

THE RELATION OF SO-CALLED ETHER PNEUMONIA TO PELVIC AND ABDOMINAL SURGERY.

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ONE of the most difficult things about the science of medicine, which is yet in its developmental and formative stage, is that as scientific knowledge advances we have to unlearn so many things we have been taught. Theories and impressions received to-day have to be revised to-morrow by the discovery of new facts. To give up an idea or an impression that has been firmly implanted in our minds for years and readjust ourselves to changed conditions, based on new discoveries, is not always easy.

For many years it was commonly taught that ether irritated the bronchi and was largely the cause of what was known as post-operative pneumonia. Such pneumonia was spoken of, and still is in most hospitals, as "ether pneumonia;" yet any surgeon in reviewing his experience may find many facts to disprove, and few or no reasons to prove, that ether is the cause of pneumonia after an operation. It is astonishing that this misconception, that ether has a harmful effect on the air passages, is so widespread. In reality, that this view is erroneous has long since been proven both clinically and experimentally.

Ether is administered in most hospitals several times every day, yet the condition known as ether pneumonia is a rare occurrence compared with the number of ether administrations given. If the pneumonia were the result of the ether, we ought to expect to have many cases every week. Again, if ether produced all the havoc with which it has been credited, the administration of it by the intratracheal method might almost come under the classification of criminal malpractice; yet we know that this method is safely practiced every day.

Rovsing has proved experimentally that, although ether does occasion increased secretion of the salivary glands of the mouth, the larynx and the trachea, the bronchi are not irritated at all, even

when the animals are killed by administering ether through a tracheotomy tube. The only way, therefore, that ether can produce pneumonia is by the aspiration of the accumulated saliva in the throat, usually the result of technical error on the part of the anesthetist who should not allow the secretions to accumulate in the throat. Such secretions may, of course, be easily infected from the buccal cavity. It is quite possible under such circumstances that tonsillar infections, involvement of the nasal accessory sinuses, or the teeth may be one of the causes of postoperative pneumonia. Attention has frequently been called to the importance of the sanitation of the nose, throat and mouth before all operations.

Mikulicz, as far back as 1898, on account of the somewhat frequent occurrence of postoperative pneumonia, deserted ether and took up chloroform in the belief that the pneumonia was due to the irritating effect of the ether. To his great surprise, it appeared that the cases of chloroform narcosis were followed more frequently by pneumonia. He, therefore, decided to give up narcoses by inhalation entirely and, thereafter, employed local anesthesia in all operations, even in major operations. To his still greater surprise, the result was that the lung complications, far from decreasing, increased to a considerable extent. He had twenty-seven cases of pneumonia in 114 laparotomies. This experience overthrew the old conception that postoperative pneumonia was due to inhalation narcosis.

Cunningham's very thorough work on the development of the lymphatics of the lung are both interesting and illuminating. He found that the lymphatics approach the lung from three different sources: From the two jugular sacs there are right and left lymphatic trunks, and from the retroperitoneal sac there are vessels which come up behind the diaphragm. The ducts which grow down from the neck meet in a plexus which surrounds the trachea. In the primitive lung the general pattern of the organ is very simple. It is obviously blocked off into large lobules by wide connective tissue septa. In the center of each lobule are the bronchus and the artery, and in the septa are the veins. At the hilum the tracheal lymphatics divide into three plexuses, one spreading on to the pleura, a second following the arteries, and a third the veins. The plexus which follows the veins grows rapidly to the pleura and spreads around the border of each primitive lobule, blocking off the pleura into polygonal areas. From this pattern the pleural lymphatics develop. At a much later stage the lymphatics grow down from the center of the lobule along the bronchi. ...

The lymphatics of the diaphragmatic surface of the pleura grow up behind the diaphragm from the retroperitoneal sac. This relation of the pleural lymphatics to the abdominal lymphatics is of the greatest importance in the consideration of the development of pleurisy and pneumonia following abdominal conditions of a septic nature. It is clearly seen, therefore, from this study of the development of the lymphatic system, how easily infections may travel from the pelvis or other parts of the abdominal cavity up through the retroperitoneal lymphatic system to the pleura, the base of the lung or the bronchi.

If we look upon pneumonia after an abdominal operation in the same light as we do upon the development of a subphrenic abscess after an appendectomy, we find they bear the same analogy to the point of original infection. The only difference is that in the one case the new focus of infection lands above the diaphragm and in the other below it, but both are brought about by the carrying of infection from the original source in the abdomen up through the lymphatics and veins by the retroperitoneal route. This idea is further strengthened by the fact that most postoperative pneumonias will show a mixed infection containing streptococci, colon bacilli or other organisms in addition to pneumococci. On the other hand, it is often true that the appendix, the gall-bladder, the Fallopian tubes and the ovaries may be the seat of a pneumococcus infection.

Says Rovsing: "One curious fact should long ago have aroused the surgeon's suspicions, namely, that almost every so-called ether pneumonia manifested itself after a laparotomy, while it is extremely rare to find pneumonia following operations on the extremities, the thorax or the head. This occurrence is too unusual to pass by unnoticed. In the main, it is due to two circumstances: (1) That peritoneal infection is conveyed to the lungs partly by way of the lymph vessels and venous blood and partly by embolism. (2) That the sore-bellied patient after an abdominal operation does not dare cough or breathe deeply, for fear of causing himself pain. The result is imperfect aeration of the lung, and imperfect elimination of secretions. If, therefore, the patient is already suffering from bronchitis, or if an infection of the lung sets in, the development of a pneumonia is greatly favored and encouraged by the deficiency in expectoration and lung ventilation."

In this connection, it should be remembered as a matter of history, that the first employment of ether in medicine was as an inhalation remedy for certain lung diseases such as asthma, emphysema, bronchitis, etc. Rovsing is authority for the statement, which is borne out in the experience of others, that in certain badly afflicted lung patients who have to submit to operation, that ether is not only

well tolerated but, in a good many cases, it seems to have a specific beneficial effect on such lung conditions.

It would seem proper to conclude, therefore, that cases of pneumonia following operations are not due to the ether. The term "ether pneumonia" should be discarded and forgotten. Post-operative pneumonia occurs with great rarity except after abdominal operations and is then, probably, due to an infection already existing in the bronchi or lungs at the time of operation, or to imperfect aeration and ventilation of the lungs by reason of the fear of taking deep breaths after a laparotomy; but in most cases the pneumonia is a *secondary infection of the lung* following a septic abdominal condition.

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DISCUSSION.

DR. GORDON K. DICKINSON, Jersey City, N. J.—The conclusion of the author that all of these pneumonias are not directly due to the ether is true. In the investigation of the subject of anesthesia in order to prepare a paper for one of our societies a little while ago, I found that ether produces a vascular stage of pneumonia. Those who go to the far north on voyages, where there are no germs, will pass through the vascular stages of bronchitis and pneumonia, but not to the full extent. In animals you get the vascular stage after ether and chloroform.

A doctor in my neighborhood goes to Crile's Clinic where they have as good anesthesia as in any part of the country, and patients who are given gas oxygen anesthesia, get a pneumonia, and are sick for five or six days. We have been using gas anesthesia very largely in our abdominal operations.

There are two or three factors to be considered in connection with the development of pneumonia following anesthesia, one of which is that germs on the tonsils back of the tongue and hanging there may be insufflated; the other is a slight drain from the abdominal cavity. Another thing which I have noticed is that the patient is usually transferred to a place where the air is poor and ventilation imperfect.

Some years ago I was taught, no matter how cold the weather, to put pillows under my patients, send them to bed covered around the chest, with warm water bags, open the windows widely, and induce a draught. Since then I have been following that plan my pneumonia cases have been reduced considerably.

DR. JOHN W. KEEFE, Providence, Rhode Island.—I believe that many of the pneumonias, as we call them, are decidedly different

from what we call acute lobar pneumonia, and are due to an infection, and that infection is carried through the blood, but not directly through the mucous membrane of the bronchial tubes. I think very seldom is it carried through the lymphatics, but that most of our infections are carried through the blood.

We have what we call inhalation pneumonia, that is, the inhalation of some vomitus from the stomach, or some mucus collects in the throat, and we call that also pneumonia. We have a room where we send most of our severe cases after operation, whether they are cases of abdominal or of general surgery. I have noted many times in the winter, that we have a series of cases that we call ether pneumonia or bronchopneumonia, and several times, after refusing to send our patients to that particular room, until it was washed, aired and fumigated, we have had no further trouble. Whether there is something in the atmosphere they breathe in that particular room in the way of septic material floating about, I cannot say, but I do know that after thoroughly cleansing the room these cases of pneumonia have ceased.

I want to put on record an interesting case I had this last spring. It was a case of septic pneumonia following a tonsillectomy. In looking up the literature I found a report of twenty-eight cases of septic pneumonia reported from Mt. Sinai Hospital, New York. All of these cases of septic pneumonia followed tonsillectomy. A minor operation was performed on my patient, and within a week or so she was given ether and had her tonsils removed. Everything seemed all right until the third day, when she developed a temperature and cough. She had three or four different foci in the lungs. She developed empyema, so that it became necessary to evacuate the pus in the pleural cavity and drain. She ultimately recovered. I feel the pneumonia was brought about in this case through the circulation; that probably some septic material entered the circulation during the tonsillectomy.

DR. CHANNING W. BARRETT, Chicago.—In the Cook County Hospital, Chicago, where thousands of operations are done in a year, at one time the internes gave the anesthetic, and during that time the percentage of morbidity and mortality from anesthesia apparently was large. In those days the internes took turns of one month in giving anesthetics. Last year a change was inaugurated, and now we get our anesthetists through a civil service examination which is open to nurses or doctors. Of the four who qualified at a recent examination, one was a lady physician who had had a good deal of experience, and three of them were nurses. Under that régime the number of pneumonias has decidedly decreased. Also we have this advantage, the patients are not sent back to the ward with other patients, they are not sent to the general ward, but to a separate recovery ward that has opportunity for a good deal of fresh air. We make free use of the partial Fowler position with the head of the bed elevated. Under that arrangement we have very little pneumonia.

I think it is very plain to all of us that pneumonia following

operations does not come entirely from the anesthesia, but it does seem to me that prolonged anesthesia, choking anesthesia, the inhalation of septic material, etc., plays a very important part in the irritation which makes it possible for the germs to develop in the lungs.

DR. JAMES E. SADLER, Poughkeepsie, N. Y.—I desire to express my appreciation of the paper presented by Doctor Darnell. My view of this question leads me to believe that while we do, occasionally, have an inhalation pneumonia following an improperly administered anesthetic, yet the cases constitute a relatively small number, and as suggested by Doctor Barrett, there is usually some other element that should be taken into consideration. In my own practice there are several factors I endeavor to avoid. In the first place, I aim never to operate an elective case where there is an acute inflammatory condition of the upper air passages. This is a marked factor in the avoidance of pneumonia. Secondly, it has always seemed to me that after these patients have been returned to bed, and are thoroughly conscious, each should be impressed with the slight danger of the pneumonia and be encouraged to breathe deeply, thereby giving the lungs needed exercise. The third point is the question of the clothing of the patient while in bed. This matter can be governed to better advantage in the smaller institution than it can be in the larger general hospitals, like the Cook County Hospital referred to by Dr. Barrett.

In my own practice, if a patient comes from the country in cold weather, with a heavy undershirt on, and has been accustomed to wearing such a garment, we allow him to wear a similar garment after the operation. On the other hand, if he has been in the habit of wearing a light under-garment, he has the privilege of wearing the same kind after the operation. In other words, we allow our patients to wear the type of clothing to which they have been accustomed.

In my own institution where we can govern such matters, we have practically no pneumonia following anesthesia, but in general hospitals, where patients wear institution clothing we do occasionally have pneumonia following operative work.

DR. JAMES E. DAVIS, Detroit.—Microscopic sections of lung tissue from these cases show a focal involvement usually. Although there is a general involvement of the vascular interstices, there is a hyperemia or even an edema of this portion of the lung tissue, and here and there a definite focus of infection. It seems to me we see different types of cases, speaking from an etiological standpoint. An improperly prepared patient who comes to the operating table with probably some food in the stomach, is a case that will likely have a pneumonia from the entrance of food particles into the respiratory tract; while there are other cases that doubtless come from the lymphatics of the abdomen, and this leads me to say that it is interesting to note the conditions that govern the movement of lymph within the lymph vessels. Ordinarily in the extremities we do not have movement of the lymph, but in the lymphatics of the

abdomen some of the larger vessels have a fairly constant movement of lymph. That movement of the lymph can be accelerated by acute conditions. For instance, the movement of the patient. Anything that will stimulate the patient, such as the giving of certain chemicals, will stimulate the movement of the lymph. Opium will usually retard that movement, and for this reason then it is a good thing to give opium after an operation to prevent the rapid movement of the lymph from the lymph vessels of the mesenteric system.

Dr. Barrett has spoken of elevation of the head. It does seem to me that it is an excellent procedure, if for no other reason than the hydrostatic advantage obtained for the lungs, and if we couple with that position the use of tap water in the rectum, the natural forces are augmented to counteract the movement of the lymph.

DR. ALBERT GOLDSPOHN, Chicago.—What I have heard here to-day rather confirms my previous opinion on this subject; that the pulmonary infection after operation is indirectly the result of ether as an anesthetic that has the pronounced tendency to produce over-secretion of the bronchial mucous membrane. I think it is not fair to say the anesthetist should not permit the accumulation of such mucus in the bronchi and pharynx, when ether is given alone without preliminary medication and to the degree of producing complete relaxation for any length of time. I do not believe that I could accomplish that feat, and I have not seen anyone else do it without getting sufficient mucus accumulated in the respiratory tract to cause some degree of asphyxia. This is quite uniformly prevented by one or more doses of atropin, scopolamine or hyoscine given previously with morphine enough to fill another important indication. This I have always done for at least twenty-five years. And I do not remember having a case of postoperative pneumonia. Bronchitis yes; but nothing sufficient to cause a rise of temperature. And I am not a speedy operator. If the preliminary dose happens to have been forgotten, then I am badly handicapped. I am annoyed by the rattling of mucus in the trachea and in the mouth. I think it is cruel to allow a patient to endure such a thing when we can avoid it.

During all these years I likewise have needed the morphine to put my patient before operation into an indifferent attitude of mind, quite in unison with Crile's principles. I want to avoid the fear that I might have if I were going upon the operating table. I think there is much need for at least one preliminary dose, of one-eighth, or one-sixth, or one-fourth of a grain of morphine, with a proportionate amount of the other drug, to allay the patient's fears, to avoid the accumulation of the cruel and dangerous mucus, and to secure tranquil sleep for the patient for a couple of hours after operation, and thus eliminate the struggling, vomiting and noisiness of such patients when they awake from a purely ether anesthetic.

Theories of postoperative pulmonary infection by way of the blood or lymph channels seem rather remote in the presence of such a direct medium for carrying such an infection from the mouth into the bronchi as such an accumulation of asphyxiating mucus presents.

DR. FRANCIS REDER, St. Louis, Missouri.—The term ether

pneumonia has been accepted by the profession in general and is used as such in the literature. Under such conditions it is not an easy matter to eliminate such a popular term. It is simply called ether pneumonia because it occurs in connection with the administration of ether. In addition to the possible causes that have been mentioned, there is another factor which is to a great extent responsible for the development of pneumonia. It is the change of temperature a patient is subjected to after the operation is finished and he or she is returned to the room. Such a patient often is in a state of perspiration. The journey from the operating room is usually along a hall whose temperature is much lower than that of the operating room. Often an elevator trip is taken with the patient to reach the bed. This does not better the chances for the patient. The blankets about the patient are frequently inadequate, often the feet are protruding unprotected. All this together with the patient's lowered resisting power seems to me to be a cause for pneumonia during the postoperative period.

DR. DARNALL (closing).—I wish to thank the fellows for their free and liberal discussion. There are one or two points I want to refer to briefly. Dr. Barrett and Dr. Reder both spoke of causes which lower the vitality of patients. If there is anything that lowers vitality we know that infection is more likely to take place.

Another thing is with reference to choking or imperfect anesthesia. As far as the accumulation of bronchial secretions and mucus and the rattling of mucus in the throat are concerned, a good many years ago that obtained more than it does to-day. In those days we entrusted the administration of ether to the average interne, and we were more or less annoyed with it. Sometimes the secretions were sucked back into the bronchial tubes and larynx and infection occurred from above. Since ether has been more skilfully administered and has been preceded by morphine and atropin in our clinic, we rarely have any trouble with the secretions. Three cases of postoperative pneumonia have occurred in my experience. One case had a slight bronchitis when operated upon, and I have reason to think, so far as I can trace it out by analogy, the other two cases came from pelvic infection. One was a severe septic abortion, and the other was a severe case of obstruction of the bowel with pelvic abscess and appendicitis. Those are the three cases I have had in my experience.

Dr. Sadlier remarked about clothing. That is a valuable suggestion and I want to thank him for bringing it to our notice. A patient who comes into the hospital wearing thick-lined underwear, should not have a thin nightshirt put on him just after operation. Let him continue to keep his shirt on.

There are one or two things I want to drive home. I feel that postoperative pneumonia is a secondary infection and not an infection in the same sense that we speak of a lobar pneumonia. It may come from a dirty nose, bad tonsils or decayed teeth; it usually comes up the other way, by the retroperitoneal lymphatics and veins.

I would commend to every one of you Cunningham's article in the proceedings of the American Society of Anatomists which is a very thorough and scientific exposition of the development of the lymphatic system.

There is one other point I want to call attention to in connection with these pneumonias. With our classical lobar pneumonia we are taught that the condition clears up by crisis; but these so-called ether pneumonias do not clear up by crisis but by lysis. There is a gradual descent of the temperature curve, which is good evidence to my mind that it is not the same thing as an ordinary pneumonia.