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ORIGINAL ARTICLES.

RIB RESECTION IN EMPYEMA.

INDISCRIMINATE AND EXCESSIVE PRACTICE THEREOF.

BY EDMUND ANDREWS, M.D., LL.D.

SENIOR SURGEON OF MERCY HOSPITAL, ETC.
CHICAGO.

Estlander and Schede devised their extensive thoracic resections for certain desperate cases of empyema over twenty years ago. For a long time many of the profession undervalued their work—in fact seemed almost to forget it. More recently they have awakened to its importance, and some of them go so far as to advocate the resection of ribs in all cases of empyema. They forget the splendid results we have had for twenty-five years in cases that do not need resection. When we learn some new thing in surgery, we seem straightway to forget what we knew before. We ought to repeat Rudyard Kipling's famous "Recessional" hymn; where he prays Heaven for help:

Lest we forget—lest we forget.

In time past, empyema was usually a fatal disease, especially in children. Old Sir Astley Cooper, with all his immense experience, said he never saw a case recover after tapping for hydrothorax, evidently because he knew nothing about sterilizing the pleural cavity. He, however, felt the necessity of drainage in empyema, and devised a metallic tube with a flange to it to prevent it from falling into the cavity, and a cork stopper to prevent the flow of air through it. This was the precursor of the flanged soft-rubber tube devised by myself, which has been so much used in the United States.

Before antiseptics were systematically recognized, it was well known that admission of air to the pleural cavity caused in some way a fatal blood poisoning. Forty years ago Bowditch of Boston won renown by showing that the patient could, by proper precautions, be tapped, and the pus evacuated without admitting any air, and that by one or several such tapplings many patients were cured. Various methods of evacuation on this principle were devised.

About twenty-five years ago we began in Chicago to treat empyema by inserting a flanged soft-rubber tube, and rinsing out the cavity daily by a copious irrigation with antiseptics. At the close of the dressing a small cork was used to close the tube, and an antiseptic compress applied. In almost all cases, the pus in a few days ceased to flow, the irrigating fluid returned clear, and the patient soon began to grow strong and put on the aspect of health. In this treatment we soon learned that air in the pleural cavity had no septic influence, if the cavity itself was well wet with a mild antiseptic fluid. The germs were destroyed and the cavity remained sterile, just as Tyndall sterilized the air in tight boxes in his famous experiments. Meanwhile most of the patients made

a rapid recovery, without any resection of ribs whatever.

About twenty years ago Estlander and Schede discovered that certain very bad cases could be cured by extensive resections of the ribs and of the thoracic walls, and a part of the profession now advocate rib resection in all cases of pyemia, and another part dispute them with vehemence. For instance, Bolton¹ of London directs "in all cases the resection of a piece of rib," but C. G. Comstock of Boston reports six cases to show that the siphon can cure without resection, and he thinks the rib operation often unnecessary. A. Rey of Algiers² advocates trephining the rib instead of ordinary resection—preferably the ninth rib seven centimeters from the costal angle—but Boisson³ advocates extensive resection. S. G. Bonney of Boston advises drainage, usually without resection, and states that cases proper for extensive resections like Estlander and Schede's are very rare.

Various Chicago surgeons have found that antiseptic irrigation, commenced very cautiously at first, is entirely safe, but that excellent authority, J. McFadden Gaston of Georgia thinks that antiseptic irrigation is dangerous and should never be used. Dr. B. F. Curtis of New York favors resection in some cases, but opposes it in others, but Dr. F. W. Murray advises resection "in all cases." He quotes a German writer as stating that in 156 cases of extensive resection death directly followed in four cases, and only 56 per cent. were known to be finally healed without fistula, but yet he goes strongly for resection.

Boisson advises to resect ribs, open wide, insert fingers and explore, but Cantley of London says incision is better than resection, and that in resections in children under 2 years of age five out of six are fatal.

Batten of London says resection is the only thing, but Wightman disagrees with him. He says the mortality of resection in 656 children, taking all ages together, was about one in six—16 per cent.—and in younger children much greater. He agrees with Morrison of Hartlepool, England, that incision and drainage is usually sufficient.

C. H. Bäumlér says, resect in tubercular cases, and also when "suppurative bacteria" are present, but others object that if suppurative microbes are present it has been found there is danger of infecting the cancellated tissue of the resected ribs with osteomyelitis. The same objection is urged against the idea of Bonney, who thinks a fetid odor of the pus to be a reason for resection instead of incision. His opponents reason that the microbes of osteomyelitis are more likely to be present when the pus is fetid, and consequently the cancellated tissue of the bone should not be wilfully exposed to saturation with such pus. They quote cases to show this danger.

¹ Brit. Med. Jour., Nov. 25, 1895.

² Lyons Med. Jour., June, 1895.

³ Archiv. de Med.

This contradictory state of surgical literature seems to require some consideration on our part. Twenty-one years ago Estlander of Germany published his large resecting operation, which he called pleurectomy, for empyema. A year later Schede proposed a modification of it for the worst cases. He advised to remove very extensively the chest wall, including the thick cicatricial layer sometimes occupying the place of the pleural membrane, along with the ribs, intercostals, etc. He named the operation thoracoplasty. Several modifications have since been devised for these operations, and the result has been to turn attention more decidedly to the resection of ribs in these cases, and there is urgent demand for information as to what cases require rib resection and what should have the safer and milder measure of simple tubing and irrigation. As a description of the technic of all the different treatments would stretch this article to a tedious length, I will give only a condensed statement of the subject.

A generation ago, empyema discharging externally was usually fatal. The first decided improvement came from applying to the disease the principles of Lister. I recollect very well the general horror of introducing anything into the pleural cavity, based on the observed fact that any air admitted there usually brought on sepsis, hectic and the ultimate death of

a great quantity of putrid pus daily, the patient has hectic fever and all the other signs of general poisoning. The first thing done is to insert a bistoury and freely enlarge the orifice, or make a new one if the present opening is not conveniently situated. Usually it is found that the original opening is too small, and though daily discharging a large quantity of foul-smelling matter, the latter is forced out through a stricture by a strong pressure from within. As soon as the bistoury enlarges the fistula a great quantity of the retained fluid gushes out. A soft-rubber tube with a flange to it is inserted and the cavity is well washed.

Dr. Gaston of Georgia says this is dangerous and ought not to be done. Long experience has shown us in Chicago that it is safe if properly performed. Of course, one should not irrigate the pleura with corrosive sublimate; nor with a 3 per cent. solution of carbolic acid. We begin with a warm but weak sterilized solution of boric acid—say, one of about .5 per cent. in strength. A little is put in at first, to see if there is any cough and irritation produced by the fluid penetrating into a bronchus. Generally there is no trouble. If it is well borne more is thrown in, and so gradually testing the question of a bronchial fistula, you generally finish by a free washing out of the whole cavity. The next day you proceed again, and make the solution a little stronger, and

Fig. 1.—Andrews' Flanged Empyema Tube.

Fig. 2.—Dr. Joseph L. Hancock's Flanged Double Empyema Tube.

the patient. Sepsis was attributed to the oxygen of the air, and not to the germs floating in it, hence the only effort was to tap, or aspirate without admitting air. It came upon us like a sunburst when we discovered that a pleural cavity already infected, and the patient far gone in hectic, could be easily disinfected and the air admitted freely without danger, if the cavity is washed out as often as necessary, and that the hectic ceased, the patient grew fat and rosy, and actually got well with plenty of air in the pleura all the time. We had discovered that oxygen in the presence of antiseptic solutions was perfectly harmless. This revolutionized treatment in Chicago, and I presume it did elsewhere. I speak now of ordinary cases. I will recur to exceptional ones later.

For the great majority of cases as they occur among us the following statement is true, especially those of a few weeks' or months' standing: If the cavity has not been opened many of them will recover, as Bowditch showed, by from one to three aseptic tappings with an aspirator, with or without a sterilized boric acid irrigation superadded. The opinion of the profession is that children recover oftener than adults on this simple plan. But if there is already a discharging, infected orifice leading out from the pleura, then mere aspiration does not succeed. In these cases the orifice must be enlarged. The opening is discharging

thus come to nearly a 4 per cent. solution gradually. At first we used carbolic acid very cautiously. It succeeded perfectly if carefully watched, but with such a large absorbing surface care had to be exercised against toxic effects. The flanged rubber tubes are of various sizes. We study the spaces between the ribs, and put in as large a tube as will enter a little flattened. Cutting off the tube at whatever length will reach the deeper parts, cut the end sloping and make one fenestrum near the tip. After each irrigation, a small cork is inserted until the next dressing and a borated gauze compress placed over all. Many leave the cork out. The flange on the tube is about two inches in diameter, and being flexible, fits air-tight against the skin. The primary object of the flange is to prevent the tube from falling in, but it has another important purpose. It can be managed in such a way as to cause a suction on the cavity, and thus expand the lung and help to bring it out to the walls of the chest. The technic of this suction is as follows: The irrigation being finished, the flange is pressed against the wet skin. Cause the patient to draw a full breath and then holding his breath, i. e., holding his larynx closed, let him make the muscular effort of expiration. The air in the pleura will rush out, and probably a little retained irrigation fluid. At the acme of the expiration place the end of the index finger on the

orifice of the tube. Then let him resume his natural breathing. Then again drawing in a full breath, let him close the larynx and again expel air through the tube. In three or four such efforts a considerably strong vacuum will be produced, so that the suction will be felt by the finger on the tube. At the close of the last expulsive effort set in the cork, and put the compress on and secure it with the bandage. The wet rubber flange acts as a perfect air-tight valve and will maintain the distensive suction on the lung for hours. This is simple and effectual, and far better than the mechanic stopcocks, siphons, etc., devised for expanding the lung.

Fig. 1 is the flanged empyema tube which I usually employ. It is of soft rubber.

This tube is also extensively used for drainage of all large cavities, as in suprapubic cystotomy, lumbar abscess, etc.

Dr. Joseph L. Hancock of Chicago has devised the flanged double empyema tube shown in Fig. 2. In trimming it for use cut the inflow tube long enough to reach the deeper parts of the cavity, and the outflow tube as short as is consistent with reaching the inside of the thoracic wall. If both are left of the same length, too much of the fluid flows straight across from one tube to the other without washing out the distant parts of the cavity. If a suction valve effect is desired for expansion of the lung, Hancock's tube requires to widen the flange by sewing under it a larger disc of soft rubber. The flatness of Hancock's tube fits it for insertion where the intercostal spaces are narrow.

If, however, there is a fistula from the pleura into a bronchial tubule, neither these nor any other device will maintain the vacuum. In a case having bronchial fistula, the irrigation has to be managed very carefully so as not to choke and distress the patient by the solution entering the lung. However, by cautiously trying different attitudes, a considerable washing out can be secured, with an excellent ultimate success. The bronchial fistula gradually closes and the irrigation is then unhampered. In nearly all cases there is plenty of room in one place or another between the ribs for the insertion of a tube without resection. If there is not, a notch may be nipped in the upper border of a rib. In a few days the cavity generally becomes sterilized, pus nearly ceases to form, just as in all other sterilized abscesses, and then the irrigation can be less frequent. At the same time the hectic disappears, the patient gets out of bed, becomes fat, rosy and strong, and generally recovers permanently.

There is a class of cases of this sort in which the cure is a little delayed. A false membrane sometimes covers the surface of the pleura. In that case the formation of pus is not arrested at first, but continues a week or more longer than usual. At length, however, the membrane begins to come away in bits and patches until it is all gone. Then the antiseptic arrests the suppuration as usual and the cure proceeds.

Let no one suppose, however, because resections are rarely needed, that they are never to be performed. Sometimes there is necrosis on the inner side of a rib, or caries in an adjacent vertebra, or abscesses leading in from other adjacent organs which need exploration with the finger, the probe or the eye, and sometimes there are old neglected cavities whose walls are stiff and firm, with thick cicatricial tissue which must be dissected away, or large portions of ribs must be resected to make the thoracic walls flexible, so that

they can be folded in to fill the hollow. I am not urging that operations on the ribs shall never be performed, but only calling back to the memory of surgeons what we all knew before, viz., that most new cases are curable without resection. Even in some tubercular cases, tubing and irrigation succeeds perfectly, just as laparotomy does in tubercular peritonitis.

3912 Lake Avenue.

PHYSICAL EXAMINATION OF RAILWAY MEN.

Read before the Fifth Annual Meeting of the American Academy of Railway Surgeons, held at Chicago, Oct. 5-7, 1898.

BY J. F. PRITCHARD, M.D.

SURGEON CHICAGO & NORTHWESTERN RAILWAY.
MANITOWOC, WIS.

When first making an investigation of this subject, about twelve years since, I was surprised to find its complete non-existence except in two systems of railway in which, for the purpose of insurance, examinations were made, but with no reference to service further than this might reach. In both instances there was then no examination made of vision or color perception. Gradually this has changed from an examination first made from a special train, and very hastily, until now, when a few railway systems employ competent examiners to make the tests; but I think there is yet great room for improvement. The recent examinations for service in the volunteer army demonstrated that there are many defective men, and if the temporary service in this war required such physical perfection, certainly the long and arduous service on a railway ought to require men of as perfect physical conformation as can be secured. This scarcely admits of argument.

The examinations that were first commenced by myself consisted only of eye tests for color and correct vision. At that time, on account of strikes and disturbances of all kinds, it was not deemed best to attempt a full physical investigation of each man, but we soon found that the men considered the examination in its true light and understood that it was for their own good, quite as much as for the interest of the railway company. There were nearly twenty-five hundred cases examined of men then in the service or coming in during this period, of which about 2.5 per cent. were deficient in color sense and a less number had other defects of vision.

It always accorded with my observation that there was a special need for a very careful physical examination of men in this service, and great pains ought to be taken to prevent men with stiff joints, deformities from previous injuries or defects, either congenital or from disease, from entering the service. It would hardly be necessary to give instances of disaster in which such cases are neglected, but only to emphasize the fact of care being very needful in selecting examiners and the uselessness of any but medical men who have made the subject a study. Examinations should be made on carefully prepared blanks and not at haphazard. In other words, the medical part ought to have a definite set of questions covering all necessary points, thus making the record specific. I would also suggest that a complete set of Holmgren's worsted would give a better record of color sense than a partial one. And if these yarns are in the hands of properly instructed examiners they can not fail to give correct results. I have had