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CASE OF CHRONIC EMPYEMA

TREATED SUCCESSFULLY BY PARACENTESIS.

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ROBERT NEILSON, aged 26, picture-frame maker, near Denny, was admitted to Minto House Hospital on the 27th October 1846, being recommended by Dr Alison to Professor Syme for the operation of paracentesis thoracis. He stated that, while in Dublin in the beginning of January of the same year, after complaining for some weeks of slight cough, he was suddenly affected with what he understood to be a pleurisy of the left side. For this he was cupped, repeatedly blistered, took mercury and hydriodate of potass, and was sent back to Scotland in the end of February, very weak and much distressed in breathing. In the month of June he was advised to sea-bathing, which he tried without benefit for two months. Various practitioners in the country were consulted, and the general opinion appeared to have been, that he was affected with "a hardness of the lungs," which blistering and time only could remove.

On admission his general symptoms were,—very considerable debility, great breathlessness, and palpitation on the slightest exertion, and these to a distressing degree, accompanied with cough when attempting to lie on the right side. His nights were very restless, but not feverish; his pulse was 80—of ordinary character, the tongue clean, the appetite good, and the bowels regular. The external aspect of the chest to the eye, as well as measurement, showed a decided enlargement of the left side, considerable filling up under the clavicle, and great bulging of the inferior and lateral parts, which was particularly apparent when viewed from behind. The intercostal spaces generally were completely filled up, and almost prominent in the lateral region; and inspiratory efforts, although very conspicuous in the right, produced no expansive movements in the left side. There was also slight fulness in the upper part of the abdomen. Percussion over the side was universally dull, but especially stone-like beneath the mammary region; and not the slightest feeling of vocal vibration was communicated to the hand. Auscultation gave a weak but rough and somewhat bronchial respiration above and immediately below the clavicle. It became less audible as the mammary region was approached, where, and underneath, it was entirely absent. It was also very faintly heard in the upper and back part of the axilla; and, posteriorly, from the shoulder to the lowest part of the thorax, and to an extent of about four finger breadths

from the spine, there was a purely bronchial respiration audible. In approaching this limit a slight but distinct friction sound was heard. The voice-sounds furnished a degree of bronchophony in the summit of the lung, and along the vertebral portion already noticed; but in no part was œgophony heard. On the right side of the chest there was considerable dulness on percussion over the whole anterior surface, but particularly great between the sternum and mamma downwards. Here, also, respiration was heard indistinctly; but very clear and puerile in all the other parts of the chest. The heart was found to be lying between the sternum and mamma on this side, and its apex distinctly seen striking about an inch below, and external to the nipple. The impulse and sounds were normal, with the exception of a very slight prolongation of the second sound, but not amounting to a bruit. It being considered that paracentesis, cautiously performed, held out the only prospect of recovery, Mr Syme, on the 31st October, drew off 21 $\frac{3}{4}$ of very thin, greenish-coloured pus, from which a little serum separated on standing for a short time. Again, on the 7th November 50 $\frac{3}{4}$ of a similar fluid were removed; and on the 14th, 34 $\frac{3}{4}$ —the chest being now apparently emptied. The instrument employed was a trocar, about $\frac{1}{8}$ th of an inch in diameter, and about 2 $\frac{3}{4}$ inches in length. The parts selected for puncture were different points, between three and four inches external to the nipple in the sixth intercostal space; and the patient lay on a sofa, with the trunk of the body overlapping its edge a little, and the left elbow resting on a chair. None of these operations were followed by the slightest local pain, or any general disturbance. There was much relief afforded to the breathing; and the respiratory murmur in the upper part of the chest was much improved in character, and a little in extent. He could exert himself moderately, and lie in bed with comfort, and even continue for a short time on the right side. The heart, also, was now found to beat much nearer the sternum. No general treatment was pursued until after the last tapping, with the exception of restricted diet, and an occasional purge with the compound powder of jalap. Now, however, a large blister was applied over the side, and gr. ij. of the iodide of potass given twice a-day. He was dismissed on the 17th November—to continue the medicine, and return again in a few months.

Was re-admitted on the 7th April 1847—improved in general appearance, but again complaining much of dyspnœa and palpitation. Mr Syme tapped him on the 9th, taking away 40 $\frac{3}{4}$, and on the 15th removing other 26 $\frac{3}{4}$. On both occasions the situation formerly punctured was made choice of, and the fluid evacuated was perfectly purulent, and the relief obtained was as great as formerly. Dismissed on the 19th.

Was admitted again on the 7th July of the same year, when he was found to be very much in the same state as when first brought under treatment, but having decidedly increased in strength, and presenting a healthier aspect. On the 8th paracentesis was again performed by Mr Syme, and 79 $\frac{3}{4}$ of pus removed. From the smallness of the canula the stream continued to flow for nearly an hour, and as it became feeble the position of the body was altered so as to drain off every drop from the pleural cavity. On the 13th he was dismissed in all respects very much improved. The fulness of the infra-clavicular region was not now apparent, and the respiration there was much more natural, and the heart's pulsations, although still considerably to the right of the sternum, were fainter, as if the organ had retired considerably from the parietes of the chest.

Was re-admitted on the 29th September, in very much the same condition as on last admission. On the 30th 112 $\frac{3}{4}$ of pus were removed—the stream continuing to flow for nearly one hour and a-half; and on the 1st October, as he was free from all uneasiness, and desirous to return home, he was accordingly dismissed.

Returned again on the 1st February 1848, very well in general health, but feeling his breathing much embarrassed, and being much distressed with pal-

pitations. 72 $\frac{3}{4}$ were now withdrawn—the pleural sac being quite emptied; and he returned home on the following day. Paracentesis was on this occasion performed in the seventh intercostal space, in the most lateral part of the chest; and the pus drawn off was observed to be browner than formerly.

From this period up to the 4th of January last, I performed paracentesis on him four different times, draining off, on the 18th May 1848, 57 $\frac{3}{4}$; on the 19th August 1848, 37 $\frac{3}{4}$; on the 27th February 1849, 67 $\frac{3}{4}$; and the 4th January 1850, 26 $\frac{3}{4}$.

Thus he was operated on twelve different times, and in all 621 $\frac{3}{4}$ of pus—equal to about 4 gallons—were taken from him. On each successive admission there was a manifest improvement of his general health and strength; he could undergo a very considerable amount of fatigue, and on the six last occasions he returned home on the day following the tapping, without the slightest inconvenience or injury. The changes, too, in the configuration of the chest, more especially in the disappearance of the infra-clavicular fulness, were very marked; and when last seen, the intercostal spaces had much the same aspect as those of the opposite side; and there was now some degree of movement of the side, during respiratory efforts, very different from its previously paralysed condition. More healthy respiration, also, was heard anteriorly, as low as the edge of the pectoral muscle, and also along the back near the spine. The heart now lay close to the sternum on the right side, and its impulse and sounds were perfectly normal. In the three last tapplings I found that considerable force was necessary to introduce the trocar, owing, apparently, to the thickness and hardness of the pleura. This was particularly the case in the last operation; and, although the canula of the trocar measured two and a-half inches in length, it seemed short enough for the depth of parts to penetrate. I may remark, also, that the fluid drawn off, although secreted in greatly increased quantity from November 1846 to September 1847—at which time it was going on at the rate of 56 $\frac{3}{4}$ per month, from that period until the 4th January last it came gradually down in quantity until it had arrived at a ratio of little more than 2 $\frac{3}{4}$ per month. It is interesting, also, to remark, that while the fluid was sero-purulent at first, and afterwards became pure pus, that at the last tapping a considerable amount of serum separated from the pus. This change, viewed in relation to the progressive improvement of Neilson's health in all respects, made me feel confident that a cure would soon be complete; and, accordingly, I am glad to report that, in a statement which I had from him a few days since, he says that he considers himself quite recovered from the affection; that he has felt so strong and well since he was last under treatment, that he recently entered into the bands of wedlock; and is convinced that no farther operative interference will be necessary. He states that he is now capable for any ordinary exertion, can lie on either side without oppression of breathing; and does not consider that there is any material change in the configuration of the chest—unless it be a slight depression of the shoulder, and tendency to stoop, which, however, he states was the case before the inflammation occurred. Of course, when a cure in this case is said to be complete, I admit that there is a lung, of which, perhaps, less than one-third only is fitted to perform any part in the function of respiration; that there is an enormously thickened pleura, with strong adhesions connected therewith; and that there is a dislocation of the heart from its own compartment of the thorax, to which it can never return. Notwithstanding all this, I regard Neilson's case as satisfactorily cured, seeing that the functions of respiration and circulation are now carried on compatibly with existence; that the strength is re-established, and fully adequate for the duties of his calling; and that, instead of feeling life as a burden, he is now in a condition, and is seeking, to enjoy it.

The above case has been thus minutely detailed, as its interest and value appear to me to depend on its being so. It differs widely

in several respects from hitherto recorded cases of empyema—so far as I am aware. In those detailed by Dr Hamilton Roe, in his excellent paper on “Paracentesis Thoracis,”¹ &c., the operation was performed at a comparatively early date, excepting in one case, which was complicated with phthisis—of which the patient died after the lapse of several months. The sum of Dr Roe’s experience accords with that of Laennec and others. He says,—“In any instance where paracentesis was employed in an early stage of empyema, or inflammatory hydrothorax, it was successful, and failed to cure only in those where it had been long delayed.” (P. 234.) The duration of the disease must doubtless be viewed as a main obstacle to cure from paracentesis, or any means; for not only are the thoracic viscera themselves subjected to serious injury in the way of compression, atrophy, displacement, and adhesion, but the power of life must ere long become undermined from the presence of a noxious fluid, as well as from long-continued derangement of the functions of circulation and respiration. Relief by operative procedure, may thus be sought for too late. Neilson’s case, however, is remarkable for its chronicity; and in spite of the existence of ten months between the pleuritic attack and the first tapping, and its continuance during a period of three years and two months, recovery has fortunately been accomplished. The most promising feature in the case was its being a simple pleural accumulation, uncomplicated with other thoracic disease; and there can be no question, but that had an operation been earlier performed, the affection would have been brought sooner to a satisfactory termination. Regarding those cases of hydrothorax, inflammatory or mechanical, which may or may not, at an early period, be treated by paracentesis, it is not at present necessary to give an opinion; but it appears plain that, as a general rule, whenever pus is detected in the pleural sac, it ought to be evacuated in this way; and that the operation be repeated from time to time, as the breathing begins to be embarrassed in consequence of a fresh accumulation. Should there be a decided prominence or protrusion at any one point of an intercostal space, and more especially if attended with pain or tenderness and discoloration, indicating that the matter is seeking an outlet for itself, the best practice is to allow it to point well, allowing nature to perform her own work, unless the symptoms of dyspnoea, &c., are urgent, when an artificial opening must be immediately made. Even in such circumstances, however, it is advisable to draw off the fluid by tapping in the first instance, rather than by incision, as it is impossible to predict what the diseased membrane will bear in the way of a wound inflicted on its surface. In cases complicated with pneumothorax the case is different, for much greater freedom may be used; although it is perhaps most judicious to make the incision

¹ London Medico-Chirurgical Transactions, vol. xxvii.

small at first, and dilate more freely a few days afterwards. I have in this manner treated successfully several interesting cases of this serious affection, in which there was reason to believe that the fistulous communication with the lung had been formed by an empyema bursting through its substance. In Neilson's case it was considered proper at first to withdraw only a portion of the fluid at a time; but it was soon apparent that the whole might, with safety, be evacuated at once; and this practice I should not hesitate to adopt in any future case, with the precautions to be afterwards noticed. In reflecting on the history of the case, the impunity with which the various operations—twelve in all—were practised, and the manifest relief derived from each, it is impossible to avoid the conviction of the unlikelihood, or rather the utter hopelessness, of expecting that a cure could have been accomplished by the long-continued use of blistering, iodine, and mercury, which would have been trusted to by some practitioners. The main objection to paracentesis-thoracis has been the apprehension of air finding an entrance to the pleural sac, and thus exciting violent inflammatory action. To avoid this supposed danger in Neilson's case, all due precautions were taken. These consisted, as I have already noticed, in the employment of a very small sized trocar and canula, so as to make it impossible that any large rush of air inwards could take place, and to insure more certainly the immediate closure of the wound; in prohibiting conversation during the flow of the fluid, so as to maintain equal and easy inspirations, and prevent any suction power being exercised from within; in the change of position during the operation,—turning the body over, cask-like, when the stream was becoming feeble; and in withdrawing the canula the instant the stream became interrupted. I agree with Drs Townsend¹ and Roe in thinking that this source of danger from paracentesis,—the admission of air during the operation,—has been much exaggerated, which is proved by abundance of surgical experience, both in operations with the trocar, when air was known to have entered freely, and with the lancet and bistoury in cases of pneumothorax, when its exclusion was not sought. The experiments of Nysten and Speiss also sufficiently prove that air introduced into the pleura is invariably removed by absorption in the course of a few days. Dr Roe, however, says, "It is clear that if we evacuate more fluid than can be replaced by the expanding lung, air *must* fill the vacuum; but as this does not seem to be attended with either danger or inconvenience, I think it better to evacuate the whole of the fluid at once with the trocar." (P. 225). Now, admitting the truth of the well-known saying, that "nature abhors a vacuum," he keeps out of view altogether the extent to which the collapse of the thoracic parietes on all sides by atmospheric pressure will, in such circumstances, assist in diminishing any space

¹ Cyclopædia of Practical Medicine, art. Empyema, p. 49.

which the partial replacement of its contents, besides the expansion of the compressed lung—small though it may be—and the ascent of the diaphragm, cannot accomplish. All this is the more likely to occur, provided paracentesis is performed with the precautions already recommended.

Some surgeons have treated cases of empyema by leaving the canula or a catheter in the wound. Dr Roe objects to this fatal practice, "because it allows a *continual* ingress and egress of air" to the pleural sac, and thereby excites inflammatory action. Now, although this source of danger must be very great in any case, uncomplicated with pneumothorax—or in which nature has not herself prepared for a fistulous opening, the main danger would arise from the direct and continued irritation of the instrument left in the wound, acting as a foreign body by pressure on a membrane predisposed to diseased action. It is strange that this latter explanation, rather than the former, did not occur to Dr Stroud, when remarking on a case published by him, in which a fatal result followed the use of an elastic gum catheter after paracentesis.¹

It is from the infliction of a similar injury that bad consequences generally follow the old method of performing paracentesis. It consists in making an incision in the intercostal space, drawing aside the skin, and then penetrating the pleura with a common hydrocele trocar. It is a clumsy expedient, possessing an appearance of scientific ingenuity, with the view of valving the internal part of the opening, and obtaining a better closure of the wound. Unfortunately, however, it often happens that the wound either does not heal by the first intention, or soon breaks open again; and when that occurs in a bad subject, or where there was no preparation made, as I have already remarked, for a fistulous opening, mischief is almost inevitable. The danger, however, is not from air admitted during the operation, but partly from its admission subsequently and constantly, and more especially from the violence done to the pleura by the operative procedure itself. This method contrasts ill with the simple and safe practice adopted in Neilson's case, in which, although twelve times tapped, on all these occasions there was an immediate closure of the trifling wound, and in none the slightest approach to inflammatory action.

A remarkable feature in Neilson's case was the extent to which the heart was displaced, for its apex was found to beat fully an inch external and inferior to the right nipple. That this should not have occasioned a greater change in its action and sounds is unexpected, although quite in accordance with the observations of Laennec and others in cases of less extreme dislocation.

This case also points out in a very clear light the sure marks which characterise a pleural accumulation, and distinguish it from other diseased pectoral states. The displacement of the heart

¹ Medical Quarterly Review, vol. 1, p. 184.

alone, viewed in connection with the general symptoms, was quite sufficient to prove the existence of a large effusion in the left sac; but the nature of the case was made still more evident by the general enlargement of the chest on this side discoverable by the eye; the fulness of the infraclavicular region; the disappearance of the intercostal spaces generally; and their rounded, although not prominent, aspect at the lower and lateral part of the chest. Then there were the very significant signs of immobility during respiration; and the total absence of vocal vibration. No disease could present more precise indications than the above; and although the remaining physical signs furnished by percussion and auscultation were the least important, as they always are in this affection, they lent their evidence to confirm satisfactorily the diagnosis. It may be asked, however, was there anything in Neilson's case, before paracentesis was performed, to lead to a conjecture regarding the quality of the fluid—whether it was purulent or serous; or, can we in any instance distinguish an empyema from a hydrothorax? In this instance the sign of stony-hardness communicated by percussion might be considered as some test of the consistence of the fluid present; and the very well filled up, even roundish although not decidedly prominent condition of the intercostal spaces, might be considered as indicative of the same, if we credit the statements made in recorded cases of this affection. But, in addition to these diagnostic guides, I would draw attention to the circumstance of the duration or chronicity of the affection, as suggestive of the quality of the pleural contents, and state my conviction that this, with other signs, may be found a valuable fact to aid in the diagnosis. In some attacks of pleuritis a purulent product is formed at once,—within a few days or weeks: such may be designated as cases of acute empyema. They occur generally in unhealthy, strumous subjects; the attack is severe from the first, attended with distinct rigors, and much fever and dyspnœa; and the fluid is not formed in such quantity as to occasion a very obvious enlargement of the affected side. These are the instances in which, if they do not fall under the observation of a discerning practitioner, and paracentesis is not early performed, an eschar takes place at some part of the pleura-pulmonalis, and the fluid, bursting through the lungs, converts the case into one of pneumothorax; or else it finds its way through an intercostal space, and points and discharges spontaneously; or the latter mode of vent-finding may follow the former. In the more chronic cases of empyema I do not doubt but that the fluid accumulated has often been purulent from the first; but I think it probable that in the greater number of instances the membrane which in the beginning poured out serum, now takes on the action of secreting pus. This I think may be inferred from the history of cases in which paracentesis had been repeatedly performed, and in which the first operation, early had recourse to, produced serum; the second, serum, turbid with

albuminous matter floating in it ; and the third, sero-purulent matter, or true pus. Of course the rapidity of this change will depend much on the constitution of the individual and other circumstances ; and that it occurs in instances in which tapping can have had no share in altering the nature of the secretion, I have no doubt. Very few instances indeed, I believe, could be adduced in which paracentesis, long delayed after the existence of a pleural accumulation was positively ascertained, produced anything but purulent matter. In regard to Neilson's case, I am decidedly of opinion that in the first few weeks or months of the pleuritic effusion it was serous, but gradually, from increased distension of the diseased membrane, its morbid action was increased likewise, and the secretion became more and more purulent. The fluid drawn off at first was to some extent sero-purulent ; and what was taken last—the thorax having been long freed from extraordinary pressure, and the powers of the constitution having been somewhat restored—had a still greater proportional amount of serum in it. On the whole, therefore, I am of opinion that the fact of the duration of a pleuritic effusion is, taken in conjunction with other signs, of considerable value in the diagnosis of its quality.

I have only now, in concluding these observations, to remark that in all probability, the progress of pathological change and recovery in Neilson's case happened in the following order : Layer after layer of adventitious membrane was formed on the pulmonary and costal surfaces of the pleura,—particularly of the latter,—adding progressively throughout the whole course of treatment to their thickness ; that after each successive tapping, agglutination to some extent took place from above downwards ; and that this, with a slight re-expansion of the lung, the ascent of the diaphragm, and a very complete collapse of the thoracic walls, effected obliteration of the entire cavity, with the exception of the supra-mammary and vertebral portions formerly described, which I have little doubt were walled in by stout adhesions at an early period of the affection.