

Case of aneurism of the upper part of the axillary artery : attended by certain peculiarities and unsuccessfully treated by ligature of the subclavian artery / by R.J. Mackenzie.

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CASE OF ANEURISM

OF THE

UPPER PART OF THE AXILLARY ARTERY,

ATTENDED BY CERTAIN PECULIARITIES,

AND

UNSUCCESSFULLY TREATED BY LIGATURE OF THE SUBCLAVIAN ARTERY.

BY

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THE form of aneurism, of which I believe the following case to be an example, is that first specially described by Mr Liston in a paper read before the Royal Medical and Chirurgical Society of London in 1842.

The case which drew Mr Liston's attention to the subject of the occasional communication of arteries with the cysts of abscesses, must be in the recollection of many. It was that of a boy, who suffered from strumous abscess beneath the angle of the jaw, and where a communication existed between the cyst of the abscess and the carotid artery at its bifurcation, the coats of that vessel having apparently formed part of the walls of the abscess, and having given way at one point by ulceration, so as to give rise to the formation of a false aneurism.

The nature of the case being misunderstood, an opening was made, from which a profuse flow of arterial blood took place. The wound was immediately closed, and a ligature was placed low on the carotid artery on the following day. The case terminated fatally from secondary hemorrhage; and, on dissection, it was found that a direct communication existed between the canal of the artery and the cavity of the abscess. The opening of communication was situated on the posterior aspect of the vessel, and exactly at the bifurcation of the common carotid trunk. It was "about three lines wide, and two and a half lines long." Its edges

“well-defined and slightly everted.” “The external coat of the artery was distinctly traced, and afterwards dissected from the middle coat quite up to the margin of the opening, where it terminated abruptly, not being reflected on to the inner surface of the tumour.”

The full details of the above case were read by Mr Liston to the Medical and Chirurgical Society of London; and a careful perusal of these details, as subsequently published by Mr Liston, can scarcely leave any doubt in the mind of the reader, that the view of the case taken by Mr Liston was correct,—viz., that the aneurism was of secondary formation,—that the disease originated in abscess,—that, the trunk of the carotid forming part of the walls of that abscess, the arterial coats gave way by ulceration at a certain point, by which the cyst, hitherto that of an abscess, was converted into that of a spurious aneurism.

Such a variety of aneurism, however, was scarcely known; sufficient attention certainly had not been directed to it. Doubts were accordingly entertained by many as to the true nature of the case, and Mr Liston's valuable paper was refused a place in the transactions of the Society. It was, however, immediately published by the author, with an appendix, in which, along with the cases contained in the original paper, eight instances of somewhat analogous cases are collected. Of these eight cases, however, *two* only can be said to be precisely similar to that of Mr Liston. In case 8, from the work of M. Robert, of Paris, the coats of the aorta close to the origin of the innominate artery had given way by ulceration, and the blood issued from the perforation into the unopened cavity of an abscess. In case 9, by Mr Quain, of University College, London, the coats of the radial artery had been disorganised in the extension of a phlegmonous abscess. The aneurismal nature of the swelling was detected, and amputation was performed. On laying open the swelling, the destruction of the coats of the vessel was found to be so extensive, that the artery was entirely divided. The evidence as to the origin and nature of the aneurism in this case seems to be quite conclusive, and would be sufficient, in absence of other proof, to establish the fact, that the coats of an artery may, like other tissues, give way by ulceration in the extension of a yet unopened abscess.

The other six cases mentioned in the paper, I have said, are somewhat analogous to that related by Mr Liston. In none of them, however, is it distinctly proved that the ulceration of the coats of the artery preceded the opening of the abscess, whilst in some it is evident that the giving way of the artery occurred during the ulceration or sloughing of the tissues, which followed the exposure of the cavity. In one of these cases, quoted by Mr Liston, I placed a ligature on the superficial femoral artery, on account of hemorrhage from the popliteal.¹ In this case, which had been in the hos-

¹ See Mr Liston's Pamphlet.

pital under Mr Syme's care, an abscess had been opened in the popliteal space; and on introducing the finger into the opening, the artery was felt distinctly beating on the finger placed between the vessels and the bone. Unhealthy ulceration of the parts ensued, on account of which the patient was removed from the hospital, and three weeks intervened between the opening of the abscess and the occurrence of the hemorrhage.

The occurrence of hemorrhage from a large arterial trunk, which has become involved in the open ulceration or sloughing of surrounding tissues, is not very rare. A good many cases are recorded, where the same event has occurred at a shorter or longer interval after the opening of an abscess, which has not appeared to have been followed by well-marked ulceration of the tissues. But the opening of an artery into the cavity of an unopened abscess, so as to give rise to the formation of a false aneurism, appears either to be a lesion of very unusual occurrence, or one which, if less rare, has been too much overlooked by surgical writers. The three cases recorded by M. Robert, by Mr Liston, and by Mr Quain, are all which I have been able to find in which these precise conditions existed. A case, however, is related by Dr Edward Dewes, physician to the Coventry and Warwickshire Hospital,¹ which appears to be of a similar character. The case is published as one "of false diffused aneurism of the abdominal aorta, caused by caries of the vertebræ." The existence of an abscess in this case is not mentioned; but I presume, from the nature of the disease, and from the fact of several pieces of exfoliated bone being found lying loose among the coagula, that suppuration must have preceded the opening of the artery. The precise cause of the breach in the arterial coats, however, is not quite clear. A case is mentioned by Mr Miller,² (which is cited as "especially conclusive" on this point) "in which the aorta, where in contact with an unopened abscess, was found ulceratively eroded *from without*, the inner coat alone remaining, attenuated, yet entire."

Whilst, however, the cases which I have quoted seem to prove the occasional formation of this variety of aneurism, the possibility of its occurrence does not appear to be generally admitted as a pathological fact. The subject is not mentioned in most of the later works on systematic surgery; the fact of the occasional communication of the canal of an arterial trunk with the cyst of an abscess is indeed not admitted by some of the highest surgical authorities of the present day. This, I think, is probably to be explained by two circumstances:—1st, The rare occurrence of this form of aneurism; and, 2d, The difficulty of proving the order in which the pathological changes in the cyst and in the coats of the artery have occurred; the difficulty, in other words, of proving that the cyst was not originally that of an ordinary aneurism, in

¹ London Journal of Medicine, January 1852, p. 35.

² Principles of Surgery, p. 212, foot note.

which suppuration has subsequently occurred ; and this difficulty may have given rise in similar cases to the true nature of the aneurism being overlooked.

It is well known that the coats of an artery resist, longer than most other tissues, the morbid action by which surrounding textures are destroyed. In spreading ulcerations, however, the arteries frequently become involved in the morbid action, and their perforation gives rise to hemorrhage ; and although they undoubtedly resist for long the ulceration of the tissues, by which an abscess extends its limits ; yet there is no reason to believe that they may not at length suffer from the destructive action to which the surrounding tissues have more readily yielded. On this subject Bécclard says :—" The external coat of the arteries long resists the morbid changes which are taking place around it. It is to be seen remaining entire in the midst of affections of long standing. * * * Occasionally, however, it terminates by participating in the disease of the neighbouring tissues."¹

The veins appear to participate in the ulceration of surrounding tissues more readily than the arteries ; and various cases are recorded, where the venous coats have given way in the midst of an opened or of an unopened abscess, by which what may be termed a *venous aneurism* has been formed,—a lesion quite analogous to the form of arterial aneurism under consideration. Instances of this occurrence in the jugular veins, in cases of abscesses of the neck following scarlatina, have been frequently recorded.²

In the history of the following case, which has been lately under my care, and in the pathological appearances of the parts as seen on dissection, *conclusive evidence*, I think, is wanting to prove that the aneurism was of the variety described by Mr Liston. Although, however, as must frequently happen in similar cases, absolute proof of the nature of the tumour is wanting, the history of the origin and progress of the disease, the changes which the tumour underwent after deligation of the artery, taken along with the appearances found on dissection, are such as to leave no doubt in my own mind that the aneurism was one of secondary formation, and produced by ulceration of the coats of an artery, which formed part of the walls of an abscess.

Absolute proof of this view of the case being wanting, an attentive consideration of the details of the case is required before arriving at any conclusion on the point.

On the 16th of November last, I was requested by a friend to visit a young man, who had applied to him, on the previous day,

¹ Bécclard—Addit. à l'Anat. Gen. de Bichat.

² London and Edinburgh Medical Journal, March 1843, p. 177. *Ibid.*, p. 386. *Ibid.*, July 1844, p. 632. A case by Dr A. M. Adams, of Glasgow, in which it is doubtful whether the vessel implicated was an artery or a vein.—*Ibid.*, April 1845 p. 265.

for advice, on account of a pulsating swelling, presenting the usual symptoms of aneurism, situated beneath the right clavicle.

On visiting the patient, I examined the tumour with care, and found that it presented all the usual signs of aneurism. Mr Syme visited him with me on the same day, and had no difficulty in arriving at the same conclusion, all the symptoms of aneurism being strongly marked. The patient accordingly came to the hospital on the following day, for the purpose of submitting to the operation necessary for the cure of the disease.

The following account of the case is chiefly taken from my house-surgeon, Mr Moir's hospital journal :—

Dennistoun Marshall, æt. 29, married, but living separate from his wife, admitted into the Infirmary November 17, 1851, on account of aneurism of the right axillary artery. Has been for the last four years employed as a japan-polisher,—an occupation in which continued active exercise of the right arm is required. He had formerly served for four years as a private in the 26th regiment in China, where he suffered severely from intermittent fever, from the effects of which, he thinks, his health has been permanently impaired. He states that he has never been free from cough since his return to this country. For the last three or four years he has led an irregular life, and about three years ago contracted syphilis, which was followed by the common train of secondary symptoms, sore throat, arthritic pains, skin eruption, and periostitis. Enlargement and induration of the cervical glands still exist, and his chest and back are still marked by a fading copper coloured eruption. He states that his cough was aggravated by his having caught cold in jail, where he had been confined for a month during last spring.

About the middle of June, after sleeping a whole night in the open air, and on damp grass, his cough became more troublesome, and he was seized with pain in the upper and fore part of the right side of the chest, and in the front of the shoulder, which was aggravated by taking a full inspiration. He did not apply, however, for medical advice, and continued at his employment up to within two days of his admission into the hospital.

Three weeks ago, he, for the first time, observed a swelling below the right collar bone, of considerably smaller bulk than the tumour which now occupies the subclavicular space. This swelling was not painful on pressure, and, as far as he is aware, was devoid of any pulsation. He did not pay much attention to it, and did not connect it in his mind with the pain of his arm till within the last three or four days, when the pain of the limb became much more severe, and he perceived a strong pulsatory movement in the swelling. He then for the first time applied for medical advice, when the nature of the tumour was recognised.

The symptoms which existed at the time of his admission into the hospital may be briefly stated as follows :—Severe and constant pain referred to the inner side of the right arm and fore-arm, but

chiefly around the elbow. A circumscribed pulsating tumour, of the shape and size of a turkey egg, situated immediately below the right clavicle. The tumour occupied the situation of the first stage of the axillary artery, projecting immediately below the clavicle, and extending to the axilla, where it could be felt by the fingers pressed behind the pectoral muscle. The integuments covering the tumour were not tense, but marked by the course of two or three large veins. On slight examination, its consistence appeared to be tolerably firm; but on steady moderate pressure being made with the hand, its fluid contents gradually receded, till the swelling was nearly quite effaced. It immediately re-appeared with an expanding pulsatory movement on the pressure being removed. Pressure on the subclavian artery above the clavicle in the same way speedily produced complete subsidence of the swelling, which again rapidly regained its former size on the finger being removed. On applying a stethoscope to the tumour, a loud *bruit de soufflet* was heard accompanying each stroke of the heart, and this was rendered more intense on allowing the tumour suddenly to re-fill after pressure being made on the artery above the clavicle. The brachial artery was felt pulsating feebly along the inner side of the arm, and the pulsation of the radial artery was scarcely perceptible at the wrist.

These symptoms being once distinctly recognised, I abstained from further manual examination, as the handling of the swelling gave him uneasiness, and as the size of the tumour appeared to be decidedly on the increase. My colleagues, Dr Dunsmure and Dr Gillespie saw him with me on the day following his admission into the hospital; but, on the above-mentioned account, refrained from making more than a very superficial examination of the tumour.

On examining the general state of the patient's health, his condition appeared to be unfavourable for the immediate performance of an operation. He had a depressed and anxious look. His pulse was about 90. His respiration was a little laboured, and he suffered from a constant tickling cough. The right side of the chest did not expand so freely as the left, and there was impaired resonance on percussion beneath the right axilla, extending for a considerable way back and in front, below the level of the tumour.

Under these circumstances, I requested my friend, Dr H. Douglas, to see the patient with me. Without entering into the details of the physical signs elicited on careful examination of the chest, I may mention, that Dr Douglas' report was favourable in so far as the state of the right lung was concerned. The cough appeared to depend on simple catarrh, of an unimportant nature; whilst the impaired resonance on percussion, and feebleness of respiration over a limited part of the right side of the chest, seemed to be the result of old disease (probably thickening) of the pleura. The action of the heart was regular, and its sounds normal; and no further disease of the vascular system could be detected. Under these circumstances, it appeared that the constitutional disturbance was

chiefly referable to the local disease, the aneurism. The state of the chest was not such as, in Dr Douglas' opinion, contra-indicated the propriety of immediate operation; and as the tumour was distinctly increasing in size, and had already reached the level of the clavicle, I proposed to place a ligature on the artery without further delay,—a proposal which was willingly assented to by the patient, who was most anxious for the immediate performance of the operation.

The operation was performed on 19th November in the usual way, a ligature being applied to the artery immediately to the outer side of the scalenus muscle. The operation was attended with unusual difficulty, from the number and size of the veins which crossed the triangular space,—a difficulty which was fully verified on post-mortem dissection of the parts. I was efficiently assisted, however, in the deeper part of the dissection by my colleagues, Mr Spence and Dr Gillespie, and the artery was, after some delay, reached and surrounded by a ligature, the sheath of the vessel having been freely exposed, but the coats of the artery denuded only to such an extent as to allow of the passage of the needle. The patient was in the recumbent posture during the performance of the operation, and did not inhale chloroform. He bore the operation admirably, and when it was finished he walked down stairs to his ward.

During the first five days succeeding the operation, everything progressed favourably. The pulse averaged from 72 to 88, and his cough was decidedly better. The aneurism had diminished to less than a third of its former size, and I repeatedly pointed out to the students of the hospital this unusually rapid subsidence of the tumour.

On the 24th (fifth day after the operation), the pulse was a little accelerated, and he did not feel quite so well. His cough, however, was better, and he made no special complaint.

On the evening of the 25th, he had an attack of shivering, followed by heat of skin and general fever; and on the 26th I found him labouring under acute general bronchitis, with a rapid and feeble pulse and considerable dyspnœa, with slight lividity of the lips. He was occasionally incoherent, his skin was covered with perspiration, and his sunk and anxious look was such that I did not expect he could survive long.

Under the free use of stimulants and opiates, together with the application of a large blister over the fore part of the chest, his condition improved; and on the 30th, under the kind and skilful management of Dr Douglas, his alarming chest symptoms had very much subsided. The dyspnœa and cough were greatly relieved, and his pulse had again fallen below 100, whilst at the same time it had improved in strength. The ligature was found loose on the dressings on this, the eleventh day following the operation; the wound having been entirely healed for two or three days previously, except at the point where the ligature protruded.

After this, he continued to improve steadily. On the 5th of December he was so well as to be able to be out of bed for half an hour. The wound was healed, with the exception of a point not larger than a pin's head, from which there was scarcely sufficient discharge in twenty-four hours to moisten the morsel of lint placed over it. The prominence of the tumour was almost entirely effaced, but it wanted the dense feeling of a solidified aneurism.

Since the day following the application of the blister to the chest, some enlarged glands had been felt in the axilla, indurated, and a little painful on pressure. There was now a larger and softer swelling to be felt deeper in the axilla, behind the pectoral muscle, which I thought probably depended on suppuration of some of the deeper glands, from the irritation of the blister, which was a large and exceedingly severe one, and still continued to discharge.

Early on the morning of 6th December, slight oozing of dark-coloured blood took place from the small opening in the middle of the cicatrix, but soon ceased spontaneously.

On the afternoon of the same day, a small jet of arterial blood again issued from the same point, but the bleeding was arrested by slight pressure.

On the 7th, at three A.M., the bleeding recurred to a slight extent. The cicatrix was now of a dark colour, and stretched by effusion of blood beneath it. Oozing of blood continued through the day in spite of careful compression and the continued application of cold.

At four o'clock on the morning of the 8th, a fit of coughing was suddenly followed by copious hemorrhage. On arriving at the hospital, I found the patient in a very weak state, having lost about a pound of blood. I learnt from Mr Moir that the whole adhesions of the wound were broken up, and that the hemorrhage was now restrained by a graduated compress, introduced to the bottom of the wound. The hemorrhage was in the meantime effectually suppressed. A few strips of adhesive plaster were drawn across the compress, to prevent its being displaced, and a bladder of ice was applied over the parts.

It was now evident that nothing but the application of a ligature to the subclavian, inside the scalenus, or to the innominate artery, could prevent the patient from speedily sinking from hemorrhage; but I need scarcely say, that the condition of the patient precluded all idea of resorting to such an attempt.

By the attention and constant watching of Mr Moir and my clerk, Mr Watson, no copious hemorrhage again occurred. The blood continued, however, to ooze in small quantity through the dressings; and the patient gradually sank, and died at three o'clock on the morning of the 10th December.

The body was examined on the following day. The entire parts concerned in the disease and wound over the clavicle were removed for careful examination. This was done by dividing the soft parts transversely in the upper part of the neck, downwards over the shoulder, and along the posterior border of the axilla. The trachea

and œsophagus were included within the incisions; the sternum divided longitudinally, and the three first ribs removed in connection with the parts.

In thus exposing the right side of the cavity of the chest, it was found that the lung was universally attached to the thoracic walls by old and firm adhesions, except from within a very short way from its apex to the level of the fourth rib. This space was converted into an abscess, which extended, about the same level, forwards as far as the costal cartilages, and backwards to within two inches of the angles of the second and third rib. The second rib lay bare, and at points eroded, in the cavity of this abscess for about four inches, as well as a small portion of the lower border of the first rib. The quantity of pus contained in this abscess appeared to be about four or five ounces. The abscess appeared to have had its origin between the walls of the thorax and costal pleura. This was thought probable, from the ribs and intercostal muscles being completely separated from the membrane, whilst the surface of the lung was still covered by a dense and thickened layer, formed apparently by the adherent and thickened costal and pulmonary pleura.

The tissue of both lungs was healthy throughout, except the upper part of the right lung, which did not crepitate on pressure quite so freely as other parts of the lung. The bronchi and their ramifications were universally slightly congested, and contained a considerable quantity of mucus. The heart was in all respects healthy, and no trace of disease could be detected in any part of the arterial system.

The parts concerned in the local disease were examined, by first exposing the wall of the cyst, and laying bare the artery upwards from beneath the origin of the large branches in the axilla. The cavity of the sac was then laid open by an incision through its anterior wall, in a line with the course of the artery. On doing this, about an ounce of pus escaped, mixed with one or two small recent coagula; and so little did the interior of the cavity present of the appearance of an aneurismal sac, that I was at once impressed with the idea that no aneurism existed, but that an error in diagnosis had been made; that the disease was simply an abscess, which had received a pulsatory movement from its contact with the artery. On reflecting, however, for a moment on the unequivocal nature of the symptoms, and on the speedy and great diminution of the size of the tumour after the application of the ligature, I was satisfied that this could not be the case.

On washing gently the inner surface of the cavity, it was seen that the greater part of its surface presented the loose flocculent appearance of an abscess; that a small portion of the lower border of the first, and the second rib to the extent of between three and four inches, were bare, and at some points rough, from destruction of their lamellated surface, and that a large communication existed in the second intercostal space between the cavity and the abscess

within the chest. Here and there the surface of the cavity (especially on its anterior wall) was lined by patches of fibrinous deposit, adherent to the walls of the cyst, and quite similar to the laminae of fibrine deposited in the interior of the sac of an aneurism.

A probe was now introduced into the divided extremity of the artery below, and passed upwards with great gentleness till it had reached about an inch beyond the lower limits of the sac, when it at once passed into the cavity of the cyst. The probe was immediately withdrawn, and the opening in the artery was seen to be of an oval form, and about two lines in its longest diameter. The edges of the opening were well defined, but, as well as the arterial coats in its close neighbourhood, were soft, almost pulpy, and very thin. The opening and its edges, indeed, resembled in all respects the perforations of two arteries in my possession, which had given way into the cavities of abscesses, which had been opened a short time previously.¹

On passing a longer probe into the artery from below, and avoiding the opening I have described, the coats of the artery were found to be entire for nearly an inch and a half beyond the opening. Here the passage of the probe met with an obstruction, which, however, was overcome without using much force, and the point of the probe, pushed gently forwards, entered the sac near its upper part.

As it was impossible to expose this second opening without further dissection, it was not so carefully examined as the lower opening, in order that an accurate sketch of the parts might be made before they were further displaced. On dissecting the artery further, after the parts had been for some time immersed in spirit, the tissues were found matted together in the walls of the abscess, and it was difficult to ascertain the precise condition of the parts. The artery was obliterated from within an inch and three quarters of the lower opening up to the point of ligature. The coats of the artery for half an inch below the obliterated portion were softened, and the canal of the artery contracted in size. The appearance of the opening in the vessel here was quite different from that of the lower perforation. It was evidently an artificial opening, and made by the probe at the point where its passage had been obstructed; but so slight was the force which had caused the probe to enter the sac, that I think a perforation had probably existed at this point, previously to the performance of the operation, and had been closed by the contraction of the artery, and by the recent effusion of lymph succeeding the application of the ligature. Of this, however, there is no certain proof.

On examining the wound over the clavicle, after it had been cleared of the coagulum, with which it was distended, it was found

¹ Perforation of the popliteal artery, already mentioned, and a perforation of the trunk of the lingual artery, in the cavity of an acute abscess of the pharynx, which had been opened four days previously to the occurrence of hemorrhage.

to have no communication with the aneurismal cavity, being separated from it by the subclavius muscle and costo-clavicular ligament, which remained entire. This had been rendered evident in the early stage of the dissection; had any communication existed, the blood, pent up by the plugging of the wound, must have escaped into the sac, which was not the case.

The artery was found quite disorganised above the seat of ligature. The hemorrhage had occurred from the proximal side of the point at which the ligature had been applied. A firm clot, of about half an inch in length in great part, but not entirely, filled up the canal of the vessel at this part, and adhered firmly to the walls of the vessel, except on its upper side, where an opening existed, through which a crow-quill might have been easily passed. The nearest branch to the point of ligature was the internal mammary, which was given off about three-quarters of an inch from the point at which the artery had been tied. The artery on the distal side of the point of ligature (as already mentioned) was obliterated and already converted into an impervious cord. It adhered intimately to the coverings of the rib, at the point where the ligature had divided the vessel.

Lastly, the veins running over the surface of the tumour and the trunk of the internal jugular vein, showed signs of recent inflammation, the canal of these vessels being partially obstructed by fibrinous deposit and coagula adherent to the walls of the vessel. The veins engaged in the wound over the clavicle did not present any morbid appearance. The subclavian vein was pervious between the upper margin of the first rib and its junction with the jugular vein, but was completely disorganised and divided at the point opposite the ligature of the artery. This had evidently been produced by the firm plugging of the wound for some days before death, by which the vein had been, along with the artery, forcibly compressed against the rib.

A remarkable variety existed in the position of the subclavian vein. It lay immediately below, and in contact with the artery, and behind the scalenus anticus muscle. It diverged from the artery behind the scalenus to join the internal jugular vein.¹

An attentive consideration of these details can scarcely fail, I think, to lead to the conviction, that the aneurism was of the variety described by Mr Liston; that it owed its origin to ulceration of the coats of the artery, which formed part of the walls of an abscess.

Another view of the case, however, has been taken by some, who have examined the parts, and on whose opinion I place much reliance, viz., that the tumour was originally a spontaneous aneurism, and that suppuration of the sac had taken place, and given rise to the appearances which were found on dissection.

¹ As far as I am aware, two cases only of this variety of the vein have been previously recorded. Blandin.—*Traité d'Anatomie Topographique*, &c., p. 210. Velpeau.—*Traité Complet d'Anat. Chirurg.*, tome i. p. 494.

A third view of the case has been suggested, and which I consequently think it right to mention, viz., that the disease was simply abscess, and that the diagnosis of the case from first to last was erroneous.

There seems little difficulty in refuting this last opinion, which does not appear to me to be borne out by a single fact in the case, beyond the presence of pus in the cavity.

Following the view which I have adopted, the symptoms from which he suffered are easily accounted for in the order in which they occurred. In the month of June, after unusual exposure to cold from sleeping all night on the damp grass, he suffered from an aggravation of his cough, accompanied with pain high on the right side of the chest, and in front of the shoulder. These symptoms continued unabated, and, it seems reasonable to conclude, were produced by the formation of an abscess of the pleura, which was limited by extensive old adhesions of the lung to the walls of the chest. For four months he continued to suffer from these symptoms, and at the end of that period he for the first time perceived a swelling beneath the collar-bone, which gradually went on increasing in size, but, as far as he was aware, was devoid of pulsation. The matter within the chest, limited by the adhesions of the pleura, had made its way outwards through the intercostal space, and burrowed in the cellular tissue beneath the pectoral muscles. That the matter had been in contact with the ribs for a long period is proved, I think, by the bare, rough, and macerated appearance of the bones. The matter, in its further progress to the surface, made its way from beneath the pectoral muscles, and burrowed in contact with the axillary vessels in the highest part of their course, and the artery, thus lying bare in the cavity of the abscess, had at length given way, probably two or three days only before his admission into the hospital, the period at which he first observed pulsation in the tumour. The cavity of the abscess was thus suddenly changed, by its communication with the artery, into a false aneurism.

Taking the other view of the case, viz., that the aneurism was the primary formation, and that the sac had supplicated, it becomes a much more difficult matter to account for the changes which took place in the tumour during life, or for the appearances found on dissection. Inflammation of an aneurismal sac, in the first place, is attended by severe pain and constitutional disturbance, and by rapid increase in the size of the tumour; but, in this case, neither pain, increase in the size of the tumour, nor any signs of inflammation, occurred after the application of the ligature, the period during which, it is thought, suppuration occurred. On the contrary, the subsidence, the almost entire disappearance, of the tumour after the operation, was unusually rapid; and firm pressure over the seat of the swelling gave no pain.

Again, supposing the aneurism of the axillary artery to have been the primary formation, it is difficult to imagine how the pro-

gress of the tumour should have been towards the cavity of the chest, and not towards the surface below the clavicle, or downwards into the loose cellular tissue of the axilla. Such an extension of an axillary aneurism is quite unusual, and, I think, highly improbable.

In the next place, the interior of the cavity presented none of the appearances which are found in the cavity of a spontaneous aneurism, which had undergone suppuration. There were no broken-down masses of fibrin, nor appearance of concentric laminæ, which are invariably present in such circumstances. On the contrary, there were, as in Mr Liston's case, only patches of fibrinous deposition adhering to the sac at one or two points.

Further, the opening of communication between the artery and the cavity presented none of the appearances of the opening of a spontaneous aneurism. It was not a thickened everted opening, with adherent fibrine, nor was there the slightest extension of the external or inner coats over the walls of the sac. On the contrary, the edges of the opening were soft and pulpy, and the perforation of the coats was abrupt and defined.

Lastly, spontaneous aneurism does not often occur without more or less general arterial disease; but in this case, with the exception of the right axillary artery, the arterial system was perfectly healthy throughout.

I have said that it had been suggested that the disease may have been a simple abscess, and that the pulsation may have been communicated from the neighbouring artery.

In answer to this supposition, it may be stated, in the first place, that the signs of aneurism were *most unequivocal*. One of the signs, however, in this case was not to be depended on, viz., the emptying of the tumour by pressure made on its surface. Supposing the disease to have been only abscess, the pressure would have caused the matter to recede into the chest through the intercostal opening. The removal of the pressure, however, was instantly followed by the peculiar expanding pulsation characteristic of aneurism, and was accompanied by a loud *bruit de soufflet*.

But one well-marked symptom was present, which alone precludes the idea of the disease being a simple abscess. Pressure on the subclavian artery over the clavicle not only arrested the pulsation of the tumour, it produced remarkable subsidence of the swelling,—so much so, that Mr Syme remarked, whilst compressing the subclavian artery alone with the finger, that “the tumour was gone.” This could not have occurred had the disease been a simple abscess. The tumour instantly refilled on removal of the pressure on the artery.

Lastly, if the tumour was only an abscess, the ulcerated opening of the artery must have taken place after the operation, at a time when the artery was collapsed and empty, and obliterated to within two inches of the opening.

This view of the matter is so extremely improbable, that I need scarcely say more to refute this opinion. Were further proof

wanted, it is to be found in the well-marked patches of fibrinous deposit adhering to the walls of the sac.

One feature of the case, as regards the ligature of the artery, is worthy of notice, viz., the occurrence of secondary hemorrhage so long as six days after the separation of the ligature, and at a time when the wound was firmly cicatrised, except at a point not larger than the head of a pin. The danger of secondary hemorrhage seems to be not only greater, but also to continue for a longer time, in the arteries, the current in which is so directly under the influence of the heart's action as those at the root of the neck. There was the additional unfortunate complication in this case of severe fits of coughing. But one cause of the hemorrhage in the present case, I think, was the application of a large blister to the upper part of the chest about the time of the separation of the ligature, which probably caused partial absorption of the newly exuded lymph, which closed the vessel, a risk which was fully estimated before the use of a remedy, which, however, Dr Douglas considered indispensable in the treatment of the bronchitic attack.

The importance of the subject is, I think, sufficient apology for my having entered somewhat minutely into the details of this case. Instances, in which pathological proof of this form of aneurism can be obtained, are necessarily rare, and it is, consequently, of moment that they should be carefully recorded.

There seems to be one important point in practice involved in the consideration of this variety of the disease, viz., the question of operative interference.

The ordinary Hunterian operation (the application of a single ligature to the artery between the aneurism and the heart) can, I think, scarcely be relied on with any degree of certainty to effect a cure of such an aneurism. There is not in these cases, as in spontaneous aneurism, the thick deposit of fibrinous layers within the sac, which rapidly increases in ordinary cases after the application of the ligature, till the tumour is filled by solid matter. On the contrary, the operation cannot be followed by solidification of the tumour, unless absorption of the purulent matter takes place,—an event which can scarcely be looked for in such cases. The matter, then, will make its way to the surface, and, unless the artery has been obliterated at the point of the ulceration of the vessel (which is a matter of uncertainty), hemorrhage will take place on the matter making its way through the integuments. The condition would be the same as that of an aneurism, which had undergone suppuration after the performance of the Hunterian operation: the collateral circulation in a state of increased activity, and bringing the blood freely round to the hole in the artery.

Were the character, then, of such an aneurism recognised during life, it appears to me that it would be better practice to treat the case like any other form of false aneurism, viz., by the performance of the old operation,—the laying open of the tumour, and the ap-

plication of two ligatures, the one above and the other below the opening in the vessel.

The prognosis, however, in such a case, under any circumstances, must be unfavourable; an artery involved in the cavity of an abscess not being in a condition favourable for the occurrence of the healthy changes necessary for its obliteration, by the application of ligatures in the neighbourhood of such an ulcerated opening.

EXPLANATION OF PLATE.

- A A A A. The cyst.
- B. The axillary artery.
- C. The opening of communication between the artery and cyst.
- D. The second rib bare and rough.
- E E. Patches of fibrine deposited in layers on the interior of the cyst.
- F. Arteria innominata.
- G. Carotid artery.
- H. Subclavian artery on the proximal side of the seat of ligature; a probe passed through the vessel to show the source of the hemorrhage.
- I. Internal mammary branch.
- J. Transverse humeral branch.
- K. Omo-hyoid muscle.
- L. Scalenus anticus reflected.
- M. Internal jugular vein reflected.
- N. Sterno-mastoid reflected.
- O. Pectoral muscle cut across.

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