

THE TREATMENT OF CHRONIC EMPYEMA *

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By chronic empyema is meant a suppuration of the pleura with no tendency to spontaneous cure. This chronic character in itself is always grave. The frequency of the condition has diminished since our better knowledge of the manner of treating acute infections. From the month of August, 1914, to the month of December, 1919, I operated upon 91 acute and chronic suppurations of the pleuræ.

I. TREATMENT OF ACUTE SUPPURATIONS—PREVENTIVE TREATMENT OF CHRONIC SUPPURATION

1. One must first determine the bacteriologic nature of the effusion. Exploratory puncture is here of value. It is, in fact, of the first importance. Pneumococcic pleurisies are usually mild and are often cured by simple aspiration, while streptococcic pleurisies are grave and most often require thoracotomy.

2. If repeated punctures leave a residuum as shown by radioscopy, thoracotomy is done at the point of election in the posterior axillary line under local anæsthesia.

3. Evacuation of effusions and disinfection of the pleura follow. In certain cases the pleura can be closed, *completely and immediately*. Example, 3 cases (2 pneumococcic with cure, 1 staphylococcic with return of suppuration and secondary disinfection with Dakin solution, secondary closure and cure). In most cases we prefer drainage by siphon after thoracotomy. This is the most simple procedure. Radioscopic examination shows progressive diminution of the pleuritic process. For bad conditions persisting in spite of drainage (as to pulse, temperature, and general condition), and a continued large infected cavity in the pleura we proceed thus: Extensive thoracotomy and pleuroscopy under local anæsthesia permitting a view of the form and dimensions of the pleuritic cavity; disinfection by the Dakin method, numerous Carrel tubes placed in all corners of the cavity. If a broncho-pleural fistula exists, discontinuous injections of oxygen are substituted for the Dakin solution. When the culture curve has reached zero and a dry compress placed at the opening of the cavity remains dry for twenty-four hours, complete closure is made of the surgical orifice, resection of the edges of the fistula, tamponing of the pleura to avoid discharge of blood into the interior, and complete suture of the wound. One thus transforms the former pyothorax into an

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aseptic pneumothorax which is spontaneously cured by bringing back the parietal pleura into contact with the lung.

The volumes of the operated cavities were as follows: 6 had a content of 2 to 3 litres; 5 had a content of 1 to 2 litres; 7 cases showed enormous cavities, exact size not given; 2 cases showed rapid cure; 7 cases were lost, all of acute pleurisy medically treated, this variety being always more grave than suppurating and operated pleurisy.

With regard to the time of thoracotomy, of the 7 patients succumbing after intervention 5 were operated early after the pleural effusion had

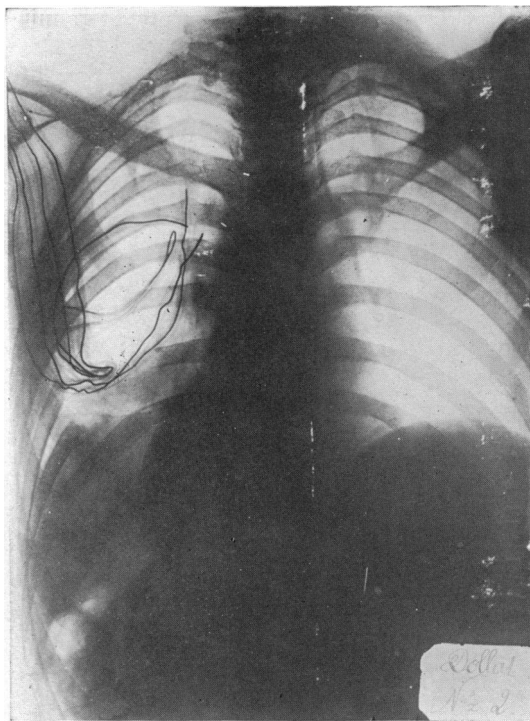


FIG. 1.—Use of armed rubber tubes for exploratory purposes.

occurred, when suppuration had scarcely begun and *general* evidences of infection were intense. All 5 cases were streptococcic. Case XII was cyanosed, with arterial hypotension of marked degree. Case XX after a three-months pregnancy presented the same symptoms with intense dyspnoea and oliguria. Case XXIII added to these symptoms an œdema of the thoracic wall. Patients affected with purulent pleurisy recent in origin or with post-grippal or originally purulent pleurisy were ill but a few days (eight to fifteen at most). Onset was sudden and all cases presented the septicæmic type characterized by more or less cyanosis of the face and extremities, dyspnoea whose intensity was more in relation to the toxæmia than with the quantity of pleural effusion, and pharyngo-laryngeal

symptoms. To these phenomena of intoxication were added in three of the cases (XXII, XXIV, XXV) external evidences of the general infection (facial erysipelas, diffuse phlegmon, erysipelas of the costal wall on the side affected) which developed with the greatest rapidity.

Thoracentesis done before operation brought no relief to these cases. The abundant effusion, invading the entire pleura, was an ill-looking, dirty-yellow, sero-sanguineous liquid, often of putrid odor and associated with adhesions of greater or less density.

In Case XXIV we were able to verify the septicæmic character of the

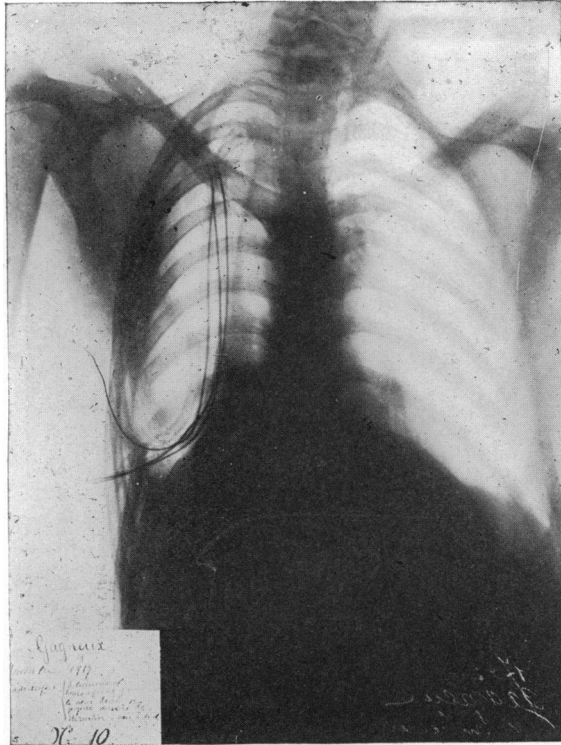


FIG. 2.—Use of armed rubber tubes for purposes of exploration.
(Gagneux.)

infection by spleen changes (enormous size and doughy consistence), the pleurisy being thus but a local manifestation of the general condition. In these five cases the blood culture was positive for streptococcus. Another of the cases (Case XXII) cured, is of the same kind. In these the operative intervention was later, and we repeated several times before and after operation intravenous injections of antistreptococcic serum.

Analysis of the events following intervention at the height of the infection prove that the pleural effusion was only an epiphenomenon and that it was the general infection which was in no wise modified by the

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evacuation of the effusion which brought these patients to us. I will not venture to draw the conclusion that one must temporize in the treatment of suppurating pleuritis and to wait until they play the rôle of operation abscess before being incised. At all events, these facts plead against immediate thoracotomy in the non-surgical pleuritis which concern us. If the effusion causes untoward conditions, remedy of it by puncture is better than a more complete operation.

Notwithstanding other treatment, *four acute cases became chronic*, causation being as follows:

Pleural diverticula and broncho-pleural fistulae rendered disinfection im-

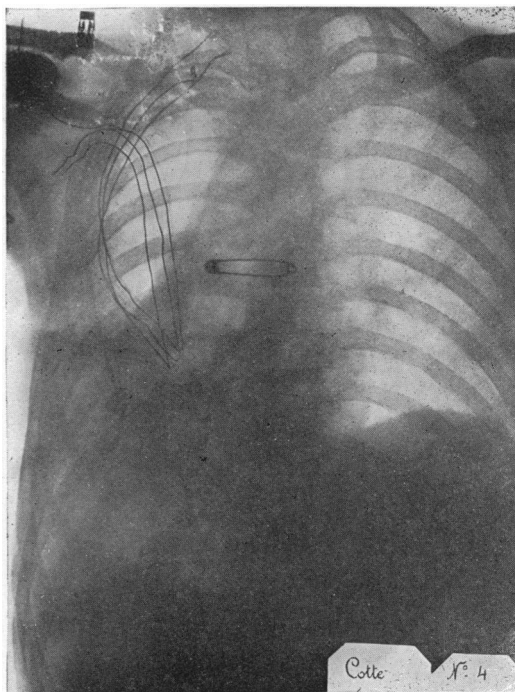


FIG. 3.—Use of armed rubber tubes for purpose of exploration. (Cotte.)

possible. One could easily locate the seat of a chronic infection by seeking out the situation of the microbic attack. When in a pleural cavity that appeared to be aseptic one sought in various regions for the microbic focus, one found a single and persistent septic cavity. By means of electric pleuroscopy one thus diagnoses a diverticulum of the pleura which is not reached by the antiseptic solutions injected and which empties itself very completely.

Bronchial fistulae are equally factors in producing chronic conditions because of the septic features which they entail. I have noticed two effects of this sort of infection, the first being a necrosed bronchial

cartilage, the course and termination of which were followed under conditions described below, *viz.*:

CASE XI.—The patient before entering our service had spent a month being treated, and several thoracenteses had been made. Some days before operation injection of methylene blue was made into the pleura, with the production of attacks of a minor grade of vomiting (“spitting blue”). After operative intervention disinfection of the pleura by Dakin’s solution was very badly borne and induced incessant coughing. Pleuroscopy then revealed, on the pulmonary pleura at the level of the interlobular fissure, a little

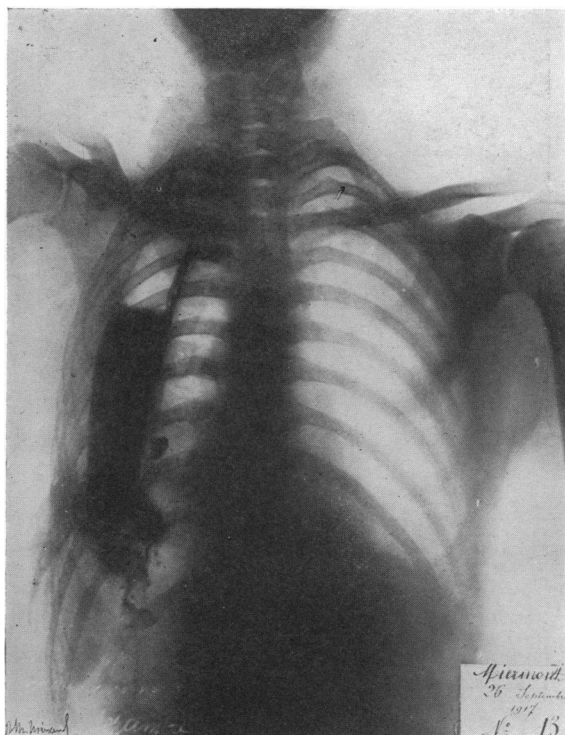


FIG. 4.—Empyemic cavity filled with bismuth for purposes of exploration.

sphacelated plaque, grayish-green in color, irregular, and about the size of a dime. It could not be detached by the forceps and contact with it provoked pain and cough.

Instillations of Dakin’s solution at this point determined diagnosis of an eschar and probable bronchial fistula (cough and discharge of Dakin’s solution from the mouth). From December 18, 1918, to January 22, 1919, discontinuous insufflations of oxygen were resorted to in order to disinfect the pleura, the Dakin’s solution not being tolerated. The bronchial eschar becoming then more and more

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limited by granulating pleura, disinfection with Dakin's solution was resumed. By February 9th the eschar was reduced to the size of a pea and no further signs were caused by it.

There are also anatomic or pathologic diverticula which one can diagnose *de visu* by electric illumination of the pleura. Such diverticula are described in Case XII.

When bronchial fistulæ are recent and without necrosis of cartilage, they do not embarrass closure of the pleura. I have operated two broncho-

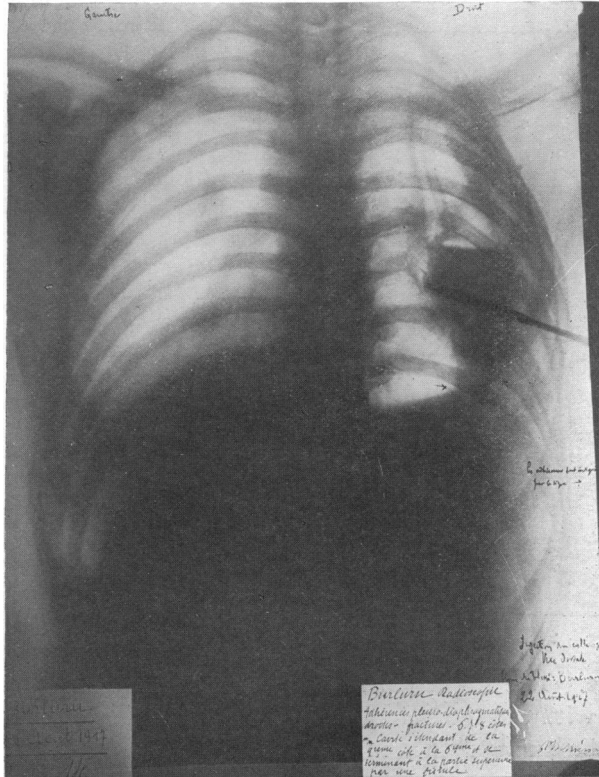


FIG. 5.—Empyemic cavity filled with bismuth for purposes of exploration.

pleural fistulæ of some weeks' duration only and after the opening of a pleurisy into the bronchi before operation. The cavity was asepticated, the costal orifice closed, and the patient cured as simply as if he had never had a fistula.

There is another variety of chronic fistula especially grave, ending generally in gangrenous processes, following pulmonary injury. Here the orifice is located at the bottom of the pleural cavity, and one clearly sees a suppuration which nothing can control. Cough is frequent, expectoration of pus more or less abundant, no disinfectant can stop the infection. In such cases I have tried to close the costal wall only to fail.

The second effect referred to is that of broncho-pleural fistula with bronchial ectasia around the fistula. In removing adhesions about the fistula in a case of this kind I found a series of cavities varying from the volume of a large pea to that of a filbert, containing pus and constituting areolæ-like veritable honeycomb. In short, such a case shows a bronchial focus, localized, and with pulmonary sclerosis. Incision and opening of these cavities are indicated, but are unsatisfactory. In one case still under treatment bronchial suppuration persisted. One must resort to extirpation of the pulmonary nidus by incision (partial pneumectomy) into

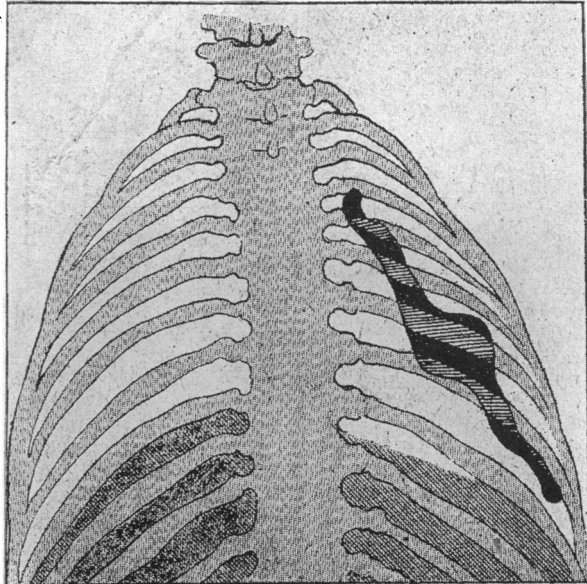


FIG. 6.—Showing empyemic cavity filled by an injection of bismuth.

healthy tissue. The bronchial fistula may become permanent by direct continuation with the thoracic wall of a small orifice which closes during expiration. An example is seen in a case which I operated during childhood, twenty-five years ago, the fistula persisting without the least embarrassment from infection. It has always resisted every freshly attempted treatment.

Small abscesses may be remarked in the visceral pleura, visible by electric pleuroscopy and being capable of retarding cure. At their site the serous membrane was markedly thinned, having the appearance of onion skin, ready to break, and consequently leaving an ulceration or perhaps a bronchial fistula, splendid avenue of communication for the transfer of infection between the pulmonary tissue and the pleura.

In Cases XXVI and XXVIII we diagnosed, by pleuroscopy, similar ulcerations located at the middle of the median lobe of the lung. In fact, they were multiple intrapleural abscesses as in Case XXIII.

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Whatever the cause of chronicity, once induced it requires a long and difficult treatment. The cavity may be indurated, fixed, fibrous, inelastic, or completely calcareous, with thick walls. I have operated cases lined with calcareous plaques like oyster shells (Tuffier and Gy, *Revue de Chirurgie*, 1907, pp. 329-346). To fill this cavity the lung must return to its contact with the pleural membrane or the pleura must advance to a contact with the retracted lung. The ill-advised operation of Estlander consisted in obliterating the costal opening, which permitted the skin and muscles to heal before the lung was in good condition; it meant abolition of pulmon-

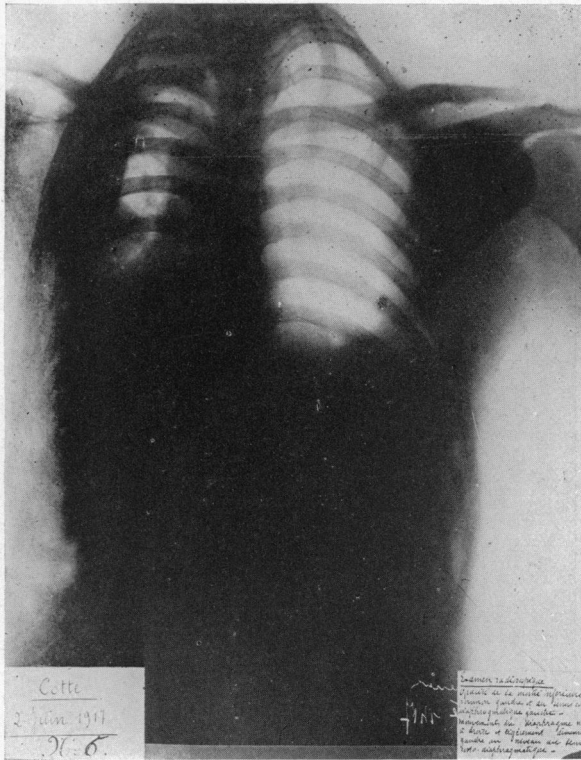


FIG. 7.—Showing radio-opacity in the lower half of the left lung.
(Cotte, June 2, 1917.)

ary function in the affected region, with all the trouble incident to it. Our object is precisely the contrary. It consists in every case where possible in removing the pleural shell to permit the lung to return to its proper position in the thoracic cage, intact or nearly so, continuing a nearly normal function.

II. TREATMENT OF CHRONIC EMPYEMAS, RECENT AND OLD

Cases are those of pleural fistula. Treatment should always be preceded by a methodical exploration of the cavity, which includes noting its extent and form and examining the pulmonary mobility during expiration

and inspiration and the effort necessary, the degree of pulmonary expansion being thus ascertained. The resulting information indicates application of one of two methods, *viz.*: Disinfection of the cavity and respiratory exercise; or, closing of the surgical wound by the method of Depage and Tuffier. If the cavity is intractable, pleuro-pulmonary decortication, partial or total, may be practised.

Exploration.—(a) Radioscopy and radiography. The pleural fistula is often narrowed, leading to a cavity; radiography permits exact knowledge of its form and extent. By introducing several rubber tubes carry-

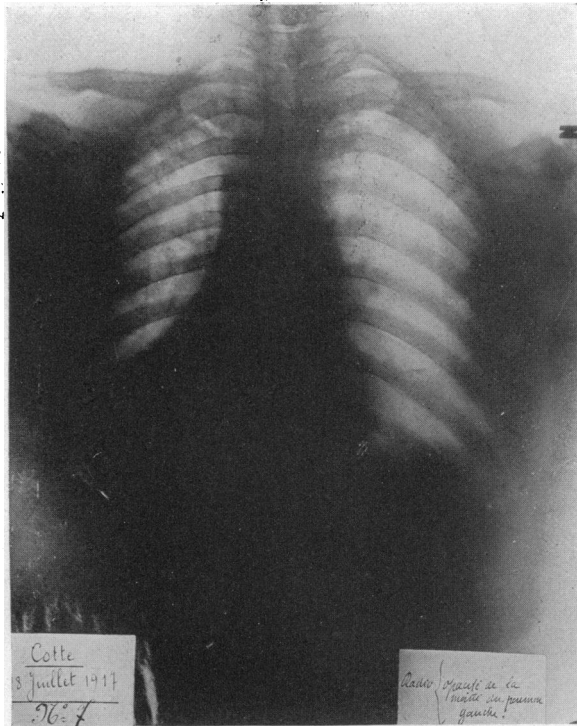


FIG. 8.—Showing radio-opacity in the middle of the left lung. (Cotte, July 8, 1917.)

ing wire, one ascertains extent, direction, and form (Figs. 1, 2, and 3). If this method is insufficient, injection is made of a paste of bismuth or barium (Figs. 4, 5, and 6). Radioscopy (Figs. 7 and 8) should show the extent of the cavity during inspiration and expiration, and the degree of effort. It permits thus a study of pulmonary expansion, one learns the minimum volume of the cavity and the play of the lung antero-posteriorly and laterally, and therefore one knows the location of points of adhesions which must be attacked. I have noticed cases where the cavity during forced expiration disappeared completely, prognosis being especially favorable.

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Radioscopy permits at the same time to follow the involution and diminution of the cavity during disinfection. Respiratory exercises with forced expiration are continued during the entire term of exploration and disinfection.

(*b*) Pleuroscopy. This enables investigation of the obstacles to contact of the lung with the thoracic wall. If the fistula is large, one does pleuroscopy through the orifice as in cystoscopy. Essentials to be noted are color of the cavity, surface of its walls, irregularities, diverticula, bronchial fistulæ, and the regions suppurating.

(*c*) Bacteriologic and microscopic examination. This establishes the

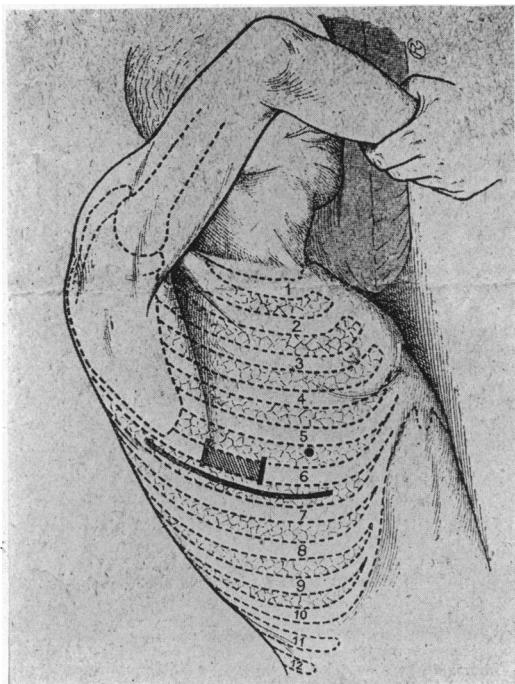


FIG. 9.—Incision in the intercostal space.

number and nature of the bacteria, their location, and gives the base of the culture curve during disinfection.

(*d*) Surgical exploration. This may be followed immediately by the surgical treatment. Method: Local or general anæsthesia; lighting by the forehead lamp; wide thoracotomy following along the intercostal space (Fig. 9) corresponding to the fistula, resection of its borders and of the bony callus which surrounds and results from the fusion of the ribs; removal of adhesions; separation of the edges of the cavity by means of a special instrument (separator). One thus learns the extent of the cavity and the consistence of its walls in different regions. Three forms of pathology may be found: (1) A fistulous tract sometimes very long, extending

from the base of the thorax to the upper ribs; (2) a regular cavity with considerable retraction of the lung, always difficult to cure; (3) a fissured cavity, narrow but with a very long principal diameter, often directed from above downward and backward, which diminishes considerably during respiratory effort. These cases may present diverticula of which the most difficult of cure are those which form pockets, bilobed or multilobed, with constrictions between each lobe. If the cavity is small and not greatly infected, one can attempt immediate pleuro-pulmonary decortication or the resections necessary to a cure. We thus treated eight cases (two acute, six chronic), but this exploration should most often be followed by chemical disinfection of the cavity.

(e) Disinfection of the cavity. I prefer the Carrel-Dakin method when

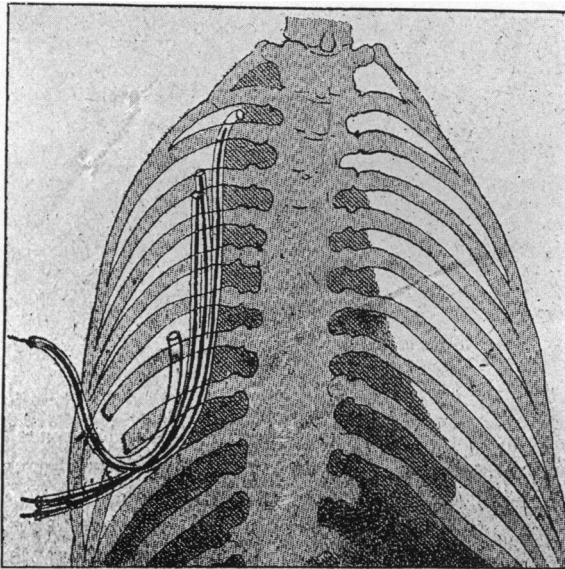


FIG. 10.—Rubber tubes, armed, introduced into the fistula for purposes of disinfection.

possible. Rubber tubes are armed with silver wire, very fine and pliable, and placed in such a fashion as constantly to irrigate the cavity and all diverticula (Figs. 10 and 11; see also Figs. 1, 2, and 3). This procedure is indispensable and the essential of the method. It is necessary to have several tubes and to place the patient in a position permitting the antiseptic liquid to have access to the diverticula. Disinfection may be more or less rapid, but it is often very slow. Its progress is mapped by curves (Figs. 12, 13, 14, and 15). This series shows some of these difficulties.

This procedure may be impracticable if there is a broncho-pleural fistula. Irrigation produces cough and a chlorine taste in the mouth which cannot be borne. Therefore, before placing the tubes, introduce into the pleural cavity a wick of gauze to tampon the bronchial orifice and

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prevent flow of the liquid to the mouth. At the time of injection one can also place the patient in lateral decubitus, lying upon the fistula. These means are often insufficient at the beginning of treatment; later the liquid no longer passes into the bronchi, probably as a result of spontaneous narrowing of the broncho-pleural orifice, and disinfection becomes easy.

When all these means fail, I replace them by continuous or discontinuous aëration with oxygen gas, passed into all the recesses of the cavity as the Dakin liquid is distributed. This method was applied in five cases. Bacteriologic examination of these cases showed three with

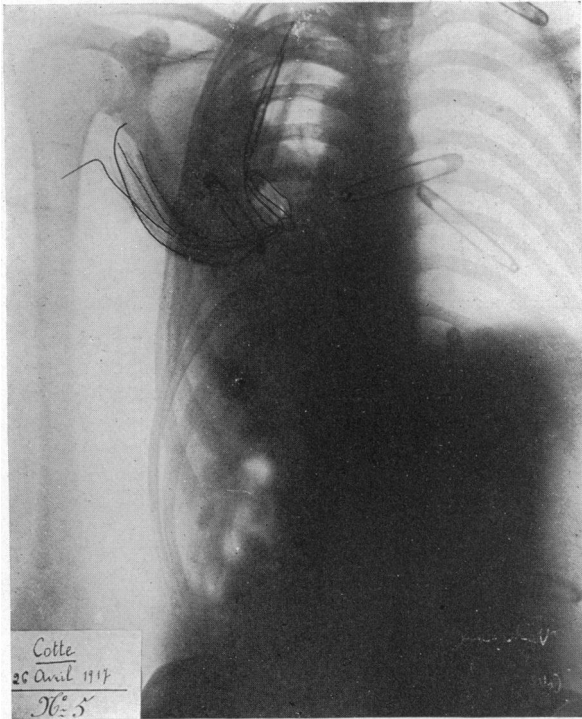


FIG. 11.—Use of armed rubber tubes for purpose of disinfection.
(Case of Cotte, see figs. 3, 7, 8.)

streptococcus alone, one associated staphylococcus, diplococcus, streptococcus, coccidia, and a mononucleated organism, and one with no bacterial finding. All five patients were cured.

Naturally this disinfection is often difficult and stubborn. The cause must be sought. The location of the bacteria explains in certain cases the resistance of the septic process to treatment, for example, in case of a pleural diverticulum not reached by the disinfectant solution and which must be located and treated, or again, with a bronchial fistula demanding oxygen or tampon with a compress before employing the Dakin solution; the culture curve may be irregular, as may be readily noted. Two cases

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were operated in two stages; I first closed off the aseptic region and later instituted disinfection of infected locations. During the stage of disinfection respiratory exercises were continued as the cavity grew smaller. Extent of the treated cavities:

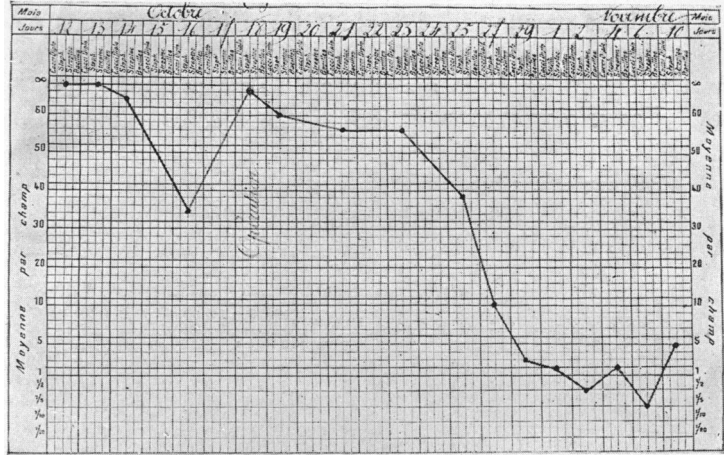


FIG. 12.—Microbe curve: showing progressive diminution of infection under treatment.

Content before operation 360 c.c.	Content at time of closure 150 c.c.
Content before operation 141 c.c.	Content at time of closure 70 c.c.
Content before operation 45 c.c.	Content at time of closure 8 c.c.
Content before operation 360 c.c.	Content at time of closure 60 c.c.
Content before operation 125 c.c.	Content at time of closure 25 c.c.
Content before operation 65 c.c.	Content at time of closure 20 c.c.
Content before operation 175 c.c.	Content at time of closure 15 c.c.

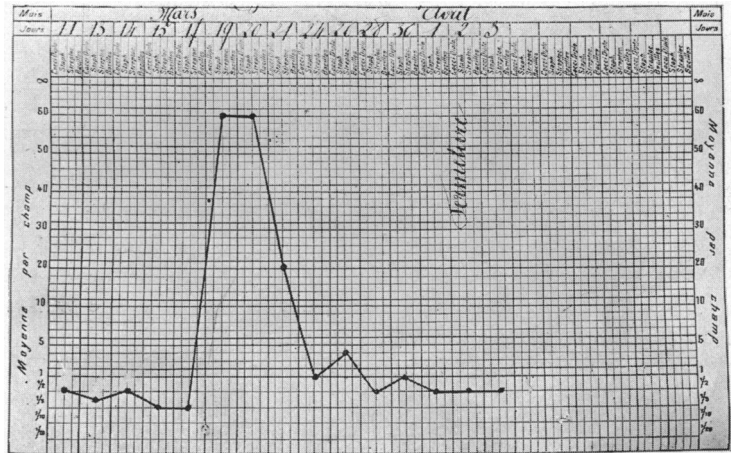


FIG. 13.—Microbic curve, showing effect of drainage and disinfection.

Early disinfection is essential; pulmonary decortication formerly done by Delorme's method nearly always failed. Before closure two condi-

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tions are important: (1) The culture curve must read zero, streptococci being absent; (2) the pleura, without further application of Dakin solution and dressed only by sterile gauze, should not secrete. One can then

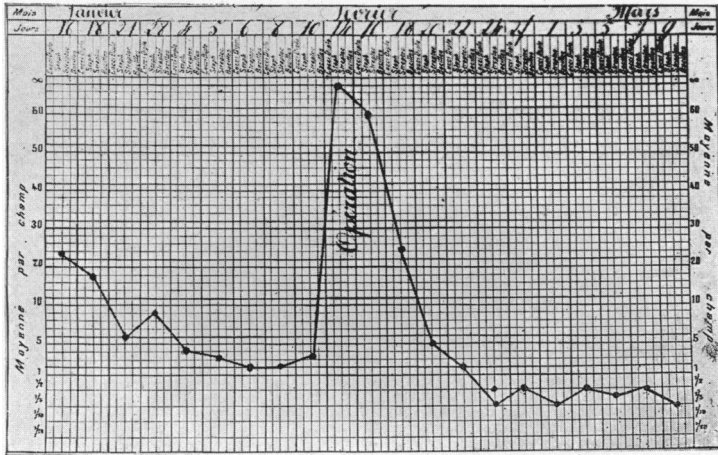


FIG. 14.—Microbic curve, showing effect of drainage and disinfection.

close the *parietal orifice* with no further concern about the cavity (Depage-Tuffier) or perform pleuro-pulmonary *decortication*. In cases where decortication alone is applicable, I operate before securing total disinfection.

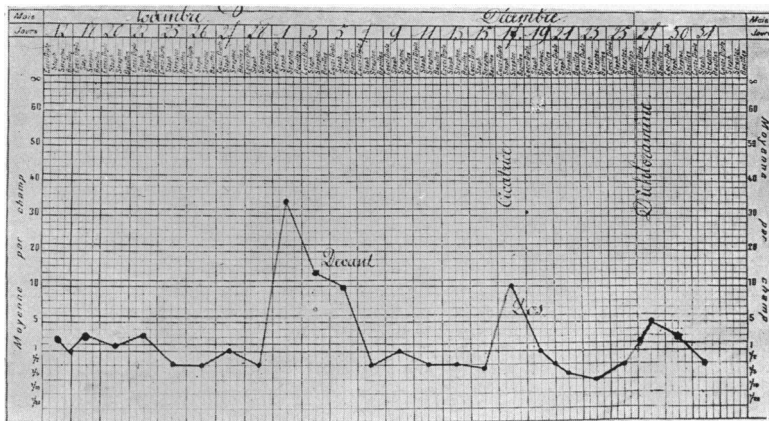


FIG. 15.—Microbe curve, showing average number of organisms in the microscopic field.

The Depage-Tuffier Method.—The culture curve reading zero and the cavity no longer secreting, the surgical incision is closed.

1. Introduce aseptically into the pleura a narrow wick, in order to prevent entrance or stay of blood within the pleural cavity during the operation.

2. Under local anæsthesia the edges of the orifice are resected throughout its depth and down to healthy tissue, all incisions are tamponed and

perfect hæmostasis of the wound is secured. Closing is done either in one plane with silkworm gut, or in two planes, the deeper with catgut and the superficial with silkworm. Closure is complete with aseptic dressing applied.

This method is indicated in all cases where the cavity is reducible by the respiratory effort, even in recent cases with uninfected bronchial fistula. Sutures are removed on the seventh day.

Should there be a bloody effusion into the pleura during or after the operation, I insert a bundle of silkworm threads to drain the cavity for twenty-four hours. One can follow the regression of the cavity by radios-

Cotte Joseph.

12	Novembre	1916	Blessure
22	Février	1917	Entrée Braxion
27	"	"	Fistule
7	Mars	"	Opération
20	"	"	Fermeture
27	"	"	Reouverture
23	Avril	"	Extraction projectile
22	Mai	"	Stoule - Suture
9	juin	"	fistule
11	juin	"	Drain
21	juin	"	Fermeture

Fig. 16.—Syllabus of the various stages in the treatment of a case of chronic pleuritis and fistule following a perforating gunshot wound of the thorax.

copy and auscultation. Usually resorption appears complete when the dressing is removed on the eighth day. If suppuration again complicates, I open the cavity anew.

Pleuro-pulmonary Decortication.—This operation was made in nine intractable cases, seven with total decortication and two with partial decortication. The fistula had been present two hundred and eighty days in the non-surgical cases and ninety-three days in the traumatic cases. Cavities invariably contained streptococci. The period of disinfection averaged thirty-three days for the non-surgical cases, forty-three days for the surgical cases. The method is the method of election in old and obstinate cases with cavities indurated and not reducible by

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respiration. It includes two stages: (1) Thoracotomy with wide exploration, and (2) decortication, complete or incomplete, total or partial.

Exploration is made by thoracotomy. Resection is made of the edges of the fistula and of the osseous plaques often due to the fusion of the ends of sectioned ribs. Wide separation, always difficult, of the surgical in-

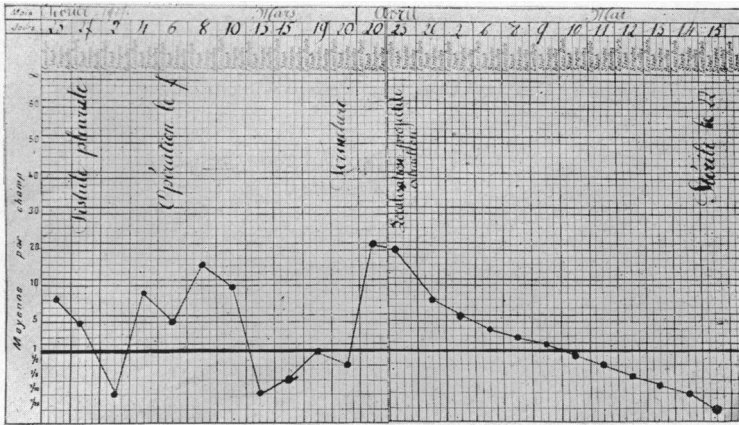


FIG. 17.—Microbic curve in the case of Cotte. (See Fig. 16.)

cision and the laying bare of all recesses and the entire cavity, are practised. If prior disinfection of the cavity is thus obtained, one continues with the decortication. If pulmonary decortication by Delorme's method has not been successful, it is only because it was not preceded by disin-

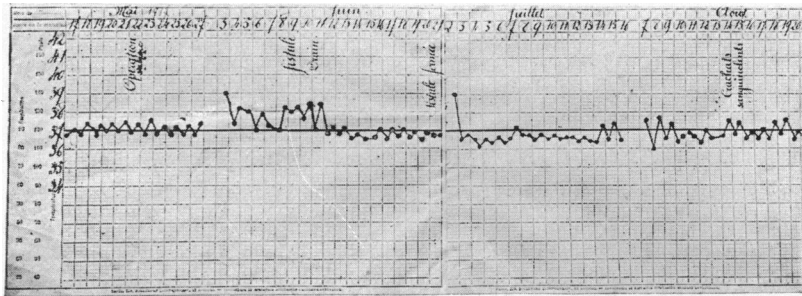


FIG. 18.—The later microbe curve in the case of Joseph Cotte (see Figs. 16 and 17), gunshot wound of lung.

fection of the pleural cavity, and in my early operations I always saw decortication followed by a new infection.

Operative Method—Total Decortication.—(1) Wide incision of the pleura is made to open the entire cavity thoroughly. (2) The cicatrix and osseous plaques about it are resected. Wide thoracotomy is done, beyond the limits of the cavity. Separation, by a separator, is made of the lips of the wound (Fig. 19). One ascertains the plane of pleuro-parietal cleavage at the level of the wound, this plane being often difficult to find.

Stripping of the pleuro-parietal region leading to the sinus of the cavity is done, here again amid grave difficulty in passing from the pleuro-parietal entrance to the pulmonary site. Adhesions are often intimate and thick at this level. The false pulmonary membrane is stripped off and here the difficulties are especially great. If, in some cases, the plane of pleuro-pulmonary cleavage is easy to find and follow, adhesions are usually so intimate that stripping of the false membrane results in penetration into pulmonary tissue with consequent bleeding. Total decortication has been successful with me only for cavities limited to the size of the two fists,



FIG. 19.—Dividing pleuro-parietal adhesions at the bottom of the cavity.

and I have never decorticated an entire pleural cavity. Sometimes the process remains incomplete because of diverticula which cannot be reached or on account of deep adhesions involving the pericardium. Immediately after the removal of the false pulmonary membrane one sees the lung resume its expansion and again fill up the pleural cavity.

Pulmonary Decortication Alone.—In three cases, after wide pleural incision, I liberated the cavity at the level of the pleuro-pulmonary adhesion by attacking the false pulmonary membrane, which permitted the lung to expand. I did not trouble about the pleuro-parietal membranes. All these cases were cured.

Partial and Segmented Decortication.—Adhesions between the pulmonary false membrane and the lung are such that one can extirpate them only in sections. The periphery is incised at the union of the parietal and the pulmonary pleuræ to liberate the lung (Figs. 20 and 21). One then attacks the false membrane in different places where it appears likely to yield more readily, leaving it untouched where the fusion is especially intimate. Islands of adhesions are thus left, of greater or less thickness, on the surface of the lung. One then thins out, by dissection, the thickness of the adhesions up to the pulmonary surface. I do not

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like to penetrate the pulmonary tissue, which always bleeds abundantly and thus constitutes an obstacle to cure.

In all these methods it may be necessary to resect one or two ribs more or less extensively. But in all cases preference is given to liberating the lung, so that it may fill the pleural cavity. One resects the skele-

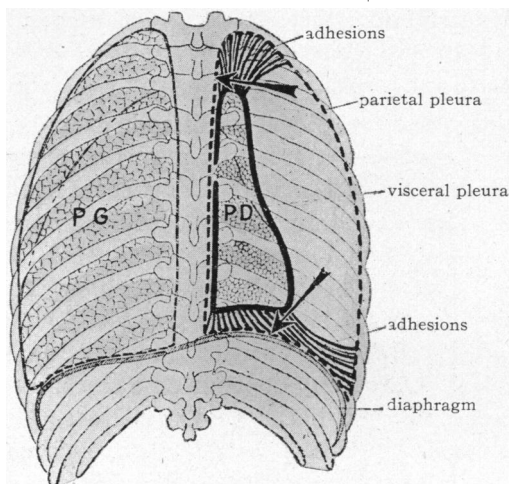


FIG. 20.—Points along which the incision should be carried at the periphery of the cavity.

ton only when expansion is absolutely impossible. If the raw surface left by decortication bleeds but little, I completely close the surgical wound in one or two planes. If there is a slight bloody oozing, I introduce a bundle of silkworm sutures to insure drainage for twenty-four hours. If

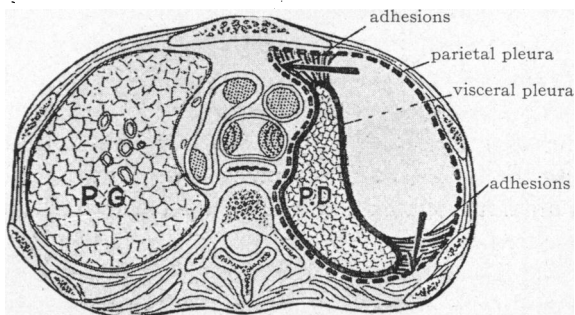


FIG. 21.—Diagram showing where the incisions should be carried in order to liberate the lung.

the oozing is very abundant, I apply to the bleeding pulmonary surface a large wick to drain it, suturing completely at the end of twenty-four hours.

Complications of Operating Chronic Empyemas.—In eleven cases the wound had to be reopened because of secondary suppuration, but the accumulation was much reduced in proportion to the original cavity.

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In two cases the wound had to be opened twice. All of these were cured. Two other cases had to be reopened, one for an osseous fistula, the other for hæmoptysis. Slight thoracic deformity was mentioned in nine cases and considerable deformity in a case of seven months' duration.

Content after operation	15 c.c.	Content at closure	3 c.c.
Content after operation	120 c.c.	Content at closure	45 c.c.
Content after operation	17 c.c.	Content at closure	4 c.c.
Content after operation	37 c.c.	Content at closure	4 c.c.

In three cases the pleural site was disinfected *de novo* and cured.

Subsequent medical treatment consisted in exercises for inspiration and expiration, the effect being watched by means of a registering pneumograph.

Final Results and Conclusions.—All my cases have been seen six months to three years after operation. Thoracic deformity was slight. The radiographic reading was an interesting evidence of the thickness of former adhesions or of cicatrices shown to have almost completely disappeared. The costo-diaphragmatic sinus alone was visible at its inferior portion.

To summarize, chronic pleurisies are exceptional when acute effusions are well treated. Chronicity depends on a chronic pulmonary infection or on special anatomic peculiarities. Costal resection in the treatment of chronic empyema should be reduced to the minimum. Closure of the surgical incision and pleural decortication should be preceded by disinfection of the cavity and then gives success which was formerly unknown.

(I have to thank Dr. Merrill A. M. Cross, Paris, for the translation of this article.—THE AUTHOR.)

THE TREATMENT OF CHRONIC EMPYEMA

STATISTICAL TABLE *

RECORD OF 91 CASES FROM THE MONTH OF AUGUST, 1914, TO THE MONTH OF DECEMBER, 1919

- 46 cases of medical purulent pleurisy.
- 43 cases due to wounds of the lungs.
- 2 cases due to infection of a hæmothorax.

I

A. Out of the 46 medical cases 29 were opened by myself and treated by the Depage-Tuffier method.

The microscopic examinations showed:

- 15 cases streptococci only.
- 5 cases pneumococci only.
- 7 cases association of staphylococci-diplococci and streptococci.
- 1 case streptococci and pneumococci.
- 1 case streptococci and leukocytes.

I practiced the operation at the first sign of:

- Pleurisy in 9 cases from 8-22 days.
- Pleurisy in 13 cases from 2½ months.
- Pleurisy in 4 cases from 2⅛ months.
- Pleurisy in 1 case from 4 months.
- Pleurisy in 2 cases from 6 months.

The duration of the sterilization was:

- 7 cases from 6 to 24 days.
- 3 cases from 1 month.
- 9 cases from 1½ to 2½ months.
- 4 cases from 3 to 4 months (case dating from several months).

In certain cases the record was incomplete.

The volume of the cavity was about:

- 80 c.c. in 1 case.
- 200 c.c. in 2 cases.
- 300 c.c. in 2 cases.
- 700 c.c. in 1 case.
- 1100 c.c. in 2 cases.
- 1600 c.c. in 1 case.
- 1 litre in 1 case.
- 1 litre in 2 cases.
- Total in 4 cases.

In another case the cavity contained about 3 litres at the opening and more than 1½ litres at the closure of the pleura.

Six patients died almost immediately after the operation, 3 were streptococci and 3 were without record of any kind.

One case was opened and treated solely by oxygen, the microscopic examination showed streptococci and dated from 3 months.

Three were opened; they recovered, but they were treated by simple drainage.

Three were opened and closed immediately. Two pneumococci (success), 1 diplococcus (failure).

* Translated by Miss Carrie Patterson.

TH. TUFFIER

B. Two cases were sent to me already opened and had been already treated by Dakin; they had been opened for over a month and showed streptococci; 1 dated from 4 months and had been sterilized in 10 days, the other dated from 3 years $\frac{1}{2}$ and had been sterilized in 4 months. Both recovered.

C. Two cases were decorticated, 1 showing streptococci and the other was without record. One dated from 3 months, the other from 1 month. The sterilization was complete in 11 days. Result—recovery.

II

Consecutive purulent pleurisy from wounds of the lung—43 cases.

Out of these 43 cases 19 were opened by myself and treated by the Depage-Tuffier method.

The microscopic examination on the 19 cases showed 14 times association of staphylo-diplo-cocci, strepto once and distryptococci in 4 cases were not mentioned.

In 4 cases when I operated, the wound dated from 20 days.

- In 2 cases it dated from 1 month and a few days.
- In 5 cases it dated from 2 months and a few days.
- In 2 cases it dated from 3 months.
- In 2 cases it dated from 4 months.
- In 2 cases it dated from 5 to 7 months.
- In 2 cases there were no records.

The duration of the sterilization was:

- In 5 cases 15 days.
- In 8 cases 1 month and a few days.
- In 2 cases 2 and 3 months.
- In 2 cases 4 months.
- In 2 cases without record.

In 1 case the closure took place the day of the operation. There was no sterilization. This dated from 5 $\frac{1}{2}$ months.

B. Seventeen cases were sent to me *chronic*, 14 from 1 month. (Eleven closed Depage-Tuffier method and 3 decortications.)

The microscopic examinations showed: Ten times associations staphylo-diplo-cocci, batonnets-strepto. Once pneumococci and bacillus of Friedlander. Three cases are not mentioned.

When I practiced the operation the wound dated:

- 2 cases 2 months and a few days.
- 3 cases 3 months.
- 3 cases 4 months.
- 3 cases 5 months.
- 3 cases 7 months.
- 1 case 8 months.

The duration of the sterilization was in:

- 2 cases 15 days.
- 4 cases 1 month and a few days.
- 3 cases 2 months and a few days.
- 1 case 3 months and a few days.
- 1 case 6 months and a few days.

In 3 cases the pleural site was reopened, disinfected anew and the result was recovery.

THE TREATMENT OF CHRONIC EMPYEMA

Three in less than a month. The microscopic examinations showed:

- I pneumococci et bacillus of Friedlander.
- I associations of perfringens, anaërobes, staphylococci, vibron septique.
- I without record.

All these cases except 2 actually recovered. The 2 failures were 2 bronchial fistulæ with ectasia of the bronchiæ.