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PART I.

ORIGINAL COMMUNICATIONS.

ART. XII.—*A Case of Empyema, complicated by Pleural Fistula, treated Successfully by the Antiseptic Method of Lister.* By EDWARD H. BENNETT, M.D.; Professor of Surgery in the University of Dublin; Surgeon to Sir Patrick Dun's Hospital; &c., &c.

IN writing the title of this paper I have used the terms "Antiseptic method of Lister" to avoid the criticism likely to be made by the opponents of this method, to the effect that antiseptic treatment of empyema and of pleural fistula is no novelty. A long list of substances used as antiseptics in the treatment of this disease could be made out, dating, according to some authorities, as far back as the time of Hippocrates. In more modern times the chlorides of sodium, mercury, and of lime, and, lastly, the solution of iodine and iodide of potassium, have all been used, mainly with a view to altering the character of the fluid furnished by the pleural cavity by their antiseptic action. The method of treatment adopted in the case which I now report avoids the risks which attend injections of the pleural cavity, and, as its result in this case proves, can attain their object, and lead to a successful issue. I include in the account of this case under the term "method of Lister" the modification of the antiseptic introduced by Thiersch—namely, the substitution of salicylic for carbolic acid, and its combination with it. Before entering on the details of my case, I

must quote a passage from the report of a similar trial of antiseptic treatment recorded by Dr. E. Markham Skerrett, in *The British Medical Journal*, July 22nd, 1876, as, although his case is one of empyema without fistula, treated from the first antiseptically, and so far more suitable for antiseptic treatment than mine, and his method has been Lister's unmodified, still our results are alike, and our conclusions, formed independently—as the dates of our observations show—agree.

Dr. Skerrett writes as follows:—"There have been, I believe, not more than three or four cases recorded in which Lister's antiseptic method has been applied to the treatment of empyema; and I cannot but think that its more extended use would result in substantial evidence of its value. My object in relating the details of this case is to call attention specially to the antiseptic treatment of this disease, and to point out what appear to me to be its peculiar advantages."

I shall presently quote Dr. Skerrett's conclusions, in order that my readers may judge how far they are supported by the facts of the following case:—

A young gentleman, a student of medicine, aged twenty-three, of strong constitution and build, an expert oarsman, suffered the following unfavourable series of illness, all in great part the results of his direct exposure to infection while resident in hospital. First, in 1873, an attack of scarlatina; in May, 1874, typhoid fever; subsequently, in December, again scarlatina, with rheumatic complications; lastly, in May, 1875, a sudden attack of pleuropneumonia, which terminated insidiously in empyema of the right side.

On September 15th, 1875, his pleura was tapped with an aspirator, and thirty ounces of sero-purulent fluid were withdrawn. On September 29th, the fluid having again collected, he was again tapped, and fifty ounces of similar fluid were withdrawn.

On 13th October, without any improvement having taken place in the general condition, the right side of the chest being greatly distended, a superficial abscess was observed pointing over the true ribs in the line of the anterior axillary fold. On the next day this abscess burst; and on the next, the fluid contained in the pleural cavity escaped through the external abscess. Three days afterwards, an attempt was made to introduce a drainage tube into the chest, through the opening of the abscess, but without success. Some inflammatory reaction followed this attempt, and appeared to

cause a closure of the passage into the chest. At all events the discharge ceased, and an appearance of pointing at the seat of the second aspirator puncture was noticed. This, however, did not occur, and the matter again, after a few days interval, recommenced to flow at the first opening. From this date until the middle of January, 1876, the fistula, which passed obliquely through the chest-wall upwards and forwards, discharged with occasional interruptions and was horribly foetid. So intense, at times, was the fœtor, that it penetrated the entire house; and the patient himself devised a means of controlling it to some extent, by receiving the fluid as it flowed in a small tin vessel attached to his side, filled with chlorinated lime. On 20th January, I saw the patient for the first time during this illness, at the request of Dr. Gordon, whom I met in consultation with Drs. M'Dowel and Harvey. We agreed as to the necessity of attempting to control the discharge which the patient's condition—one of advanced hectic—clearly indicated could not be much longer borne. The indications were evidently the establishment of free drainage, and, if possible, a modification of the quantity and quality of the discharge. It was agreed that at first we should attempt this by antiseptic dressing, more particularly as a favourable opportunity seemed to offer for the success of this attempt in the fact that the fistula had almost ceased to discharge for some days, and the odour of decomposition was consequently absent. The treatment was from this date entrusted to me. The right side of the chest was enlarged, measuring fully two inches more in circumference than the opposite; the intercostal depressions were absent; in the neighbourhood of the fistula, which was placed between the fifth and sixth ribs in the line of the anterior axillary fold, the side bulged out excessively. The entire side, except in the infra-clavicular region, was dull on percussion. In this position respiratory murmur could be heard over a small area; and again, along the spine posteriorly, a narrow line could be traced between the scapulæ, between which and the spine on the right side respiratory murmur could be heard. A difference of opinion existed as to the origin of the respiratory murmur heard in this position, equally divided between the views that it was communicated from the sound side, or due to the presence of a narrow strip of lung capable of respiration, still existing on the diseased side. The result of the case, I think, demonstrates that the latter was the correct interpretation. The left lung was resonant throughout, and gave evidence of increased action in the harsh puerility of its murmur.

The patient's condition, otherwise, is sufficiently described by the statement that he was suffering from marked and progressive hectic, with considerable cough, but that as yet there did not appear to be any secondary visceral lesion established. The liver was not enlarged, and the bowels tended to be constipated. Troublesome diarrhœa had existed, but was then controlled. The difficulty of breathing, during any exertion, even that of sitting up, was extreme, so that it appeared to be necessary to avoid any course of treatment which might entail any serious disturbance. In the hopes of being able to avail myself of the temporary closure of the fistula, and of the check to decomposition resulting from it, in order to commence the antiseptic treatment, I carefully applied a large carbolised gauze dressing on the morning of the 20th January, and deferred any attempt to open the fistula until later in the day. Late in the afternoon I removed the dressing, and under the spray introduced a tangle tent through the fistula and secured it. The tent was introduced with some difficulty at 9 p.m., and entirely filled the opening, so that no fluid escaped. I selected a late hour in the day to introduce the tent, as I expected that its expansion would give distress, which could be best borne for a sufficient time under the action of the patient's usual evening opiate. Next morning I found that the tent was not causing any annoyance, and that the dressings were not marked by discharge. In the afternoon I changed the dressing, and found that the tent was fully dilated and sufficiently loose in the fistula to allow of its easy extraction. On removing it, while the patient lay horizontally, a considerable flow of matter free of putrescent odour escaped, and a large sized drainage tube was readily introduced. The flow, after the tube was in place, was not nearly as free or as copious as I expected; however, as the patient appeared much distressed by being raised to the sitting posture, and as I was satisfied that the tube was fairly placed in the pleural cavity, I secured it, and completed the antiseptic dressing. Next morning the discharge having escaped from beneath the dressings, I changed them and readjusted the tube. The dressings were flooded with discharge; a sheet folded many times beneath the patient was soaked through, and his body lay in a perfect flood of purulent fluid. This discharge had taken place suddenly in the early morning. I changed the dressings, and found now that the air freely entered the chest cavity while the wound was exposed under the spray. I feared that with so copious a discharge, even with the dressings changed morning and evening, a failure of the

antiseptic process would occur; that in fact all carbolic acid, which the dressings contained in their dependent parts at least, would be washed out by such copious discharges. Having already satisfied myself of the efficiency of salicylic acid as an antiseptic dressing, I determined to combine it with the carbolic treatment, with the object of saturating the discharge as it flowed, with a non-volatile antiseptic. In effecting this object it fully answered my purpose. For some days, while the discharge, though diminished, flowed at times so freely as to saturate everything placed beneath the patient, still no odour of decomposition could be detected; and the most remote parts of the folded sheet, which showed stains of the fluid, at the same time readily answered to the test for salicylic acid, the colour of a drop of a dilute solution of perchloride of iron at once changing to purple as it fell upon them. The mode of application of the acid was simply a pad of jute prepared after the method of Thiersch, of three per cent. strength, applied over the wound and drainage tube, and secured by having a Lister's eight-fold gauze and waterproof dressing bandaged outside it.

In three or four days the discharge was greatly diminished, and the patient's general condition appeared much improved. A check in the progress now occurred; irregular rigors, evidently attributable to some complication, not elements of the hectic, which was tolerably regular in its character, affected the patient, along with some ill-defined distress in the pleural cavity. The tube continued to discharge pus regularly, and of unaltered quality. These symptoms were suddenly relieved one day by a large escape of fluid, and at the same time a large area of the chest became suddenly tympanitic on percussion. This area was placed above the level of the fistula, and in front of it. The bulging of the chest-wall which was most marked in this position previously, subsided after this second sudden escape of fluid. I cannot explain these phenomena except by the supposition that a part of the pleural cavity was shut off originally or subsequently to the evacuation of the larger cavity by some accidental septum; that the tension of this cavity gave rise to the irregular constitutional disturbance, and that its relief was the result of the sudden flow of fluid. Whether this be true or not, the patient rapidly mended in health, and the discharge, still large in quantity, became a clear serum, and so continued up to the end of March. Any slight derangement of health altered its quantity—even the introduction of a new drainage tube caused slight increase and slight change in transparency of the

fluid, but at last the amount seemed to be nearly constant. The chest-wall had ceased to bulge, and respiratory murmur became audible over the greater part of the side, extending gradually outwards and forwards from the spine and from below. The area, which I have observed as probably corresponding to the encysted portion of the pleural cavity, retained its tympany, however, unaltered. The larger amount of discharge I now collected from the tube, while the patient sat up and stooped forward. The amount so collected was, for over a month, six to eight drachms at each dressing; this, at the end of March, fell to four, but below this it seemed disinclined to fall. Only a very small quantity stained the dressings. The patient's health at this time was excellent; he had lost all hectic; his appetite was good, and he slept well; confined strictly to his room, and chiefly to bed, for fear of any exposure during the extremely harsh weather of the last spring, he fattened excessively. He could not, however, make any exertion without considerable distress of breathing, and a subsequent increase and alteration of the fluid discharged from the fistula.

During all this time the dressing with carbolic spray, salicylic jute, and carbolic gauze, was carefully continued, and during each dressing the cavity, emptied under the spray, was filled with air drawn in to replace the fluid as it flowed—*injected*, in fact, with dilute carbolic acid in the state of spray. It occurred to me now, as the discharge remained obstinately at a fixed quantity, but little escaping into the dressings, and most collected from the tube, that two causes co-operated to delay the progress—the inability of the lung to expand in consequence of its previous compression and adhesions, while the chest-wall, though falling in, was necessarily, from the patient's age and build, unable to do so rapidly; and secondly, a condition of inaction of the walls of the cavity, a result commonly observed in the too prolonged use of carbolic acid, or indeed of any other substance applied to granulating surfaces. I met the latter by substituting the spray of salicylic acid for the carbolic, so as to change the application to the pleural surface, for only by the spray in-drawn during the dressings was any substance, except the air filtered through the dressings, brought in contact with the surface. A marked change for the better occurred with the alteration of the spray. The fluid was reduced to four, three, and on 26th March to two drachms, and the dressings were now changed only every second or third day, while the patient moved about his

room, and even down stairs. The harsh weather alone prevented me from allowing him to go out. I was prevented from any attempt to remove the tube by the knowledge of the existence of a large cavity still open in the pleura, as proved by the percussion, and by observing the quantity of air that bubbled through the opening at the dressings. The risk attending any attempt to close the fistula by withdrawing the tube was clearly demonstrated by an accident on the 18th March. The tube, shortly after a change of dressings, while the patient moved about, slipped out of the fistula, and remained out for a day and night, when he felt distress, and sent for me. By this time he was confident that the tube had slipped or become blocked, as he was unable to hear or feel the air passing through it. On its re-introduction a moderate accumulation of fluid—in all about six drachms—flowed, and, as it appeared unaltered in character, I did not anticipate any bad result. However, in the afternoon a violent rigor came on, and he spent a miserable and restless night. The next morning I found him in pain, and looking very ill, with a hot skin. I dressed the wound, but still found no change in the character of the fluid, which was reduced to the normal quantity. I could not lay my hand on the immediate cause of the fever, although its exciting cause was evident enough. The next day the solution of the difficulty was no longer doubtful. The fluid now became purulent, and in quantity again about six drachms. With this an immediate subsidence of the fever and pain showed that the suppuration, the result of the tension, acted as a critical discharge. Now, for the first time, a distinct “leather-creak” sound was developed in the cavity, audible to the patient, and accompanied by a coarse grating vibration, palpable to the hand laid over the chest. These phenomena lasted for two or three weeks, gradually subsiding, and capable of being elicited at last only by forced respiration. In the end of May the patient went out daily, and required dressing only twice a week—in fact, only when the tube became filled by dried secretion.

In the month of June the cavity appeared obliterated, and respiratory murmur could be heard all around the fistula, while the chest wall had fallen in, so as to measure at the level of the fistula two inches less than the opposite side; at the same time the harsh respiration of the sound side had given place to a more normal murmur. On June 20th, after consultation with Dr. Gordon, who constantly watched the progress of the case with me,

I removed the tube, directing the patient to keep quiet for a day or two. No disturbance of any kind followed, and the fistula has closed permanently.

In the paper by Dr. Skerrett, to which I have above referred, the treatment by the antiseptic process is contrasted with that by injection of the pleural cavity in the following conclusions.

The advantages of the antiseptic treatment are these:—

1. A free discharge is allowed.
2. Decomposition and consequent absorption of the products of putrefaction are prevented.
3. The treatment is very much less disturbing and exhausting to the patient, both because the process itself is much simpler, and also because it is less frequently repeated.
4. There is no irritation of the pleura.
5. One, and perhaps the chief, cause of sudden death during the after-treatment is avoided. In a word, by the application of the antiseptic method to empyema we are enabled to secure all the advantages of a free opening, without any of its disadvantages.

In the same number of *The British Medical Journal* Mr. Bell advocates “the free incision in empyema *versus* the aspirator,” and his cases support the views expressed above as regards the necessity for free discharge as essential to antiseptic treatment. I cannot but think that it is safer to rely on efficient antiseptic dressings rather than trust to free discharge and poulticing combined, with or without occasional antiseptic injections.

Before closing this paper, it remains merely to draw attention to a point in which the case I have recorded presents exceptional features in comparison with the ordinary cases submitted to antiseptic treatment. I found that it was necessary that the air should be allowed to flow freely in and out of the pleural cavity with each act of respiration during the entire period of treatment, a condition not present in any other wound I have treated on this plan, and one which tests to the utmost the powers of the antiseptic used. In the early part of the treatment I applied very wide gauze dressing, secured by a few turns of a broad binder. Subsequently, when the discharge threatened to wash away the carbolic acid by its excessive flow, I added a pad of salicylic jute to provide an antiseptic which should be capable of saturating the discharge as it flowed through and outside the bandages. Subsequently, I gave up the use of carbolic acid spray, to change the character of the application to the pleural surface; and lastly, as the

gauze, worn for a long time on the skin outside the pad of jute caused irritation and severe itching, I substituted for it cotton wool, in the unbroken sheet, saturated with salicylic acid, secured to the side by having ordinary soap plaster spread around the edge of the piece. In this way I was gradually led, as the case progressed, to use only the preparations of salicylic acid in the dressing, and these were constantly worn during the termination of the case, while the patient moved about the house, and lastly walked and drove in the open air. During the entire treatment no trace of decomposition or of fœtor occurred. The pad of jute, prepared after the method of Thiersch, with, on its outside, either a carbolic gauze dressing or an unbroken sheet of cotton wool, charged with salicylic acid, provides a perfect filter for the air necessarily drawn through it into the chest—a property due largely to the moist condition of the jute, in consequence of its being prepared with glycerine. The original object of the addition of the glycerine in such quantity as to keep the fibres moist (4 oz. to 1 lb. of jute) was to prevent the crystals of the dry acid flying off the jute in dust as it was handled; but I am confident that the glycerine fulfils the further object I have stated, rendering the jute a perfect air filter. A trivial, but still not entirely unimportant point, I have learned also in the management of this case—namely, a ready mode of fixing the drainage tube in such a case, where but one small opening exists, and the risks of escape of the tube either into the cavity or completely out of the opening, as is liable to happen with the constant respiratory and other movements, must be avoided. After various plans had been tried, I adopted, as the readiest and most manageable, a single piece of salmon fishing-gut, carried as a suture through the tube at right angles to its axis, and cut off a couple of inches from the tube at either side. A little piece of isinglass plaster fixes each whisker, as one may name the ends of the gut, to the chest-wall, wet with the spray, and retains it perfectly; the gut is stiff enough to keep the tube adjusted without galling the side, as a wire suture would; and, on the other hand, it does not conduct the discharge to the plaster as silk or thread does, and so prevents its softening and the consequent slipping of the fastenings. The tube was removed and the fistula closed in this case on 27th June last; and a sufficient interval, over three months, has now elapsed to justify me in stating that the cure has been permanent; the patient can walk and ride without distress, and has even put his cure to the test by being upset out of a boat into the sea, without ill effects.

His side has fallen in, and the liver has risen considerably in level; but he thinks that his side is again gaining something of its dimensions, more even than is due merely to recovery of power in the muscles; and the respiratory murmur has returned, even beneath the scar of the fistula.

Dr. Gordon has favoured me by reading the proof of this paper, and kindly furnishes me with the following confirmation of its details and statement of the patient's present condition:—

“I have perused the above case very carefully, and can testify to the accuracy of the details and the efficacy of the treatment. The patient was under my care for a very considerable time, labouring under a pleuro-pneumonia, followed by extensive effusion; and, although I advised the introduction of a tube into the pleura in September, the difficulties interposed were so many that the patient was in almost a hopeless state when Dr. Bennett saw him in January. I met him casually at the house of a relation about a fortnight since, and can testify to his being now in the most perfect health.—S. GORDON.”

ART. XIII.—*The Diseases which Prevail among Workers in Flax.*^a

By CHARLES DELACHEROIS PURDON, A.M., M.B., Dub.; F.R.C.S.I.; Certifying Surgeon, Belfast District; Senior Physician, Belfast Charitable Infirmary; &c.

THE different processes that flax has to go through before it is made ready for clothing our persons or adorning our houses cause certain diseases in those that are employed in its manufacture, but one of the most injurious, and in certain branches very fatal, is the effect induced by the inhaling the flax-dust—called by the workers, “Pouce”—which is produced when the fibre is cleansed by machinery from the decayed wood and earth that had adhered to it in the steeping pools. This is given off largely in the scutch mills, where it is inhaled by the scutchers and those employed at the rollers through which the straw is passed; these workers suffer so much, from the effects it produces, that it is well for them there is an interval always between the seasons of their employment, during which time they are engaged in country work; this serves to partially repair the damage done to their lungs; not so with the

^a Read before the Annual Meeting of the British Medical Association at Sheffield, August 10, 1876.