BRONCHOSCOPIC TREATMENT OF BRONCHIECTASIS AND PULMONARY ABSCESS.

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NEW YORK.

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BRONCHOSCOPIC TREATMENT OF BRONCHIECTASIS AND PULMONARY ABSCESS.*

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By the use of the bronchoscope in the treatment of bronchiectasis and pulmonary abscess many patients suffering from these conditions may not only be relieved, but even cured by the establishing of proper drainage of the lung.

In bronchiectasis, especially in cases following diphtheritic involvement of the bronchi, there is a marked peribronchial infiltration and connective-tissue thickening of the bronchial wall which often produces stenosis by subsequent contraction. These bronchial stenoses not only follow diphtheritic tracheobronchitis, but may also follow the sojourn of foreign bodies for a long period, influenza, syphilis, and other conditions in the mediastinum causing pressure from without, as in peribronchial infiltrations and mediastinal glandular pressure. Pressure from without the bronchus is often productive of a chronic inflammatory thickening of the compressed bronchial wall, which may cause stenosis later.

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In intubated cases suffering from laryngeal diphtheria with obstruction of the lumen of the intubation tube, secretions may be retained in the lungs, and produce a "sponge soaking" of the lung structure, and the patient, being unable to expel this secretion from the lung, frequently succumbs. Such cases are frequently diagnosed bronchopneumonia, but the so-called bronchopneumonia is rapidly relieved by bronchoscopic evacuation of the secretion. As soon as proper pulmonary drainage is established, the condition of the patient improves. (Fig. 1.)

In peanut bronchitis following the inhalation of a peanut kernel or particles of masticated peanut, a very severe reaction follows, and an enormous amount of secretion is produced by the irritant action of the peanut. If the peanut kernel or particles are not removed there is such retention and "sponge soaking" of the lung, with foul secretion, that the child succumbs later to pulmonary abscess and septicemia. (Fig. 2.) A child three years of age who inhaled many small pieces of peanut pulp into the right bronchus suffered from a severe bronchitis following the accident, and was sent to the hospital the following day for treatment. There was considerable difficulty with expiration, and a marked asthmatic wheeze was audible at some distance. The bronchoscope was introduced, and many pieces of peanut were removed by forceps and suction. The condition of the child improved after the removal of the peanut fragments, but physical examination showed that little air entered the lower posterior portion of the lung. The following day the posterior branch of the right lower lobe bronchus was explored, a 4 mm. bronchoscope being used. Some foul smelling pus was sucked out from

this region, but no fragment of peanut was found, and the aeration of the lower lobe of the lung did not improve to stethescopic examination while the bronchoscope was *in situ.* Unfortunately a small

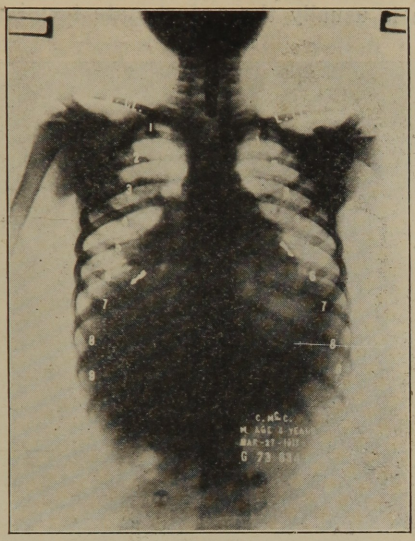

FIG. 1.—Radiograph of a patient intubated for laryngeal diphtheria. The lumen of the intubation tube became obstructed, which caused retention of secretion and "sponge soaking" of the lungs. The dark triangular area in both lungs is the gradual "sponge soaking" from below upward. The condition was diagnosed bronchopneumonia, but was promptly relieved after the removal of the tube and bronchoscopic evacuation of the retained secretion.

piece of the peanut had lodged in a small dorsal branch of the right lower lobe bronchus, which I was unable to locate and remove. The small piece of peanut had disentegrated, and had produced a

septic bronchitis three days after the accident. The abscess ruptured into the pleura, and was drained by rib resection. The child succumbed six weeks later from pulmonary abscess and general septicemia.

This is usually the unfortunate termination fol-

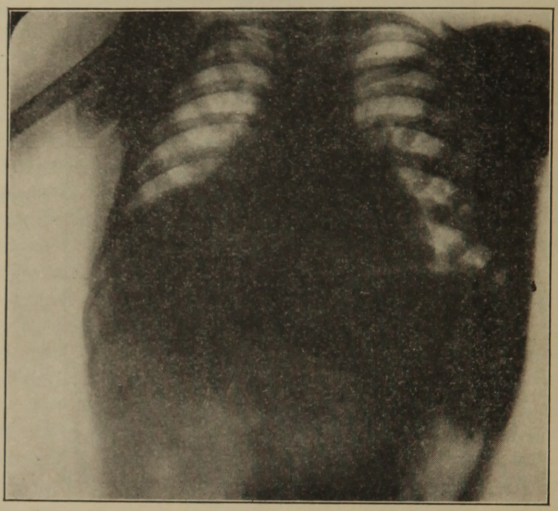

FIG. 2.—Radiograph of a purulent "sponge soaking" of the lung following the inhalation of a fragment of peanut kernel. Note the dark shadow in the region of the right lower lobe, in which a small particle of the peanut lodged. Several small pieces were removed bronchoscopically, but the fragment which remained produced septic pneumonia and pulmonary abscess.

lowing the aspiration of extremely irritating substances such as food and nuts, especially when a small particle is deeply lodged in a small branch bronchus which is beyond the range of the broncho-

scope. The secretions become purulent within a short time, and lung abscess is the inevitable result. This is frequently the starting point of bronchiestasis. The retention of secretions below a foreign body or bronchial stricture often follows, even after the successful removal of the foreign body, for the bronchus will necessarily dilate below the stricture and become a reservoir of foul secretion. A bronchial stricture, no matter how small the lumen may be, does not shut off the airway; but it does shut off the normal expulsion of secretions, and the retention of foul secretions for long duration will promote bronchiectasis lung abscess, or the lung may even become gangrenous. (Fig. 3.)

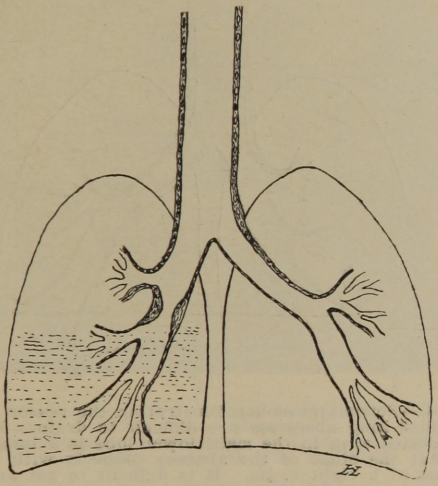

FIG. 3.—Schematic sketch of the tracheobronchial tree and lungs. The stenotic narrowing in the right stem bronchus illustrates the cause of bronchiectasis and "sponge soaking" of the lung from retained secretion. The dotted area in the right lung shows the retention of secretion up to the level of the stricture. Proper lung drainage bronchoscopically will relieve the condition.

Lung abscesses may be either diffuse or circumscribed. In the diffuse variety the lung is usually "sponge soaked" with pus, the removal of which bronchoscopically will greatly improve the patient. On the other hand, a circumscribed abscess may be extremely difficult to cure, especially when the abscess attached by its stalk is at a right angle to the bronchus into which it pours its contents. (Fig. 4.) If the stalk of the abscess connects in a line with the bronchus into which it empties, then it is not

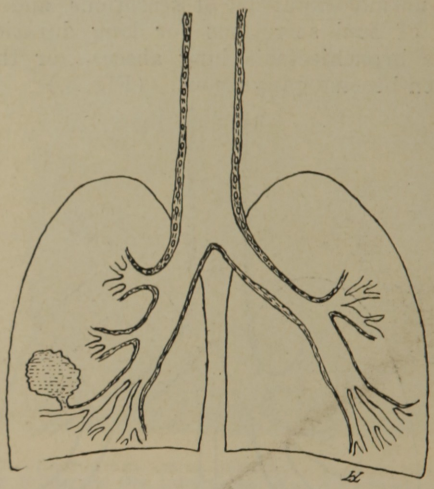

FIG. 4.—Schematic sketch illustrating the reason why circumscribed lung abscesses are difficult to drain. The small round dotted area in the right lower lobe is a lung abscess. Note that the stalk of the abscess connects with a branch bronchus at a right angle. It is difficult to get around the corner and enter the abscess cavity.

a difficult procedure to enter the abscess cavity and drain it properly, but a true circumscribed lung

abscess is at times extremely difficult to cure. The method advised by Yankauer will relieve many of the conditions, for the infiltration of the solution will soften secretion and make expectoration of the thick pus much easier for the patient.

In the studies bronchoscopically of pulmonary abscess by the writer, pus is usually seen to be pouring from a small branch bronchus, and it has been

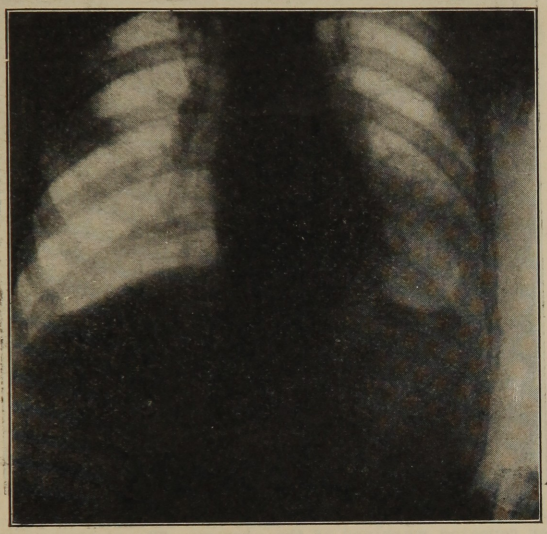

FIG. 5.—Radiograph of a lung abscess in the left lower lobe. The abscess cavity connected on a line with the branch bronchus into which it emptied, and the abscess cavity could be entered with a special five millimeter bronchoscope.

at times difficult to locate the definite abscess cavity in the lung from which the pus is oozing. However, in a case referred to the writer by Dr. Jesse

G. M. Bullowa a definite abscess cavity was entered near the diaphragm by a specially made bronchoscope, 5 mm. by 45 cm. in length. The abscess was well down toward the diaphragm, the stalk of the abscess connecting with a left lateral branch bronchus. The mouth of the stalk of the abscess was surrounded by granulation tissue, from the

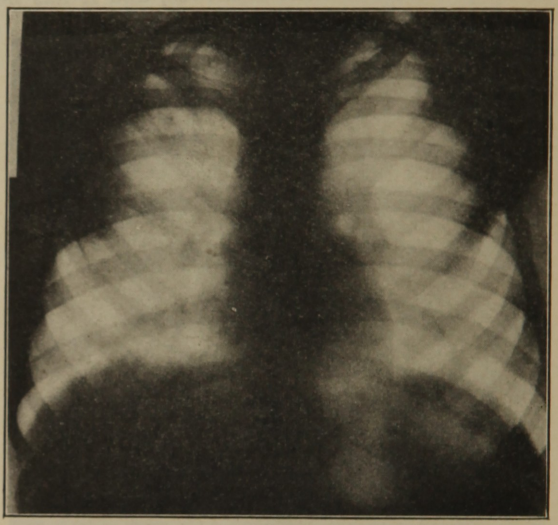

FIG. 6.—Radiograph of the same case as shown in Fig. 5, after repeated washings of the abscess. The shadow in the left lower lobe has disappeared, and expectoration of pus ceased.

center of which foul smelling pus was oozing. The 5 mm. bronchoscope entered the abscess cavity through the connecting stalk, for it was on a line with the lip of the bronchoscope, and not around a corner. (Fig. 5.)

When the abscess cavity is connected by its stalk to a branch bronchus which can be entered with a small bronchoscope, it can be readily drained and washed, but many treatments are often necessary before the case is finally cured. In some instances there is considerable reaction following pulmonary washing; while in other cases there is little or no reaction or shock. In the young man referred to,

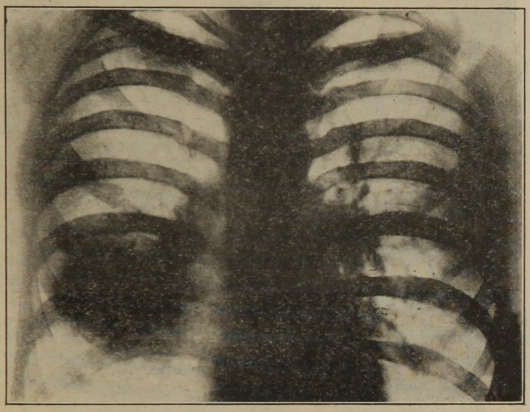

FIG. 7.—Radiograph of a pulmonary abscess the stalk of which was at a right angle to the branch bronchus into which it emptied. Note the dense shadow over the right lower lobe, with pus "sponge soaking" of the surrounding lung tissue.

there was a marked reaction after each treatment. His temperature rose to 105° F. one hour after each washing, and gradually fell to normal the following day. He also complained of much pain in the left chest in the region of the diaphragm. However, he made a complete recovery after a period of three months and has remained well ever since.

one and a half years later. (Fig. 6.)

In another case, a man of twenty-two years, referred by Dr. Kupferman, had a pulmonary abscess

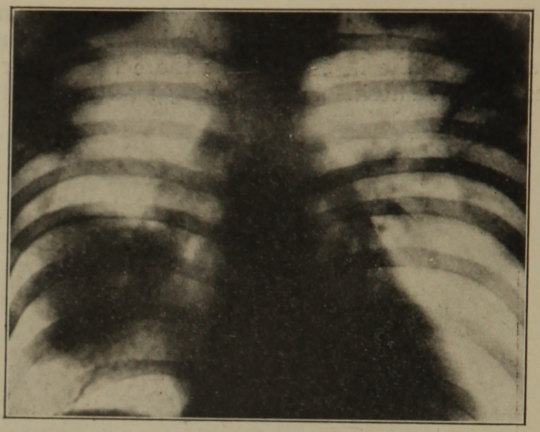

Fig. 8.—Radiograph of the same patient as pictured in Fig. 7, after seven lung washings. The density of the shadow has slightly decreased. The abscess cavity could not be entered by the special long bronchoscope, for it was around a corner.

of one and a half years' duration, following tonsillectomy and the inhalation of a piece of wooden tongue depressor. He had an abscess off at a right angle to the bronchus, into which it was emptying, and pus could only be seen oozing out of a small branch bronchus, and I was unable to enter any definite abscess cavity even with a 5 mm. bronchoscope. (Fig. 7.) However, the patient was apparently improved after seven washings, the fluid having softened the thick purulent expectoration which had been difficult to cough-up before treatment. The patient, unfortunately for him, decided

that the weekly pulmonary washings were too slow in producing a cure, and he decided to have the abscess drained by thoracotomy. This was unsuccessful, for he succumbed shortly after the opera-

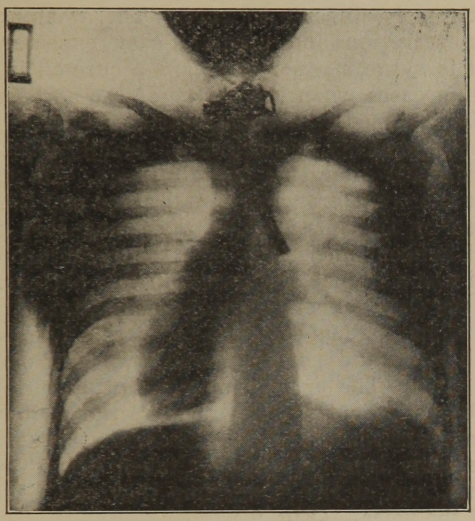

FIG. 9.—Radiograph of the writer's method of drainage of a bronchiectatic cavity and pulmonary "sponge soaking." A long fenestrated soft rubber tube is used as the inner tube of the tracheal cannula. Little air entered the right lung until the tube opened the stricture and drained the "sponge soaked" area.

tion. The radiographs taken at the time of admission and after the last washing showed an apparent improvement. (Fig. 8.) There was also improvement in the amount of pus coughed up, and less odor. This case was one of the type of abscesses well off at a right angle to the bronchus into which

it was emptying, and while I could see the mass of inflammatory granulation tissue at the mouth of the abscess stalk, I was unable to enter it with the small especially made bronchoscope. This is the reason why so many of the pulmonary abscesses are so extremely difficult to cure. The washing will soften secretion and promote easy expectoration, but it is by no manner of means a cure-all in long-standing cases when the cavity of the abscess cannot be reached. Bronchiectasis resulting from bronchial stenosis is much more readily dealt with by bronchial dilatation and drainage. In one instance the right bronchus was drained and the lung aerated by the introduction of a long soft fenestrated rubber inner tube into the right bronchus. There was a bronchial stenosis in this patient. She wore the soft rubber tracheobronchial tube for six months, and made a complete recovery. The patient is still alive and perfectly well, two and one-half years later. The bronchi may be intubated by the long bronchial intubation tubes of the writer, but the catheterization of the bronchi through the tracheotomy tube is tolerated much better by the patients, and at the same time they can have the use of the voice. (Fig. 9.)

Pulmonary drainage is difficult in all cases of circumscribed abscess, but I think the conservative bronchoscopic measures of treatment should be given a thorough trial first, before radical major surgery is attempted.

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