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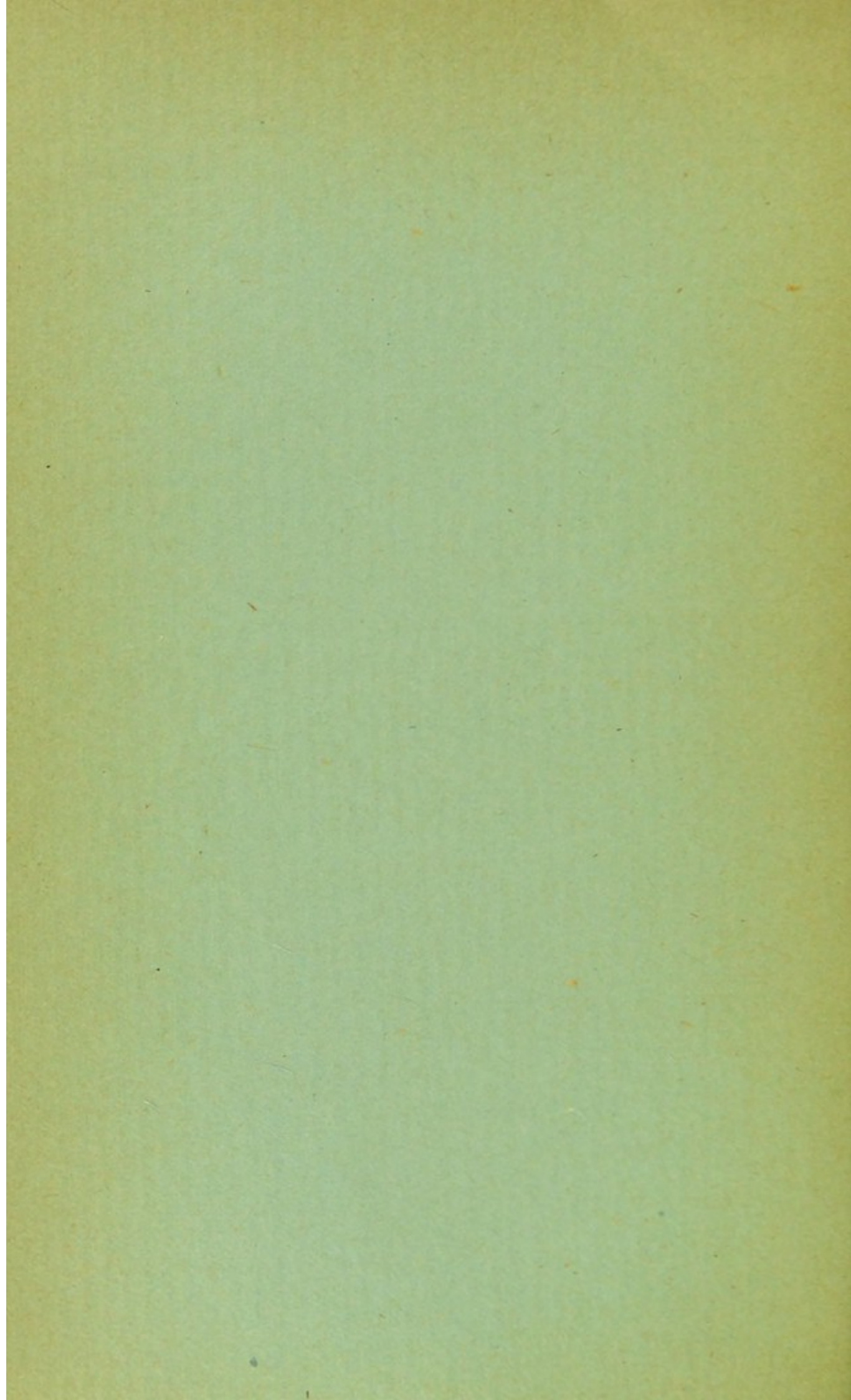
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EMPHYEMA

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Empyema is a condition so frequently unrecognized until the changes in the pleura are positive and destructive, that the results are exceedingly detrimental, not only to the immediate health of the patient, but to the subsequent symmetry of the chest. Many cases of lateral curvature of the spine are directly traceable to empyema as a cause of the commencement of the deviation. Collapse of the lung and contraction of one side of the thorax must necessarily distort the ribs and spine. The extreme degree to which the trunk may be twisted is well illustrated in the following case:

A girl of 14 had pleurisy at four years of age; her left chest was drained by a good surgeon for several months through two openings. One cicatrix is near the second costal cartilage, the other near the nipple. At the present time, 10 years later, her body is so tilted to the right that the line of the internatal fissure crosses her left shoulder, and a plummet line dropped from her right shoulder falls three inches outside her right hip. The anteroposterior diameter of the left chest varies from 3 inches to 4½ inches, while the right is 5 inches to 8 inches. The left thorax is greatly flattened and collapsed, and resonance and the vesicular murmur are heard only over the upper third. The right chest is very prominent, and the spinal curve with dorsal convexity to the right is most marked. The rotation is very great in the right thoracic region; moderate to the left in the lumbar. (Figs. 1 and 2.)

In many cases, in which drainage is instituted early, no deformity of the chest or body results. Only recently I had the opportunity of examining a lady upon whom I had operated 30 years ago when she was a child of five. She bore two large scars on the lateroposterior aspect of the right thorax, but her spine was perfectly straight, her right chest but slightly flattened, and even when stripped, asymmetry of the trunk could only be detected by close observation.

Many cases of pleurisy with effusion are subtle and insidious in their progress, patients even walking about with a large quantity of unrecognized fluid in their

¹ Delivered, by invitation, before the Altoona Academy of Surgery, April, 1904.

chests. In other cases the lack of recognition is due to the severity of the symptoms, especially when complicated with pneumonia, the effusion being masked until pus is thoroughly formed. No practitioner can afford to be other than an expert in percussion and auscultatory signs that mark an accumulation of fluid in the chest. With a flat percussion note, absence of respiratory murmur, of vocal fremitus and of vocal resonance, there need be but little doubt. A small locally walled-up accumulation may, however, cause a temporary uncertainty.

Errors of diagnosis are however not uncommon. I frequently have cases sent to me as spine disease or as lateral curvature, because the patient is tilting the body to one side and is carrying himself cautiously. When such a patient is stripped, it is plainly noted that the side toward which his body is inclined is sensitive to pressure, that movements in the opposite direction cause distress, while auscultation and percussion give speedy assurance of the existence of pleural accumulation.

On the other hand, pus in a case of dorsal spinal caries may make its way into the pleura, and if not evacuated, may perforate the lung. The danger of tuberculous infection of the lung in these cases is great, yet I have known the patients to recover. In some instances I have been able to demonstrate the continuousness of the pus track by injecting methylene-blue or pyoktanin into a sinus on the back and have it expectorated from the mouth.

In cancer of the liver, with extension to the diaphragm and adhesion of lung, I have mistaken the condition for local encysted empyema, and have tapped unsuccessfully. I have had a similar experience in posthepatic abscess following appendicitis. Empyema from injuries of the liver and from abscess of the liver, or other infections following abdominal disease, has also occasionally deceived me. In malignant disease also of the spleen, or of the curve of the transverse colon, the surgeon may be misled unless a complete examination is made.

The fibrinous exudate, as drawn, sometimes presents a peculiar creamy appearance before it has been fully converted into pus, as illustrated in the following case of pleurisy of seven weeks' standing. The fluid was localized in front at the upper anterior portion of the chest, the heart being pushed downward two inches. I drained this accumulation in a child of 10, with speedy cure. The fluid had the appearance of an oil emulsion, and was

about the consistency of pus, but on standing, did not separate in layers as pus does ; even after 24 hours it was still of a creamy consistency and intimately mixed. Reaction acid. After making it alkaline, stains by the

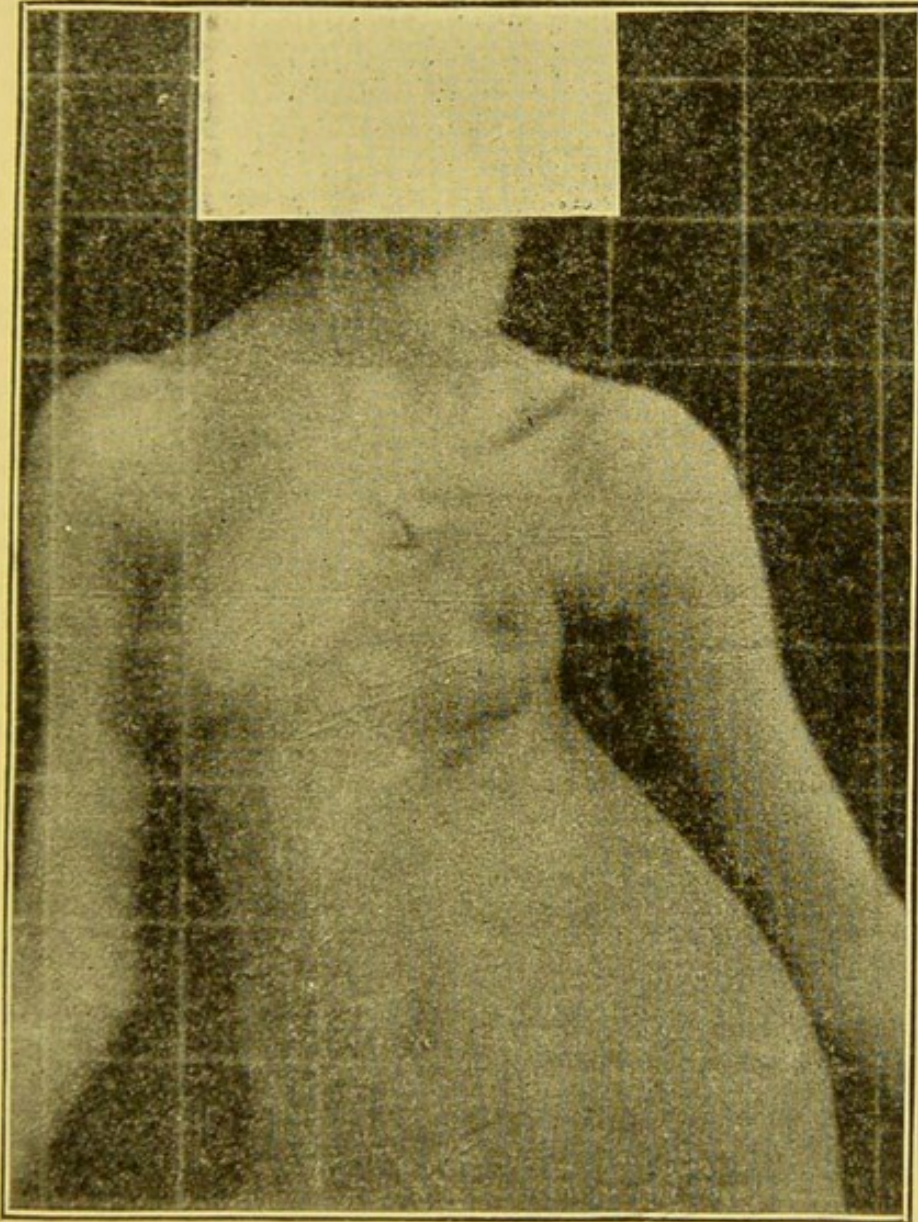


Fig 1.—Contracted left thorax following empyema, with tilting of body to right.

contrast method for 24 hours showed no tubercle bacilli. Plain stains showed a few diplococci, and a short, thick bacillus, but no streptococci nor staphylococci. A few polynuclear granular leukocytes were present, but no typical pus cells. There was much fibrin, which

appeared in flakes, rather than in fibrils. This accounted for the consistency of the fluid.

Occasionally, spontaneous opening occurs in neglected cases; while the tendency seems to be anterior in spite of gravity, yet I have seen a number of cases of posterolateral openings. It is a very unfortunate complication when purulent accumulations are permitted to continue until they perforate the lung. To allow such an abscess to drain through the bronchi is to expose the lung to tuberculous infection, and to have the horrible, ill-smelling pus discharged from the mouth is exceedingly dangerous. These cases demand speedy interference and the freest drainage through a short route, *i. e.*, through the thoracic walls. A small serous effusion can be absorbed; it had better be withdrawn. Early recognition and early removal are therefore most important. I am not one who believes in the wisdom of compelling the absorbents to take up a pleural effusion, even though it be only serous. When aspiration is performed aseptically there is practically no risk, and the information to be gained thereby far more than counterbalances any slight detriment. It is the surest and safest preventive of empyema, and "prevention is always better than cure." The longer the lung is compressed, the more likely is the injury to become permanent. The error usually committed by practitioners, and one which I have seen several times during the past two months, is that this test is often made with an ordinary hypodermic syringe, the point of which is short and of small caliber. No liquid is obtained, and the physician decides that none is present, while the facts of the case are that he has not entered the pleural cavity at all. A false diagnosis is established, he is deterred from further attempts, and the patient goes on to empyema under his very eyes. This test exploration should always be made with a long aspirating needle of good size, either the smaller or medium needle ordinarily connected with the aspirator set, and the vacuum bottle should be ready at hand for the complete withdrawal of fluid, if discovered.

Another very common error in the hands of a timid man consists in introducing the needle slowly; the thickened pleura is pushed forward in front of the instrument, and of course the fluid will not be reached. Again, if a small-calibered needle is used, flocculi of lymph or fringes from the membrane may block the orifice. A quick, short, vigorous thrust, the depth of the needle being properly guarded, is the best; if made just at the

upper border of the rib, there is no danger of striking the intercostal vessels. Cocain infiltration or ethyl chlorid is sufficient, but a piece of ice dipped in salt and held against the part, is equally good. If a serous liquid is found, it should be thoroughly withdrawn with the

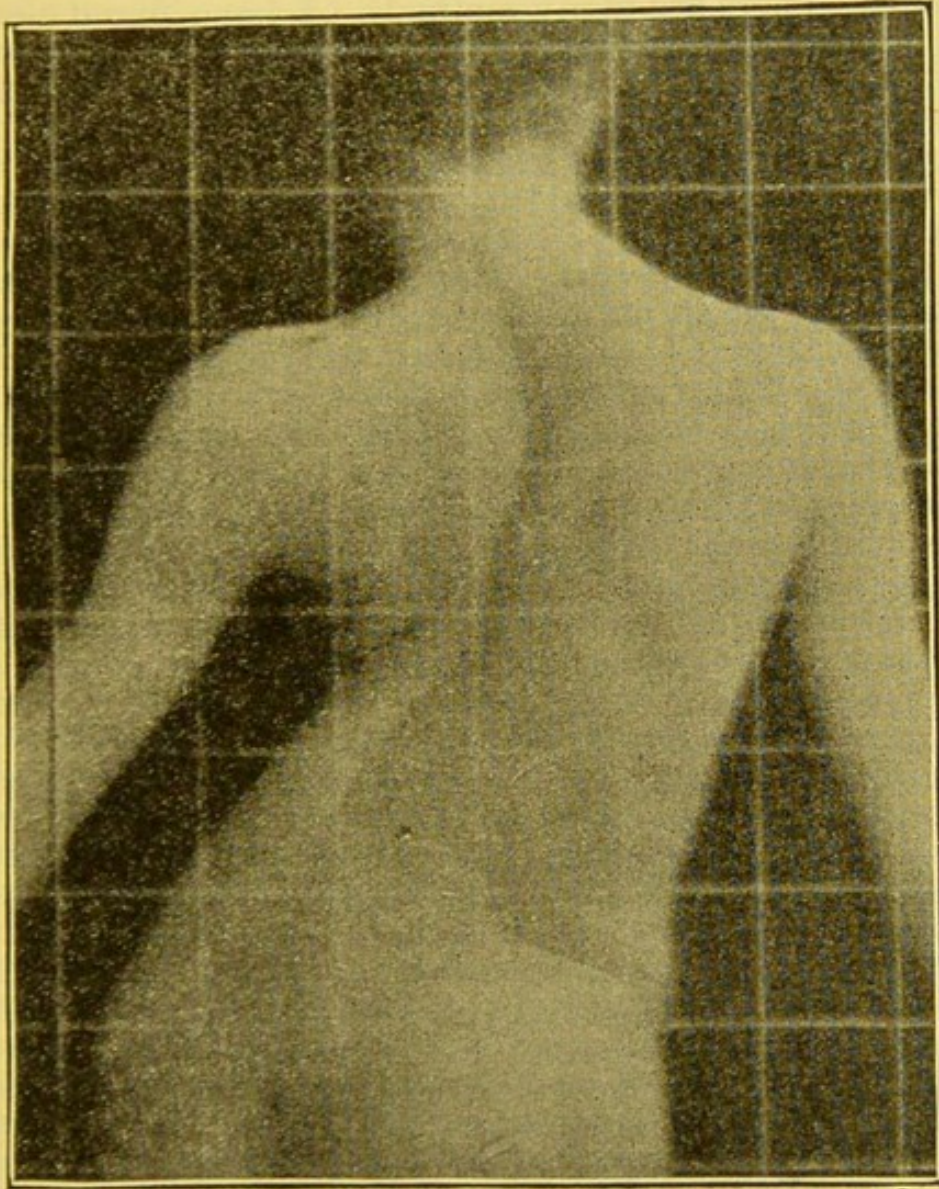


Fig. 2.—Contraction of left thorax following empyema, with tilting and rotation of vertebrae.

aspirator, and even if purulent or seropurulent, the withdrawal will be of advantage as a preliminary operation, since it gives an opportunity to the lung for expansion, and also relieves one of the serious conditions, namely, displacement of the heart.

Aspiration is an operation, however, only for tempo-

rary relief in pus cases. As before stated, it may allow the lung to expand and the heart to slide back to its position, and in some cases allow of slight recuperation on the part of the patient.

A few days' delay only is allowable for expansion. Thorough drainage should be the rule. How shall we drain? There are many methods. I have found none so helpful or safe and rapid in cure as the making of two large openings, with such an amount of resection of the ribs as may be indicated. The question of the resection of ribs will depend first, upon the condition of the pleura, second, upon the immobility of the lung. The resection may be an inch of a single rib, or it may be many inches from all the ribs. The surgeon cannot properly determine either of these conditions without a large opening, so that both palpation and inspection may be practised. When the pleura is dense and is degenerated, large multiple excisions are necessary, even complete thoracotomy. In doubtful cases it will be sufficient primarily to resect a portion of the ribs; thorough drainage will then put the patient in better condition for extensive resection of the walls. The site of the incisions will depend upon the position of the accumulation. The first opening may be made at any convenient point; let the pus flow slowly through a small opening; watch your patient's respirations; resect a portion of rib to admit the introduction of the finger, carry in a large-handled probe by means of which the most dependent portion of the cavity can be reached. An ordinary probe is useless for this work, but a long silver catheter or steel sound will sometimes answer as a substitute for the large probe, which should be a foot in length. The second opening should be at the very bottom of the cavity, with resection of a rib or ribs, to insure free drainage. If the lower opening is made too close to the diaphragm, the movements of this muscle may occasionally obstruct it. Again, the upper opening should not be made at a point that will be interfered with by the movements of the scapula. The amount of rib resection will vary greatly; in children, an inch at each of the openings is sufficient. It is very important that there shall be no pinching of the drainage-tube, and no obstruction to the exit of pus. In adults, the amount of bone removed will vary from two or three inches in the region of each opening, up to taking away nearly the whole chest wall. Ordinarily the difficulty is that the openings are made too small, not too large. In thoracic

surgery of a lung that is not crippled by disease, the inlet of air will cause collapse and great dyspnea, but in empyema the lung is already compressed and fastened, so that there is but little effect upon the respiration, whether the opening be large or small, still the slow withdrawal of the fluid is better for the heart than rapid. The drainage-tube should be of very large size; for the first few days it should pass in at one opening and out at the other; later, it may be divided in the middle and shortened at each dressing, but extreme care must be used lest a section drop into the pleural cavity, as has not infrequently happened. Various devices of winged and ferruled tubing have been invented to prevent this accident, which is certainly a most serious one, and many a secondary operation has been necessitated to remove the offending body. A tube with a collar may be employed, or a silk trailer may be attached, so as not to depend entirely upon the safety-pin, which may turn upon its long axis. Various forms of valves have been invented to exclude air and permit the passage of the pus, but they all seem to me unnecessary, since proper aseptic care and a free, rapid exit of the pus are infinitely more safe and curative.

Washings.—In my experience the washing of a chest cavity is nearly always disadvantageous. It is permissible in fetid accumulations, but even in these cases I believe that my patients have done better when it has been omitted, provided free drainage has been secured. After the first few days a fetid discharge indicates that the drainage is not complete but that pus is being retained; odor means that the openings should be extended so as to enable all purulent material to be immediately carried out upon the dressings.

The fact that irrigation is required shows that drainage is imperfect. The full and free exploration of the cavity at the time of operation, both by finger and by the long probe, is the best preventive of fetor. The use of irrigation at best should be only mechanical, and should consist of either salt or boric acid solutions. I have seen most violent irritation and inflammation aroused and great pain in consequence of the use of mercuric chlorid and other injections.

When the sinus persists after drainage, I have sometimes effected closure by laying open the entire tract, cutting away both soft and hard tissues, paring out the granulation tissue, and packing the wound, thus compelling it to granulate from the bottom.

Thoracectomy and Thoracoplasty.—In recent cases of moderate severity, free drainage is all that is necessary, but in the old neglected cases of pyothorax, in which the lung is collapsed and is thoroughly bound down, much more extensive operations are necessary. It is but natural that a cavity bounded exteriorly by rigid walls, supported by trusses like the ribs, and bounded internally by a rigid lung, should be unable to collapse and heal. Operative measures in such cases are of varying degree of severity and it is sometimes necessary to remove practically one-half the thorax of the individual. The radical operation in its extreme degree implies an excision of all the ribs, even to the first; the latter, however, is a dangerous operation, as it comes in such close contact with subclavian vessels. The "U" shaped incision for the extreme grade of operation starts from a point high up between the vertebræ and the scapula, runs down to the base of the chest, then upward and forward to the pectoral border near the anterior axillary line. The extent of the removal of the wall will vary in accordance with the condition of the pleura and lung. In some cases it is sufficient to excise a section only of the ribs in the path of the incision, raising a trap-door and then removing the ribs by incising each one upon the under surface, longitudinally to its axis, and shelling it out, or the resection may be made by dissecting up the skin and superficial tissues and excising the individual ribs from the outer face. In other cases the pleura and intercostal muscles are excised entirely in addition to the ribs, the skin flap being allowed to fall in and close the cavity. In such incisions I have always found it better to tie the intercostal arteries separately as cut, rather than to ligate any mass of tissue. Another plan which has for its object the expansion of the lung is to decorticate the lung (pneumoplasty as advised by Delorme, Fowler and others), dissecting away all the thickened pleura, releasing it from its adhesions, and then by deep breathing and other exercises endeavoring to cause the lung partially to obliterate the diseased space. All of these operations are exceedingly formidable, are followed by great deformity, and can all be avoided by early diagnosis and treatment. By any of these methods the ribs may be dissected from their costal cartilages nearly to the spine.

The use of the Röntgen ray will sometimes locate the pus, but ordinarily it is not satisfactory unless iodoform-glycerin is injected.

Even in the cases in which tuberculosis is present, it is often helpful to drain the abscess cavity, and in some cases even closure may be effected. In tuberculous cases extensive resections are apt to be serious; it is wiser not to be too radical. An extensive thoracoplasty is always a serious operation; in fact, the deathrate even with an ordinary amount of excision of ribs is nearly one in four.

Postoperative Lung Gymnastics.—The use of deep breathing, dumb bells, muscular exercises, body flexions, playing of musical instruments, etc., is all important.

CONCLUSIONS.

1. Early diagnosis of pleurisy and early operation are the prime elements in the avoidance of empyema. The general practitioner is the one who needs to be on the alert.

2. A test for fluid should be made with the aspirating needle, not a hypodermic, as the latter is too small and short. Liquid, if present, should be immediately withdrawn; if purulent, further operation within a day or two is advisable as soon as the lung expands and the heart moves toward its normal position. Aspiration should be limited to diagnostic purposes, to the withdrawal of serum, and as a preliminary operation in empyema.

3. In all cases of pyothorax, free drainage, not aspiration, should be the rule. The larger the openings the quicker will cure be effected. Resection of ribs is imperative for exploration by the finger and for removal of fibrinous masses.

4. Washings are counterindicated, except in fetor, and even then more perfect drainage is indicated rather than irrigation.

5. In old chronic cases with contracted lung and degenerated pleura, more or less excision of the chest wall and pleura should be performed, even to the excision of the entire extent of all the ribs.

6. Even in tuberculous empyema, benefit is derived from thorough drainage.

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