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THE object of this paper, in response to the request of your president, is to present some facts to form the basis of a discussion regarding the grave accidents and secondary septic complications that sometimes follow the use of the exploring needle for diagnostic purposes. My own attention was particularly directed to the subject recently by a case of pneumothorax followed by sudden death, produced apparently by an exploratory puncture with a hypodermic needle. This case was reported to this society in December.

I wish to say in advance that I would not be understood as in any way protesting against the use of the exploring needle for diagnosis in properly selected cases with necessary precaution, nor as suggesting that in the vast majority of cases there is any considerable danger attending its use ; but I would protest against the routine indis-

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criminate and careless puncture of everything normal and abnormal upon insufficient grounds, when other signs and symptoms, and especially the physical examination, give more reliable information. The impression has arisen in the minds of a large number of the profession that this procedure is absolutely free from any danger, however performed and under whatever conditions resorted to. This is especially the case among hospital men. A member of the house staff of one of the large city hospitals recently said to me, in speaking of the nature of a pulsating tumor of the chest: "I know it is an aneurysm because I introduced a hypodermic needle into it and moved it around in all directions, thus proving it was a large cavity, and then withdrew a syringe of blood." That in this case portions of stratified fibrin from the aneurysmal wall were not separated and set free as emboli was not the fault of the operator. So general is the belief in the absolutely harmless nature of this operation among the younger physicians that I believe few would think of ascribing to it any accidents occurring after its use, however close the relation to the operation.

I wish in these remarks to simply call attention to the fact that serious results do sometimes unquestionably follow the use of an exploring needle, and to report a few of the accidents that have occurred from its use.

I have made no attempt to collect a large series of cases or go carefully into the literature, scanty as it may be, as this was not necessary for my purpose, but have been content with a few cases illustrating the different kinds of accidents and secondary complications following puncture of different parts of the body with an exploring needle.

These may be divided into three classes:

1. Those accidents resulting directly or indirectly from the traumatism produced by the needle.

2. Those cases of septic infection produced by the inoculation of healthy tissues during the withdrawal of the needle through them after introduction into more deeply seated infectious matter.

3. Those cases of septic infection produced by the introduction of needles not properly disinfected into healthy or diseased tissues or fluids.

Under the first head, the accidents following from the traumatism produced by the puncture, the following cases should be recorded :

Cases of Pneumothorax.—The first case of this kind that came under the writer's notice was reported to this society in December.

In that case a patient came under observation for some pulmonary affection, and the physician in charge introduced a hypodermic needle into both sides of the chest. From the right side he obtained two or three drops of pus and blood. From the left nothing was obtained. The following morning the patient was found dead in bed. The autopsy revealed the presence of a very extensive interstitial pneumonitis with tubercular deposits in the left lung. The lung was very much contracted and occupied not more than half the space ordinarily filled by the normal lung. The heart was drawn to the left of the median line. The right pleural cavity was exceedingly large and was filled with air. The right lung was collapsed and compressed against the spinal column and contained scarcely any air. There were no adhesions between the two layers of the pleura, and there was no fluid of any kind in the pleural cavity. The lung was very carefully removed and inflated. Then, after placing it under water, an exceedingly small pin-hole perforation was found in the lower lobe near the free border. There were a few small tubercular nodules scattered through the lung, and extensive emphysematous changes. The tissues around the puncture seemed to be normal with the exception of a slight hæmorrhage at the point of puncture and the emphysematous

condition found elsewhere. I believe that this perforation and the subsequent pneumothorax were due to the puncture of an emphysematous vesicle that, as was shown by the drops of pus, was situated over more deeply seated diseased tissue. The puncture remained patent and the pneumothorax followed. This interpretation, of course, is not susceptible to proof.

Dr. G. F. Lloyd, of the Flatbush Hospital, Brooklyn, has given me the history of the following case, which was apparently one of the same nature :

The patient was a Hungarian laborer, aged forty-one, and was admitted to the hospital with the following history : He fell on the ice a day or two before admission, and struck the right side of his chest against a curb-stone. On admission, the diagnosis was made of simple pleurisy with effusion, situated on the right side. There were ecchymoses in the skin over this side where he had struck against the stone. His temperature was 101.5° F. and his pulse 80. The patient did not seem to be very sick. A day or two after his admission a hypodermic needle was introduced into the right side and then into the left side. Serum was obtained from the right side. The left side appeared to be normal, and nothing was withdrawn through the needle. Four hours later the physician was called to see the patient because of severe dyspnoea. On examining the chest he found the intercostal spaces on the left side bulging, with tympanitic resonance over the whole side. Stimulation by hypodermic injections and by the stomach was resorted to without avail, and the patient died half an hour later with symptoms of intense dyspnoea and cyanosis. No autopsy could be obtained.

It seems to me that there is no way of accounting for the symptoms and signs in this case except by assuming the presence of pneumothorax. This followed immediately after puncture of the lung with a hypodermic needle in a man suffering apparently only from a simple pleurisy on the opposite side. The needle used was an ordinary hypodermic needle.

Dr. Thacher reported a similar case at the December meeting of this society. The history of his case was as follows :

“A child had some infectious disease, some pulmonary symptoms developed, and, in order to settle the diagnosis between broncho-pneumonia and pleurisy, the hypodermic needle was inserted on both sides. Within two or three hours intense dyspnoea developed, and the child soon died. The speaker made an autopsy. Both lungs were collapsed, and a puncture was found through the lower edge of both at the site where the physician said he had introduced the hypodermic needle. There was a slight amount of broncho-pneumonia. The speaker could account for the pneumothorax in no other way than on the supposition of puncture of the lungs by the hypodermic needle.”

These cases of pneumothorax, it seems to me, are of special interest. So far as I know, attention has not been previously called to the occurrence of this condition after the use of an exploring needle. It probably would never follow the introduction of a needle into a perfectly normal lung. The conditions under which it would, perhaps, be most likely to occur are when the pleura is quite normal and the lung is diseased, and especially when there is a process of softening in the lung near the pleural surface, but not involving it.

It seems to me probable that there are cases of pneumothorax of less extent due to this cause, which do not produce symptoms marked enough to attract attention, and that there are other cases which are recognized, and in which recovery takes place, that may also be produced in this manner. A moderate degree of pneumothorax, existing on one side and gradually developed, would not be likely to produce very urgent symptoms, and, as the opening would probably be soon closed as the lung became

partially collapsed and the air in the pleural cavity absorbed, the condition might easily escape recognition, and, if recognized, soon disappear. In all the cases reported above, where death occurred, it will be noticed that both lungs were involved and rendered practically useless.

I have obtained the notes of a number of cases of general peritonitis produced by oozing along the track of the needle after puncture of a distended gall-bladder. The first one was reported by Dr. A. B. Pope. The case occurred in the service of Dr. Ball in Bellevue Hospital :

A fluctuating tumor was found in the region of the gall-bladder, which was supposed to be a distended gall-bladder. A hypodermic needle was introduced, and immediately after its withdrawal the patient complained of intense pain in the abdomen. He said to the physician, "You have done me up this time, doctor." He died in three days of general peritonitis. At the autopsy, bile was found mingled with the peritoneal exudation.

Dr. Wylie, in the "Trans. of the New York Obstet. Society," March 2, 1886, described a similar case. Dr. Roosevelt reported a third case at the December meeting of the Clinical Society, and Dr. Janeway has given me notes of a fourth case of the same kind that he saw in consultation in private practice.

Dr. Wylie has also reported a case of fatal peritonitis produced by oozing of pus along the track of the needle in a case of perityphlitic abscess. A hypodermic needle was used for the puncture. Dr. Mundé has reported, in the "Trans. of the New York Obstet. Soc.," a case of suppurating dermoid cyst which he punctured with a hypodermic needle after opening the abdominal cavity, and on withdrawing the needle a drop of pus escaped. If this had been punctured through the abdominal wall, death would

have certainly followed from general peritonitis. It illustrates well the mode of occurrence of such accidents. Cases of peritonitis have also been reported as following puncture of pyosalpinx and encysted pockets of pus in the abdominal cavity.

Gerster ("Aseptic and Antiseptic Surgery," p. 247) has reported a case in which death occurred from general peritonitis after puncture of a perityphlitic abscess, the needle having passed through the peritonæum.

The "Medical News" for January 1st contains the report of a case of sudden death following the introduction of an aspirator needle occurring in the practice of Dr. J. C. Reeve, of Dayton, Ohio.

The patient was suffering from abscess of the liver and it was decided to aspirate the liver. Immediately after the introduction of the needle the patient suddenly began to breathe heavily, and in a moment was dead. No anæsthetic was used. There was nothing found at the autopsy to account for the sudden death.

A German surgeon, whose name I have forgotten, has recently reported a case of removal of a large pancreatic cyst in which, previous to the removal, an exploring needle was introduced into the cyst for diagnostic purposes. A general peritonitis, lasting about a week, immediately followed, although the patient recovered, and the cyst was later removed.

Dr. Janeway has given me notes of the following case :

In a patient with suspected pericarditis with effusion an exploratory puncture of the pericardium was made by the physician in charge. The patient died soon after, and at the autopsy laceration of the heart was found, with hæmorrhage into the pericardium.

In the "Australian Medical Gazette" of June, 1887, a series of cases are reported where unfortunate results fol-

lowed puncture of hydatid cysts. These are given with the report of a case in which symptoms of collapse terminating fatally followed immediately upon puncture of a hydatid cyst of the spleen. Only a few drops of fluid had escaped, when the patient went into collapse and died. Among the cases included in this paper are the following :

In the "St. Bartholomew's Hospital Reports," vol. xvi, the following case is reported :

A small hydatid cyst of the liver was punctured with a very fine trocar. Only a few drops of fluid escaped, when the patient died suddenly with the symptoms of shock.

In the "Lancet," vol. xxi, the following case was reported :

A very fine trocar was introduced into a hydatid cyst of the liver, and a few drops of fluid escaped, when the patient went into collapse and died in twenty minutes.

A number of cases are on record of death following puncture of hydatid cysts of the lungs. In most of these death has followed from escape of fluid into the lung and drowning; in others, as in the foregoing, collapse and death have directly followed the puncture.

Dr. Tingley, of the house staff of Bellevue Hospital, has given me notes of the following case :

A hypodermic needle was introduced into a large ovarian cyst; the following day the cyst was removed by operation, when a thin layer of colloid matter was found at the site of puncture between the abdominal wall and the cyst wall. Had not an operation been performed early, peritonitis would probably have followed.

Not properly belonging here, perhaps, is a case of continued oozing following puncture of an ovarian cyst with the aspirator needle reported by Dr. Lusk.

A case of circumscribed pleurisy following breaking of a hypodermic needle in the chest wall is also reported by Dr. Tingley.

Dr. A. A. Smith has called attention to the occurrence of cough with bloody sputum for several days after exploratory puncture of the lung, and Dr. F. S. Dennis has referred to a case of continued oozing from an aneurysm after puncture with a hypodermic needle.

It is possible that some of the cases included in this class properly belong in the second class.

The second class includes those secondary septic complications following the inoculation of healthy tissues in the withdrawal of the needle after its introduction into more deeply seated infectious material.

A case was reported at the December meeting of the Clinical Society by Dr. Roosevelt:

When, in the exploration of the chest in a case of empyema, the needle was introduced into the peritoneal cavity, through the diaphragm, and into the pleural cavity, a general peritonitis followed the exploration, probably produced by the infection of the peritoneal cavity by material remaining on the needle in its withdrawal, or perhaps by oozing along the needle track.

Dr. Janeway has referred to two cases of cellulitis of the back that had fallen under his observation which followed the introduction of an exploring needle into the lung in cases of fœtid bronchitis:

The cellulitis was of the gangrenous type, accompanied by subcutaneous emphysema, and was probably produced by the infection of the tissues with the material from the bronchiec-tatic cavities remaining on the needle when it was withdrawn.

An instance of mild septic infection of a similar nature has fallen under my observation.

In a case of encysted peritonitis attended with little rise of temperature the introduction of an exploring needle was followed by a chill and a temperature of 104° that continued for several days. A similar case is reported by Dr. Tingley. Following the introduction of a needle into a perinephritic abscess the temperature ran up to 106° . The infection in these cases may also have been produced by oozing along the track of the needle.

The third class includes the cases of infection of normal or diseased tissues or collections of fluid by inoculation of them with a septic needle. These cases occur most frequently, and are those most generally recognized and most easily avoided. But little requires to be said about them. There are but few clinicians of considerable experience who have not had the misfortune to see one or more cases of simple pleurisy changing into suppurative pleurisy after puncturing with a hypodermic needle. Several such cases have fallen under my own observation. I do not refer, of course, to those cases that become suppurative after aspiration, but to those that become suppurative after simple exploratory puncture. In some of these cases certainly, if not in all, the occurrence is not a mere coincidence, but is due to the infection of the serous fluid by a septic needle. Similar cases of suppurative peritonitis following the introduction of a needle into the abdominal cavity in peritonitis have been observed. Dr. Lusk has reported two cases of suppuration in ovarian cysts following the introduction of an aspirating needle.

A similar result would be likely to result from this procedure under the same conditions in any form of cystic neoplasm or retention cyst, or in cases of collection of serous fluid in any pre-existing cavities. The occurrence of suppuration under such conditions is simply a question of inoculation of the tissues or fluids with septic organisms.

Reference should be made to the dangers and accidents following puncture of intestines distended with gas or liquid contents. There are numerous cases recorded where a general peritonitis has resulted from the oozing of faecal matter through the wounds thus produced.

I especially desire not to seem to exaggerate the dangers following the use of the exploring needle or to overestimate their importance. The following remarks, however, are suggested and seem to be justified by the cases reported :

1. The employment of the exploring needle is not infrequently attended by considerable danger, and a number of deaths have directly resulted from its use.

2. The indiscriminate, careless, and routine resort to exploration with a needle should be condemned. This procedure should not be resorted to without careful consideration of the conditions obtaining in each case and the results that may follow the puncture. The site for the puncture should be thoughtfully chosen, the puncture carefully made with complete antiseptic precautions, and the smallest needle that will answer the purpose employed.

3. The puncture of collections of fluids with tense walls in relation with serous surfaces should be, as far as possible, avoided, and, if it is resorted to, sufficient fluid should be withdrawn to relieve the tension upon the walls of the sac. In many cases certainly an exploratory operation would be attended by less danger.

4. In the introduction of the needle into deeply seated infectious matter the nature of the intervening tissue should be carefully considered.

5. The needle before use should be always thoroughly disinfected, preferably by heating in the flame of an alcohol lamp or a Bunsen burner.

6. The skin where the puncture is to be made should

be rendered thoroughly aseptic by first scrubbing with soap and water and then washing with an antiseptic solution.

7. The dangers attending the use of this valuable adjuvant in diagnosis should not in the slightest interfere with its employment in properly selected cases, where due precautions are observed as to its use.



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