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Exploratory Pleurotomy and Resection of Costal Pleura.

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EXPLORATORY PLEUROTOMY AND RESECTION OF COSTAL PLEURA.

By CARL BECK, M. D.

Henry W., four years of age, was sent to the surgical division of St. Mark's Hospital on June 6, 1894. The family history revealed that the patient's father was in good health and that his mother had died from pleuro-pneumonia. From the report of the family physician it was learned that the patient had been sick since January 29, 1894, when he was seized with pleuro-pneumonia, which ended in a crisis about February 7th. The temperature (from the attack until June 6th) varied between 99° and 102° F., and symptoms of compression, such as dyspnœa, dullness, and weakened respiration, were always more or less present. On the strength of these symptoms pyothorax had been diagnosticated, and accordingly thoracotomy was advised by the family physician.

On June 6th, when I saw the patient for the first time, I found the following condition present:

The boy was emaciated and showed a slight retraction of his thorax on the left side. The circumference at the nipple was twenty inches, each side comprising ten inches. Respiration, 62; pulse, 130; temperature in ano, 101·4° F. By palpation the vocal fremitus was found increased on the left side and slightly diminished on the right side. Anteriorly on the right side the

whole area situated above the upper border of the third rib, as well as the axillary region, was found to be tympanitic on percussion, while the area below was normal. Posteriorly the percussion note was vesico-tympanitic above the fifth rib and normal below.

On the left side dullness was found anteriorly from the apex to the base. Auscultation on the right side revealed roughened respiration and fine moist râles over the whole chest. The vocal resonance was slightly diminished. On the left side distant respiration without change could be heard, while the vocal resonance was slightly increased.

Crepitant râles could be distinctly heard over the whole left side. They were accompanied by fine moist râles. The dullness was most manifest over an area extending from the upper border of the seventh rib and from the mamillary line to a point situated about an inch back from the posterior axillary line.

The heart was slightly displaced toward the right side. The first sound was short, high in pitch, and metallic in quality. The pulmonic second sound was accentuated. The aortic sound was normal.

In the light of this *status præsens*, the diagnosis "pyothorax" was obvious. The most important means of verifying this diagnosis, exploratory aspiration, had, however, not been tried yet.

After the whole left side was well disinfected, an exploratory needle, which had been rendered dry and aseptic by holding it over an alcohol flame, was introduced in the fifth intercostal space between the anterior and posterior axillary lines. Considerable resistance could be noticed as soon as the needle had passed the intercostal space. As only one drop of a slightly yellowish fluid was drawn, the aspiration was repeated two inches lower down in the same line and with a negative result. After having inserted the exploratory needle seven times on different portions of the dull area, I refrained from further procedures at the time. Knowing the frequency of diagnostic errors in such cases where, in spite of the negative result of a few aspirations, pyothorax was present, I was not yet convinced of the absence of pus.

Every physician who has had much experience in pyothorax will admit that in spite of the most minute consideration of all diagnostic rules bearing upon this subject, he will often be surprised by the result of the exploratory puncture. It may happen, in fact, that all the classical symptoms, as they are described so well in text-books, are absent, and still pyothorax is detected at last. Repeatedly I have found pus only after a considerable number of aspirations were made; so, for instance, in a case where the cavity was almost filled up with a cheesy mass, the liquid pus present amounting to a trifle only. In such a case it is natural that the needle, by being introduced into these solid masses, can not draw any pus (*vide* article on Pyothorax, *Medical Record*, May 19, 1894). The same negative result can be obtained in a case where there are large fibrinous masses in serous effusions.

It has, furthermore, to be considered that there are exceptional cases of pyothorax where the pus cells have settled down like a sediment to the bottom of the abscess cavity, while above this a collection of a clear serous fluid is found, which, if aspirated, would necessarily leave the surgeon under the conviction that no pyothorax existed at all. Such misapprehension may come all the easier if the exploratory puncture is made high up. This fact teaches that punctures should be made below as well. It should then, however, not be forgotten that just in the most dependent part the clots which settle there are likely to clog the exploratory needle. If in such a case absorption of the fluid should take place, and the sediment-like pus should undergo thickening at the same time, the result of the aspiration, being negative, would ordinarily give no information as to the true state of the pleural cavity.

To continue the history: On the following day I repeated the exploratory aspiration five times over the dull area with

the same result as before. Some elucidation was expected from the bacteriological investigation of the drop which had been drawn at the first aspiration; but the bacteriological examination revealed the absence of pathogenic micro-organisms, and under the microscope only blood and lymph cells were detected. Similar investigations were made after each of the negative aspirations in this manner: a syringe was filled then with sterile water, which was discharged into a Petri's plate containing gelatin. This was done in the expectation that, in case cheesy masses were present, small particles of them would be forced into the calibre of the needle, in or on which they could not be perceived macroscopically; but, by being mixed with the sterile water, they could possibly be recognized by the aid of the microscope. But this experiment proved to be negative also.

What diagnosis could be made now on the basis of these examinations? The history showed that there was an inflammatory process, probably followed by the formation of an effusion. Considering the fact that effusions in the pleuræ of children are almost invariably of a purulent character, it was obvious to assume that a pyothorax had been present, the liquid contents of which were absorbed by this time. Another question was, Were the solid contents absorbed also, and was the dullness only the expression of thickened pleural tissue, or was it the expression of cheesy masses the existence of which could not be demonstrated by our insufficient diagnostic means? In favor of a thickening of the pleura was the great resistance experienced whenever the needle was introduced; but then it had to be considered that both conditions alluded to could be combined just as well. If so, was it wise, then, not to interfere with the further process of absorption of cheesy material which predisposes so much to tuberculosis? The possibility of the existence of a subpleural abscess or of an echinococcus of the lungs could with all probability be excluded. Neoplasms, such as carcinoma, sarcoma, or

lymphoma, could also be excluded by regarding the acute onset of the disease. Tuberculosis did not appear to be probable, as neither in the sputa nor in the aspirated drop was any evidence of the presence of the tubercle bacillus found.*

So, considering the difficulties of diagnosis in this case, I did not see why, if everybody admits the necessity of exploratory incisions in abdominal surgery and lately also in the precarious field of brain surgery, *the pleural sac should not enjoy the same privilege.* What is to be feared most in an incision of this kind is the formation of pneumothorax. But this accident would hardly occur in pleuritis, where the presence of adhesions would prevent unintentional opening of the thorax. Under strict aseptic precautions even this accident, however, would not necessarily need to be feared, as pneumothorax would disappear soon after the wound was closed, as the lungs would then expand readily. So, for instance, have I never met with any dangerous symptoms due to pneumothorax in five cases of subphrenic abscess where I, after resection of a rib, opened the pleural sac before I had incised through the diaphragm. In the case of a very much emaciated patient the symptoms of shock became evident as soon as after opening of the pleura air rushed into the pleural cavity with considerable noise, so that I deferred incision of the subphrenic abscess until the following day, whereafter the patient made a good recovery.

On June 9th, under minute aseptic precautions, an incision was made above the fifth rib, reaching from the mamillary

* This, however, could not be regarded as an absolute proof for its non-existence, as in serous effusions this bacillus is but exceptionally found. Even in cases in which tuberculosis has been well demonstrated by other diagnostic means, ounces of freshly drawn effusions have been injected into the peritoneal cavities of rabbits without producing the slightest symptoms of tubercular infection.

line to the posterior axillary line, where the dullness was most distinct. A piece of rib, four inches in length, was resected subperiosteally. The posterior portion of the periosteum was then divided, so that the costal pleura came into view. Careful dissection revealed the presence of thick fibrous tissue, which was cut off by conducting the knife flat upon the pleura about in the way a chiropodist holds his knife. The knife lost its edge by cutting this tissue on account of the cartilaginous, partially even calcareous, condition of the pleura. After the flat incisions were repeated about a dozen times, thus constantly removing pleural tissue, a point of softer consistence was reached. The diameter of the resected pleural tissue amounted to nearly an inch.

By now introducing a flat probe to the point alluded to, it was revealed that the inner surface of the costal and the external surface of the pulmonary pleura were loosely attached to each other by adhesions. By pushing the probe farther back it was easy to lift the posterior surface of the costal pleura from the corresponding anterior surface of the pulmonary pleura by tearing the adhesions. But it had naturally to be presumed that this fibrous condition of the costal pleura extended much farther. Therefore, as anæsthesia was borne very well, the fourth and sixth ribs were removed also for the same length as the fifth was. Then, by lifting up the costal from the pulmonary pleura, and after having introduced a blunt elevator through the incision in the costal pleura, it was easy to exsect the degenerated costal pleura by means of the rib shears. The average diameter of the margins of the exsected pieces amounted to half an inch. No effusion and no cheesy masses were found anywhere in the pleural cavity. After the field of operation was made clean by gauze mops dipped in sterilized water, the edges of the wound were united by a continuous silk suture, leaving a few sterilized wicks in each corner of the wound. Then, by means of sterile gauze and of a large piece of absorbent mossboard, compression was exercised upon the resected area.

No reaction followed which could be attributed to the wound. The dyspnœa was not relieved until forty-eight hours afterward, when the number of respirations went down to 40.

The average temperature had been 101° F. and the pulse 120 within these two days. On changing the dressing three days after the operation no reaction was found in the wound. When the wicks were withdrawn a few drops of serum were discharged. The wicks were not replaced. Two weeks after the operation the following condition was made out: Union by first intention was obtained. The temperature was normal and the pulse-rate was 96. The general condition of the patient had improved. Above the resected areas the dullness was much less distinct than before, while the respiratory sounds were very distinct. Dyspnœa was still present, but slight.

The patient was discharged from the hospital a week later, after having gained three pounds. He remained well until the 28th of November, when he was taken ill with bronchitis. At that time he was examined by Dr. Reynold W. Wilcox, of this city, who reported to me that the respiratory sounds were very much more distinct over all the directions indicated by the cicatrix on the left side. The same condition was ascertained by Dr. Morvay Rottenberg, of this city, who also had the kindness to examine the child on December 24th.

On May 10, 1895, when we had a chance to examine the patient again at my clinic at the New York Post-graduate Medical School, it was found that the dyspnœa had disappeared entirely. Auscultation did not reveal any abnormities. Only slight dullness above the resected area was still noticeable. The general condition of the child proved to be excellent.

As there can be no doubt that exploratory incisions of the pleura, if done under the necessary precautions, will prove to be free from danger, they should be undertaken whenever there arises any such doubt as in the case reported. As to the diagnostic value of this method, it may be urged that in this case the exploratory incision proved the presence of an enormously degenerated pleura and the absence of solid masses. That the resection of thickened pleural tissue will relieve compression is also obvious. To what extent it can, however, be utilized in

practice will, of course, not be pointed out by a single case. As the whole thickened area was not removed, a fair amount of degenerated tissue remained; but it appears to me that if only a portion of it, especially the thickest part —in other words, if a great obstacle to the free expansion of the lungs is removed, there are all chances of compensation.

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