardium, and to have attained a very large size for that situation. It must have held considerably over a pint of blood.

REMARKS.—This case was one not well suited for treatment by galvano-puncture, which, indeed, was tried as a sort of forlorn hope when the fatal termination of the case seemed rapidly approaching; and though little effect was produced on the tumour generally, there was, I think, some deposition of fibrine where pointing and rupture threatened. The current was not maintained for as long a period as I should now use it, and in the first two operations we were, I think, too cautious and timid as to the number of cells employed. His death resulted from hæmorrhage from the needle punctures, and yet, though it may seem paradoxical, I think his life was somewhat prolonged by the use of the battery; for the skin, which threatened to slough, certainly improved in condition after the first operations, perhaps from the diminution of tension.

CASE II.—The next case is that of Joseph Bowker aged 38, admitted to the Manchester Royal Infirmary, January 10th, 1876. He was a healthy-looking man, of rather short stature, who for the last twelve or thirteen years had worked as a platelayer. His health had been good; but, about midsummer 1861, he had an attack of rheumatic fever, which lasted three months. He had been a steady man, and never drank much till six months before admission, when he began to take several glasses of beer a day to relieve his pain. His family history was good; his parents were living and in good health, about sixty-eight years of age; and his five brothers and four sisters were all living and well. For some time before admission, he had felt his work, which often involved the lifting of heavy weights, to be too severe, and he had been losing flesh. There was no history of chancre. A swelling in his neck was first noticed in September 1875, but he had had pain in the left shoulder for about twelve months previously, and for the last three months it had been growing more severe, so that he had slept badly from the intense tingling pain in the left supra-clavicular region.

I will briefly mention only the more important physical signs in this case.

The apex-beat was not distinctly felt or seen, but the cardiac dulness commenced in the fifth interspace in the nipple line, where the heart-sounds were also most distinct. The dulness commenced above at the third left costal cartilage. A large pulsating swelling occupied the middle and left side of the neck, extending transversely from one inch to the right of middle line to the junction of the inner with the middle third of the left clavicle and upwards to the level of the upper border of thyroid cartilage, while below it was lost under the upper part of sternum and left clavicle. This swelling was firm and elastic, the pulsation was very distinctly expansile, and manipulation gave a well-marked feeling of fluctuation. Vertically it measured four and a half inches, and transversely five and a half inches. The larynx and trachea were pushed considerably to the right. The sterno-clavicular articulations and the upper bone of the sternum could not be distinctly made out on account of the swelling, and the left clavicle was displaced

forwards and downwards. The heart-sounds were normal at the apex. At the second right cartilage they were replaced by a double shock, which was felt rather than heard, the diastolic being the more forcible of the two. Over the tumour the impulse was strong, accompanied by a dull sound, and the diastole was marked by a sharp sense of shock. The right radial pulse was soft, weak, and easily compressible; the left fuller and stronger: the left temporal, and facial, and the left carotid, which was deeply placed behind the tumour, pulsated more forcibly than the corresponding right arteries. The left pupil was smaller than the right, but both contracted on exposure to light. Percussion over the back was normal, except in the left supraspinous fossa, where it was dull and the respiratory murmur feeble, as it was, indeed, over the whole of the left back. The chest was free from râles. This patient was put on half-drachm doses of iodide of potassium, and on a diet almost identical with that recommended by Mr. Tufnell in his brief but most important monograph on the treatment of aneurism. For breakfast, he had 2 ounces of milk, with 2 ounces of bread and butter; for dinner, 3 ounces of meat, 3 ounces of potatoes or bread, and 4 ounces of water; for supper, 2 ounces of milk or tea, and 2 ounces of bread and butter. The recumbent position was also carefully maintained.

On January 20th, it was noted that he had been kept awake for two nights by pain in the tumour, which presented at the anterior and lower part a spot of the size of a shilling, which was slightly prominent and tender on pressure. The patient said the skin felt too tight. He was restless after a draught of bromide of potassium and chloral, and half a drachm of nopenthe was given, which suited him better. The next day, an ice-bag was applied to the tumour. His symptoms became much relieved, so that it was noted on February 3rd that he was easy and comfortable, and said he felt as if nothing ailed him. Shortly after this he had a severe attack of bronchitis; notwithstanding which, on February 14th, the tumour felt firmer and the impulse decidedly less marked than on admission.

On the 17th, his breathing was bad, and he had to be propped up in bed, and there were abundant râles over the whole chest.

The tumour was measured on February 21st, and was found to be larger than on admission. Vertically it was $4\frac{3}{4}$ inches, and transversely $6\frac{1}{4}$ inches, and there was slight œdema of the left arm, which on February 25th was much more swollen, and the left cheek was red from venous congestion. The patient was then in a worse state than on admission, mainly, I think, from the bronchitis; the aneurism enlarging rapidly and threatening before long to prove fatal.

On February 26th, three needles connected with the positive pole of a Foveaux's battery were passed into the most prominent part of the tumour about an inch asunder, and the negative pole was applied to the chest-wall by means of a sponge, which was moved about as the skin became reddened. We commenced with eight cells, and went up to twenty, at which the current was kept for fifteen minutes, and brought down to ten, and then to five for thirty-eight minutes. Altogether the current was passed for an hour and fifty-eight minutes.

By March 4th, the tumour was smaller; his bronchitis had left him, and he only complained of want of food.

On the 11th, it is said that the impulse was not nearly so marked.

March 22nd, The tumour was greatly diminished in size; its vertical measurement was $2\frac{1}{2}$ inches, while the transverse was 3 inches. The larynx and trachea had returned almost to the middle line. "He felt no such beating in tumour as before the operation." His general health was good: he had no pain during the operation or after, except just the introduction of the needles.

April 28th. The vertical measurement of the tumour was $1\frac{3}{4}$ inches; transverse, $2\frac{1}{2}$ inches.

He went on well during the summer, and on October 12th, the measurements were, vertical $1\frac{1}{4}$ inches, transverse $1\frac{3}{4}$ inches. The impulse over the tumour was distinct and heaving; little, if any, lateral expansion was to be felt. The upper half of the sternum and the adjacent cartilages were raised with each pulsation. Dulness at the left edge of the sternum extended to the lower margin of the second cartilage. The total transverse dulness was about 3 inches. He had no pain, dyspnoea, or cough, but felt perfectly comfortable: his general health was good: he had gained flesh.

So far, this patient had gone on wonderfully well. The diminution in size and the increased firmness of the aneurism, though not following immediately on the galvano-puncture, commenced so soon after it and proceeded with such marked rapidity, that it was impossible for those who watched the case to doubt that they stood in the relation of cause and effect. Unhappily, we were not content with doing well, and on October 18th, 1876, galvano-puncture was repeated. In consequence of the Foveaux's battery being out of order, Stöhrer's was used. Three needles were introduced into the tumour and connected with the posi-

tive pole. A sponge was connected with a negative pole, and moved about the chest as the skin was reddened. Six cells were set in action, and then ten cells. When twelve were tried for a minute or so, great pain was felt and the strength of the current at once reduced. After keeping up the current for an hour, it was stopped, when six cells only were in action.

Two days afterwards, the impulse was lessened, the tumour felt firm, and the sternum was less forcibly raised, but he had a sense of soreness in the aneurism. This passed off, and on the 23rd he "felt very well". The respirations were 24, and pulse 64.

On the 27th, the aneurism was firmer, and not so high above the sternal notch: the respirations were 20, and the pulse 64.

On November 2nd, however, a fortnight after the last puncture, there was some thickening of the tissues with a sensation of heat; and the next day redness and tenderness over the aneurism. This went on until an abscess formed, which seemed superficial, and which, we hoped, did not involve the sac.

On November 9th, it was punctured, and about a drachm of pus tinged with blood removed by the aspirator.

On the 14th, it discharged freely, and he improved for some time, the suppuration diminishing and things looking well; but on December 27th, a sudden gush of blood, estimated at two pints, shot from the aneurism, and the patient, who had raised himself up, fell back dead.

The following remarks are condensed from the full notes of the *post mortem* examination by Dr. Ross, pathologist to the Infirmary. The body generally was healthy. The opening on the surface led into the aneurismal cavity immediately behind the sternum, and the cellular tissue was intact. The tumour was globular, and rose half an inch above the sternal notch, its most prominent part being in contact with the sternum, which it had partially eroded, as well as the sternal end of the clavicles, which also were somewhat displaced. The diameters were 4 inches transversely, $3\frac{1}{2}$ inches vertically, and $3\frac{1}{4}$ inches antero-posteriorly. The aneurism involved the innominate and the transverse arch as far as the left carotid. This vessel was flattened by the tumour for the first inch of its course, but did not form part of the sac, as was likewise the left subclavian. There was no pressure on the pneumogastric or on the recurrent laryngeal nerves, as we anticipated from the absence of any paralysis of the vocal cords. The trachea was pushed to the right and somewhat flattened from before backwards. On inspecting the interior of the aneurism, the whole of the anterior and superior half was found covered by a fibrinous layer, an inch in thickness, of dense consistence, whitish colour, and formed of thin superimposed layers. The posterior inferior half was free from any deposit in its interior. The true wall of the aneurism was destroyed opposite the first piece of the sternum, forming a circular patch an inch in diameter, where the fibrinous layer in the interior came in contact with the bone. The cavity formed at this point contained pus, which had dissected its way between the dense fibrinous deposit and the true wall of the sac for a considerable distance; but there was no communication with the interior at this point. This was effected at the superior posterior border, where an opening about the size of a goose-quill passed through the fibrinous wall to the fluid contents.

REMARKS.—The fatal issue of this case was a great disappointment, not only to myself but to many who had watched the case. The cause of the suppuration is not clear. I was disposed to blame the battery we used at the second operation, the elements of which are much larger than those of Foveaux's. On October 20th, two days after the last operation, he complained of some soreness in the aneurism, but this passed off by the 23rd, when he said he felt very well; and it was not till November 2nd some thickening of the tissues was noticed and a sensation of heat felt by the patient. But for the occurrence of the suppuration, which melted down, as it were, the barrier we had been trying to build up, it is probable that the man's life might have been very greatly prolonged, and it is certain that but for the first galvano-puncture he would have died many months earlier. It seems fair to conclude that it added six or seven months to his life, and it certainly gave him freedom from pain and discomfort.

Though this narrative is too long already, there are many points lightly touched or omitted; but I may, perhaps, refer to the direction in which these aneurisms pointed. That which was wholly intrapericardial first approached the surface in the second interspace to the left of the sternum; the second case involved the innominate and the transverse arch; but the tumour, escaping from the thorax, extended up the left side of the neck as high as the upper border of the thyroid cartilage, so that it was taken by some for an aneurism of the left carotid. The whole of this cervical tumour disappeared in consequence, I think, of the galvano-puncture, and the position of the dense fibrinous deposit in the sac points to this likewise as its cause.