

symptoms of his weakness and loss of weight and not been satisfied to call it indigestion, the mistake might have been averted.

So, no more misnaming of indigestion, but find the real cause which, I dare say, in 60 % of cases are due to biliary tract infection.

In the last few years I have been impressed by the importance of street car nausea and vomiting, especially in children. After a thorough examination had revealed no particular findings, the proper correction of glasses would remedy it.

That a real hereditary nervous affection causing headache with vomiting does exist, one can not deny; but it must also be borne in mind that apparently these conditions are relieved by the pathological gall-bladder.

#### TREATMENT

Practically all of these cases have disturbances in bowel function. In fact, the more I see of biliary tract infections, the more I am impressed with the primary importance of the bowel, and that is thorough elimination. This may be done with whatever drug is at hand, but the routine I have used with success is calomel gr. I, followed by a saline such as magnesium sulphate, sodium phosphate, etc., enemas and high colonic flushes to reduce distention. Morphia should be used to alleviate the acute pain only when absolutely indicated.

Many are associated with evidences of colitis and enterocolitis, others in which no actual influence of infection can be elicited which shall be treated symptomatically, diet, chologogues, etc. When the acute symptoms subside, a thorough eradication of all seats of infection should be investigated and corrected.

It follows that the rational treatment of hepatic or biliary disturbances should be by way of the bowel, which will directly or indirectly influence these organs by way of the portal system and increase the hepatic and biliary function by high colon irrigation with chologogues and diet.

#### DIET

Best known among the forms of dietetic treatment for diseases of the biliary tract is the so-called low cholesterol diet. This is based on the definite conception that an increase of circulating cholesterol plays a

part in gall-stone formation, and also on the fact that an increase in circulating cholesterol may be due to a diet rich in these substances. Chaufford, therefore, excludes the yolk of eggs, peas, fatty meats, all fried foods and pastries, and in fact all freshly baked cake and bread.

Those cases which are not relieved in due time and show no abatement of symptoms should immediately have surgical care by a general exploration and early removal of foci to avoid a chronic ailment, adhesions and further infection.

#### CONCLUSIONS

1. That a thorough study of conditions should be made.

2. That an exploration should be done to remove foci to avoid adhesions and extension of infection.

3. A closer co-operation between surgeon and clinician.

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### CHANGES IN THE SURGICAL TREATMENT OF PLEURAL EMPYEMA FOLLOWING THE RECENT EPIDEMIC OF PNEUMONIA\*

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For the past few decades changes made in the surgical treatment of pleural empyema have not been numerous, except variable technic in regard to drainage, and varying methods of doing a thoracotomy or a costectomy. Writers differed as to the character of the incision with respect to the form of outlet devised, but the majority agreed that the time-worn surgical axiom regarding pus cavities was to maintain its position in the forefront; and that rule was free drainage.

Those more timorous of radical interference set up extravagant claims for a simple thoracotomy without rib resection, merely using a two- or three-inch incision intercostally with several rolls of rubber dam extending into the cavity. Other operators were content to introduce rubber

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drainage tubes by simple thoracotomy, and through these to instill bland cleansing irrigations. Still others used formalin or other sterilizing injections introduced into a closed cavity.

It seems plausible that with the advent of Dakin's solution and our desire, if possible, to prevent pneumothorax, we have working principles which will shorten the convalescent period and offer the patient a post-operative physical status more nearly approaching his normal.

The principles and results of treatment tabulated in the paper are based upon personal experience in the empyema ward of U. S. General Hospital No. 14 at Fort Oglethorpe, Ga., where it was the writer's privilege to treat and study one series of forty-two cases of empyema as a class during the months of November and December, 1918. The character of treatment used was thought by Col. Edward Martin, of the University of Pennsylvania, and who was Chief of the Surgical Service of this Army Hospital, to offer results superior to all other methods.

The main outstanding points in the surgical treatment used are: (1) to avoid pneumothorax, (2) to establish adequate drainage, and (3) to irrigate the pleural cavity with a half of 1 per cent. of Dakin's solution.

The title of this paper does not allow a scope sufficient to discuss the character of organisms present, the routine of cultures made and of the bacterial count, nor the various physical and roentgenologic findings. Capable internists, technicians and bacteriologists made possible a satisfactory mode of diagnosis and medical treatment as shown by end results. The experimental work done in the laboratory to find agents other than Dakin's, which would digest the fibrin elements of the discharge were interesting, but the discussion is not warranted here.

By far the most complete statistics have been made in the Army camps and Army hospitals, where large numbers of cases were segregated. In civil practice the number of cases in a given community were divided among the local hospitals, so that no one man had an opportunity to study a large number of cases. The reports from the empyema commissions of

various Army hospitals have given, through the columns of the medical press, an elaborate account of findings, chemical, physical and bacteriological, which simulate closely our findings from similar examinations. The same commissions and individual writers also have gone into the question of stimulant (alcoholic), and high caloric feeding as supportive treatment.

To avoid being tedious we shall omit statistics in detail, only noting this one group of forty-two cases, the method of treatment, and the end results. The question of age and sex has no part in the presentation of these cases, as they were all young, husky soldiers. It was the general practice to aspirate first and give the patient an opportunity to recover without radical drainage. In doing any form of aspiration or probatory puncture, it is very important not to wound the lung tissue with the needle, as the taking of infectious material into the lung may develop new pus pockets. In case the fluid in the chest cavity is found to be sterile, as in very recent cases of pneumonia, the fluid is drawn off and the patient allowed to wait a few days. Later, if symptoms warrant, the chest is aspirated again, or when necessary, preparation is made for drainage. Even in some cases of frank pus the patient may be aspirated repeatedly if each succeeding aspiration seems to be beneficial. Six of the forty-two cases recovered after interval aspirations (usually every five or six days) and without the aid of drainage. One of the cases, a young Negro, had large quantities of pus in each pleural cavity. The patient was drained by the method later described on the right side, and three weeks later a large accumulation of pus was found in the left pleural cavity. The left cavity finally cleared with repeated aspiration. If it had been thought best, however, to drain the left side also, the drainage of both pleural cavities by this method is safe and of very little risk to the patient. Double drainage affects the normal action of the lungs only slightly. How different is the picture if a costectomy on each side is done, with resulting bilateral pneumothorax!

The following method of drainage and

treatment is the Mosingo method, with possibly slight alterations:

#### TECHNIC

By probatory puncture with a syringe of twenty-five or fifty cubic centimeters capacity and a large bore needle the site of drainage is determined. It is desired if possible to drain posterior to the post-axillary line and at about the level of the seventh or eighth interspace. A case may be found which is an inter-lobular abscess and affecting only a small circumscribed area in the pleural cavity. In this case the tubing must be done at the site where the needle finds pus, whether or not the location is selective for drainage. When the site for drainage is determined, the aspirating needle is left in-situ as a guide for the small incision. It must be remembered that the roentgenologic report is extremely important in determining the site of drainage, and also to some extent determines the depth of the tube's insertion, as well as indicating the thickness of the parietal pleura. The field is blocked with a 2 per cent. novocain solution prior to the needle puncture. This puncture is made easy by first incising the skin with a scalpel. An incision one inch in length is made in the interspace and following closely the aspirating needle. The opening is made slowly and after the fashion of a stab wound. When the abscess cavity is entered, the finger is thrust into the opening to prevent the inrush of air. A large gum-rubber tube one-half inch in diameter and fifteen inches in length is threaded through a flat cork (cork one-sixth inch thick and one and a half inches in diameter), the tube fitting very tightly in the cork and clamped by a curved hemostat at each end. The cork should be placed about three inches from the end of the tube which is to be inserted into the cavity. As the finger is withdrawn from the incision, the clamped short end of the tube is forced well into the pus cavity and the clamp removed. The clamp is left on the distal end of the tube. A silk-worm gut closes each end of the incision and is then tied over the cork pulling it tightly against the chest. The flat cork is now plastered fast to the chest wall by criss-cross layers of adhesive; a gauze sponge should interpose between the

cork and the chest wall. The distal end of the tube may now be unclamped and the cavity slowly emptied. For twenty-four hours the patient is kept quiet in bed without further treatment. The cavity is irrigated first with saline to accustom the patient to the procedure, and if a pulmonary fistula exists, to save the patient pain and embarrassment by not overflowing the cavity with the first irrigation of Dakin's fluid. In case of pulmonary fistula, a smaller quantity of fluid is used. The irrigations of a one-half of 1 per cent. of Dakin's are used every two hours during the day, and every three hours at night. A glass "Y" is attached to the distal end of the drainage tube, connecting also with the Dakin receptacle which hangs about twenty inches above the patient's body, above, and connecting below with the tube leading to a Wolff bottle on the floor. The Wolff bottle establishes and maintains negative pressure. Clamps are kept on these last-named tubes, when each is not active in its proper function: e. g., the lower tube is clamped and 50 c. c. of Dakin's is let into the cavity by removing the clamp from the tube leading out of the Dakin container. The fluid is left in the cavity five minutes and the lower clamp is again removed, thereby allowing siphonage of the Dakin fluid and the discharge.

Caples, of New York, discovered that this method of siphonage gives twenty millimeters of pull by negative pressure, the normal pressure in the chest cavity being only eight millimeters.

#### BACTERIAL COUNT

The bacterial count is made every second day from a smear. When the count reaches the low figure of five organisms to ten fields, it is considered safe to close the cavity. After discontinuing Dakin's, it was our practice to use dichloramine-T in the cavity by nebulization twice daily. The nebulization is used for three days and the tube is then withdrawn, followed by secondary closure of the cavity.

#### LENGTH OF DRAINAGE PERIOD

All cases were closed in from twenty-one to thirty days. The field is made clean and the wounds closed with silkworm gut, and dressings applied.

### COMPLICATIONS

Three patients had pulmonary fistulae. Two had been drained previously by trocar and catheter which were unsatisfactory. In two cases the site of drainage became infected and caused some leakage of the irrigating fluid. (The body there is protected by heavy coats of vaseline.) One case had pericardial effusion in which absorption took place. Three cases had clubbed fingers from long-standing infection. Two cases developed phlebitis, one in the forearm and the other in the inner aspect of the thigh. One patient, a Negro, had pus accumulation bilaterally in the chest cavities.

### COURSE OF THE DISEASE AND END-RESULTS

In a few cases a rise of temperature occurred some days after drainage was instituted and on examination it was found that the tube had slipped out far enough to make drainage unsatisfactory, or that side pockets had formed near the fistulous tract. These drained voluntarily into the original pocket. There was no mortality in this series of cases. There was no evidence that it would be necessary to do secondary operative work. There was no case of rib necrosis from tube pressure, and there were no sinuses.

### OBJECTIONS TO THIS METHOD

1. This mode of treatment would be troublesome in small children, due to the child's desire for great latitude of movement of the body. For the small child I would suggest the same treatment minus the attached drainage tube leading to the siphon bottle, and would suggest clamping the end of the drainage tube which is held within the dressings. The irrigations can be made through this tube and drained out at the same sitting, care being taken not to allow a quantity of air to enter the chest cavity.

2. Cases where multiple pockets are shown by skiagram can be drained more adequately by an opening in the chest wall sufficient to admit of one or more fingers for the purpose of converting two or more cavities into one common pocket through the destruction of adhesions.

### FACTORS FAVORING THIS METHOD OF TREATMENT

1. This drainage is easily accomplished with the aid of local anesthesia only.

2. Coughing is reduced to a minimum; whereas in costectomy the cough is painful and excessive for a few days.

3. There is positively no shock; while the shock in rib-resection is due to a collapsed lung and to disturbance of the natural pressure on the healthy side caused by the mobile mediastinum. However, if the mediastinum is thickened by adhesions, the normal relation of pressure in the healthy side is maintained.

4. There is not the added danger of secondary infection in a large chest wound exposed often for dressings.

5. The patient is more comfortable and cleanly, and there is total absence of odor in the ward.

6. It is possible to drain both cavities simultaneously if desired.

7. By virtue of this method of drainage and the proper use of the blow-bottle, and other lung exercises during convalescence, decortication of the lung will be rarely or never necessary.

8. Dakin's gives better results when confined in the cavity for ten or fifteen minutes. This can not be done under the open method.

The most important lesson taught by the recent epidemic is not to drain a pleural empyema until the body has developed a tolerance for the infection, or in other words until anti-bodies have been formed.

## THE TREATMENT OF GUNSHOT FRACTURES OF THE EXTREMITIES\*

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In the treatment of compound fractures, in which class all gunshot fractures fall, there are three main considerations.

These, given in order of their importance, are: (1) the saving of life; (2) the saving of limb; and finally (3) the preservation of function, the other two conditions having been met.

The thing of prime importance, first, last and always, in the treatment of this type of fracture, or, for that matter, any type of fracture, is a free, unstinted, intelligent use of the x-rays.

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