While operating on cases of infected haemothorax with open "sucking" wounds or severe rib injury, I have on several occasions found the lung adherent to the chest wall in the neighbourhood of the wound. The haemothorax is shut in by these adhesions. I have seen the same at two autopsies. Is this an attempt by nature to close an open chest cavity? It would explain the anomalies in clinical signs found in some cases and might account for the occasional difficulty in getting a sample of pleural fluid when an infected haemothorax is present. In two cases I have seen recent adhesions of the sound lung to the chest wall. I think this may be more common than is generally accepted.

Of course, one is dealing with a class of case in which the injury is very severe and the operative mortality must be high. When one considers that the large majority of cases will die if "left alone" the results indicate a very considerable advance on the more conservative methods of treatment.

Cases in Group B (2) and (3) do almost uniformly well if treated on these lines. Those earlier cases which died appeared to succumb to a secondary infection of the pleural cavity from the infected wound of the chest wall.

In the majority of the simpler cases of septic haemothorax which died in the casualty clearing station to which I am attached a streptococcus appeared to be the main infection. It is probable that systematic very early exploratory aspiration and culture will indicate means whereby this mortality may be reduced. It appears to me that this branch of surgery, although still in its infancy, has already saved many lives which would otherwise have been lost. Results will improve with improved technique and further investigation.

These are the factors which incite me to put in print my early findings. From my point of view, these remarks are premature, but, if I succeed in attracting attention to what has been a somewhat stagnant field of surgery, this article will have served its purpose.

In a working period of approximately two months the following results were obtained:

Total cases of Group B operated on and chest wall closed	58
Evacuated apparently doing well	44
Died	14
Required secondary operation (drainage, etc.)	12
Number of cases with multiple wounds	29

Attached are the short original unaltered notes of the last six consecutive cases included in the above statistics.

CASE I.

Pte. A., wounded 1 a.m. June 16th, 1917. Large shell wound through left arm. Fragment proceeds through latissimus dorsi into left chest—open sucking wound. Haemothorax; surgical emphysema. Patient getting progressively worse since admission. Symptoms: dyspnoea, with sense of suffocation; cyanosis. Pulse 140.

June 16th, 3 p.m. Under morphine, local novocain, chest wall wound excised with four inches of sixth rib. Large wound of lung felt, but owing to patient's very precarious condition no extensive search for foreign body was made. One ounce of 1 in 1,000 brilliant green was put in chest after swabbing out. Closure of pleura. The patient began to improve immediately. Chloroform administered for rough trimming of arm. Pulse after operation 120.

The patient gradually improved, but on June 22nd still had a temperature of 102° and pulse 96. Chest aspirated; bacteriological examination negative. Only ½ oz. fluid obtained. No trace of brilliant green. Right lung showed signs of basal congestion, which Colonel Herringham considered was probably pneumonia.

On June 26th temperature 102° and pulse 108. Dull patch at base of left lung behind. Under local novocain, portion of ninth rib resected over dull area and localized abscess evacuated with large foreign body, wedged in body of tenth dorsal vertebra. This cavity communicated with a bronchus, but was shut off from pleural cavity. Carrel-Dakin. Progress steady. Patient evacuated in excellent condition, with normal temperature and pulse, on July 7th, 1917.

Note.—Here the affected lung carried the patient through his pneumonic crisis. Simple closure immediately improved the patient's condition.

CASE II.

Prisoner of war, H. S., wounded June 15th, 1917. Entrance and exit shell wound, right chest. Operation June 18th, 1917, under local anaesthesia with omopon. Large posterior sucking wound excised. Thorax wiped out. Lung found adherent to exit wound, partially blocking it. Streptococcal haemothorax. Symptoms of suffocation. Chest wall closed.

Improvement for twelve hours; death after twenty-four hours from streptococcal septicaemia. Extensive wound in lower lobe of right lung.

Note.—Streptococcal infections are always severe. Sucking wounds which are closed late have always a more serious prognosis.

CASE III.

Pte. B., high explosive wound, chest and left leg, June 16th, 1917. Entrance and exit wound, right scapular region with large open wound in neck; fracture of first rib behind angle. Extremely collapsed. Breathing very distressed. Under chloroform, partial excision of track. Bipp, paraffin pack, entirely plugging opening in neck. Severe bronchitis of "sound" lung.

June 22nd. Aspirated, 20 oz. Negative bacteriological report.

June 26th. Temperature and pulse normal.

July 3rd. Evacuated, well.

Note.—When the track cannot be efficiently excised and closed a paraffin pack (gauze wrung out of liquid paraffin) is extremely efficient.

CASE IV.

Pte. J., wounded June 21st, 1917. Under chloroform and oxygen, wound of left lower chest with tear of tip of lower lobe of lung and diaphragm. Foreign body removed from diaphragm, which was sutured with catgut. Upper wound small; excised. Fragments of rib removed from entrance and exit wound of lung; 40 c.cm. brilliant green injected (into pleural cavity), chest wall closed. Multiple wounds of left arm; partial excision and Carrel.

July 2nd. Temperature normal but breathing easily disturbed by moving.

July 4th. Evacuated, apparently well.

CASE V.

Pte. P., wounded 12 midnight, July 2nd, 1917. Operated on twelve hours later. Much shock; hypertonic intravenous saline. Resection of fractured ribs in front. Hernia of omentum into chest cavity. Excision of wounds. Hernia reduced. Diaphragm closed by six sutures; chest wall closed by suture. After wiping out haemothorax and 1 oz. brilliant green injected, bullet casing removed from spleen. Spleen and kidney drained, packed with gauze; only upper pole of kidney damaged.

July 12th. This patient has made practically an uninterrupted recovery.

CASE VI.

Second Lieutenant X., wounded June 30th, 1917. Wound of kidney, spleen, and large tear of diaphragm from chest wall. Haemothorax wiped out; brilliant green injected, and diaphragm stitched to chest wall with mattress sutures. Fragment of shell removed from above spleen. Upper pole of right kidney pulped; spleen and kidney packed; no apparent injury to lung. Uninterrupted progress.

July 8th. Patient evacuated, well.

THE SURGICAL TREATMENT OF SEVERE WAR WOUNDS OF THE CHEST.

BY

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The early treatment of penetrating wounds of the chest is one of the problems of the present war which is of the greatest importance.

Up to now the materials for the discussion of the problem have been relegated mainly to the physician, and it is only recently that the surgeon has had the opportunity of operating on any but late cases. Accordingly the results of a sufficient number of cases on which to form a just estimate of the value of operative treatment as compared with expectant measures have not been available.

We have collected the results of our experiences of these cases, and we offer them as a contribution to the discussion.

During the earlier part of the period the results have led us to believe that, except in cases where the general condition of the patient will not allow of these measures, there is no defensible reason why chest injuries should not be treated at the earliest moment on exactly the same principles as wounds of other parts. It is generally admitted that the proper treatment for open wounds of limbs is to excise all the lacerated tissues and to remove the foreign body. In so far as these measures are not carried out with perfect technique and success, so

much longer is the patient in becoming fit for service again.

Sepsis may be carried into the depths of penetrating chest wounds and develop there primarily, or it may pass gradually from the skin through lacerated muscle, smashed rib, and torn pleura, and ultimately fulminate in the pleural cavity or wounded lung. This latter type of what might be termed secondary infection is seen especially in cases of perforating bullet wounds with explosive exit.

It must be remembered that the pleural cavity, when filled with effusion and blood clot, is, in a general way, one of the finest incubating chambers an organism could have. Even in the case of perforating bullet injuries with insignificant entrance and exit wounds one must always be on the look-out for evidence of a septic infection of the usually concomitant pleural effusion.

The principles we have tried to follow in the treatment of chest wounds recently dealt with have been identical with those guiding the operative treatment of a wound of a joint. In these latter cases the two essential rules are:

1. Complete removal of all possible sources of sepsis.
2. Conservation of the function of the joint if this is compatible with (1).

As applied to penetrating chest wounds these principles involve operation at the earliest possible moment, free excision of all infected tissues, removal of the foreign body and cleansing of the pleural cavity or wound of the lung, followed by accurate suture of the lining membrane and tissues over it, whenever possible without drainage. Drainage of the pleural cavity has been employed only when one or other of these principles could not be fulfilled—for example, when a large foreign body, with infection around it, could not be removed.

When anaërobic infection of the superficial muscles is present the wound is left open to an extent corresponding to the area of the infection—for example, in the case of a wound of the back when the more superficial muscles alone are infected it is possible to suture the pleura and leave the superficial part of the wound freely drained.

There does not seem to be grave objection to washing out with, and possibly leaving inside the pleura, a few ounces of a non-irritating antiseptic, such as Dakin's or flavine solution, but the necessity for this is by no means established.

The 199 cases of perforating wounds of the chest dealt with by us can be divided up into four classes as follows:

	Cases.
1. "Open" or sucking wounds with free air entry	39
2. "Closed" wounds with large septic laceration of the parietes	32
3. "Closed" wounds with early signs of infection of haemothorax	20
4. "Closed" wounds with no evidence of intra-pleural infection	108
Total	199

All cases in Class 4 were evacuated to the base as soon as they were fit to travel, without operative interference of any sort.

It is a fallacy to regard many of the cases in the last three classes as closed with regard to access of infection to the chest cavity, and it must be understood that the term "closed" is applied to these wounds purely in the macroscopic sense.

The cases for operation were not chosen. Many apparently hopeless cases were undertaken, and we were rewarded by the recovery of many whose condition before operation had been despaired of.

In the first three days of the period under review there were no fewer than twenty-two deaths in cases in which no operation had been performed and in which the chest wound was the principal injury. This will give some idea of the gravity of the wounds and of the condition in which the patients arrived at the casualty clearing stations. This high mortality impressed upon us the necessity of adopting surgical measures more frequently and earlier. Partly on account of the number of other cases hitherto regarded as deserving more urgent surgical attention, our chest cases were seldom operated upon until they had been in hospital for one to three days.

Only such cases as, in the light of the mortality of the

first three days, were in all probability going to die if left alone were taken to the operating theatre.

General Condition of Patient.

Respiratory distress was practically always pronounced, and in some cases it was intense. In many cases mental anxiety was a noticeable feature. The usual signs of loss of blood were present in greater or less degree.

After a few days, especially in septic cases, the skin assumed a lemon-yellow tint, and in some instances the patient became quite jaundiced in appearance although the liver was unwounded.

The temperature we found to be of varying ranges, but in the majority of cases it was normal or subnormal on admission. Respiration and pulse rate were invariably quickened and breathing was laboured and attended with pain. Haemoptysis was a constant symptom when the foreign body had penetrated the lung tissues, but it never assumed alarming proportions.

Physical Signs.

The physical signs presented a striking uniformity. The side on which the wound was situated did not move freely; vocal fremitus was feeble if present at all; on auscultation no breath sounds could be heard at the base of the affected side, but in the upper part of the chest bronchial breathing, with crepitations or râles, were very frequently present. Vocal resonance was absent over the lower part of the chest, and between that area and an area of normal resonance or hyper-resonance in the region of the apex of the lung there was very frequently an area where oegophony was present. Over the base and back of the chest on the wounded side there was usually an area of total dullness, indicating the extent of the effusion. Curiously, no cases were found in which the effusion was hidden by the presence of adherent lung, as has been experienced by other surgeons.

In open cases a pack of gauze was usually found *in situ* on admission. On removal of this, as a general rule, fluid of varying nature bubbled out from the wound with each upward movement of the diaphragm. Removal of the plug invariably increased the distress of the patient, which again was relieved soon after the opening was re-occluded. This observation had great influence in deciding the operative treatment. The immediate improvement in respiratory comfort when the pleural cavity was closed at operation was very striking.

Preliminary Treatment.

Most of these cases arrived from the various dressing stations in a condition of respiratory distress, and many were suffering from collapse.

They were put in a special ward, warmed up by various measures, and allowed to rest quietly. If the patient was very distressed 1 c.cm. (one-third of a grain) omnopon (Roche) was administered hypodermically. One pint of hot coffee with 1 oz. of glucose was given by the rectum. If necessary, 15 minims of a solution of camphor 1 part, olive oil 4 parts, and ether 5 parts were also given intramuscularly. These wounds produce more mental anxiety than do wounds of almost any other part, and by blunting the patient's sensibility we found that the mental distress disappeared, and the general condition gradually improved.

The patients were found usually to be most comfortable when well propped up in bed in Fowler's position; if they slipped down they soon began to show symptoms of distress, which passed off when they were lifted up again into their former position. Tight clothing and bandaging were avoided. The risks of septic bronchopneumonia of the uninjured lung are great, and to attempt to combat these, creosote (2 minims in mucilage) was given three times daily. In cases where there was little or no expectoration but where moist sounds were numerous, a mixture containing ammonium carbonate, tincture of digitalis, and tincture of senegae was also given.

Examination of fluid from the pleural sac was carried out in many cases, and in the large majority streptococci were found. In order to try to diminish the virulence of this infection, polyvalent antistreptococcic serum, 10 c.cm., was given as a routine to the most severe cases of chest wounds after we realized the prevalence of this form of infection.

In many cases nothing further in the way of treatment was necessary.

Indications for Operation.

Open cases were operated upon as soon as the condition of the patient permitted. The great majority of cases in this class have never hitherto reached the base.

"Closed" cases with gaping or lacerated wounds of the soft parts and bone, whether scapula or clavicle, were treated as soon as possible.

As regards the remaining cases the indications for operation were based on (a) the general condition of the patient, and (b) the physical signs.

So-called "closed" cases without large wounds of the soft parts were usually left alone; a little bismuth, iodoform, and paraffin paste was rubbed into the wound and the skin disinfected round about.

If the respiratory distress increased, especially when accompanied by increasing displacement of the heart, operation was performed. In many cases, even when a preliminary exploratory puncture had been made, the result of bacteriological examination was not waited for, as experience showed that sometimes the withdrawn fluid produced no growth, while that obtained at the operation was proved to be infected.

Nature of Operation.

Where the external wounds were large, through-and-through, and the foreign body had traversed the lung and pleural sac, one or both, the wounds were excised, including the smashed ribs and soiled edges of the pleura. If possible this was done *en masse*. In bullet wounds it was usually unnecessary to excise the entrance wound.

If the site of the wound permitted of free inspection of, and access to, the pleural cavity, sufficient rib was removed to allow of insertion of the hand into the pleural sac for exploration and cleansing.

If sufficient access could not be obtained, owing to the position of the wound, four inches of the eighth or ninth rib below the axilla were removed and the pleural cavity was freely opened. This usually was enough to allow of inspection, palpation, and cleansing, but if more access still was required the rib above was divided or resected.

The procedure detailed in this last paragraph was also carried out in cases subjected to operation when only small "entrance and exit" wounds existed.

Injuries to the Lung.

If the wound of the lung was a superficial tear it was palpated and freed, by wiping, from blood clot and possible foreign material; if it bled it was sutured by a rounded needle and catgut or rubbed with bismuth, iodoform, and paraffin paste, and packed with gauze.

A through-and-through wound of the lung was usually left alone, unless very large.

Gangrenous portions of lung were clipped away, bleeding being stopped as above described, but haemorrhage was seldom found to be a troublesome factor. All blood clot was carefully removed from the pleura and the cavity was left as dry as possible.

When the Lung is Adherent.

In cases in which there is a localized inflammatory area in the lung and it is adherent to the parietes we consider that early operation is especially important because of the danger of the spreading of inflammation in the uncollapsed lung. Free access in such cases is easily obtained by excision of the superficial soft tissues and ribs, and the finger can then be introduced in order to ascertain the direction and extent of the track. Before this examination it may be necessary to fix the lung to the parietal pleura by stitches to prevent recent adhesions being broken down.

If the foreign body and clothing are felt they can be removed with forceps. If the haemorrhage prove troublesome the wound can be packed with dry sterile gauze lightly smeared with bipp paste, and in any case the "bed" of the foreign body should be carefully wiped out, smeared with paste, and a drainage tube or light gauze pack inserted.

When the Lung is not Adherent.

We found that the lung was non-adherent in the majority of instances, and this factor makes treatment much

more difficult. The operative measures we adopted were as follows:

The foreign body was sought for and removed. If it was embedded in the opposite wall of the thorax or mediastinum the aperture of exit could be seen or felt, and, if necessary, a separate incision was made for its removal. An attempt was always made to excise the margins of the exit wound in the pleura and to stitch them together. If this cannot be done the track should be rubbed with bipp from the pleural side. In some cases the foreign body was found at the base of the chest, having gravitated there.

If embedded in the lung, that organ was pulled up and fixed between the fingers, or caught with forceps, and the foreign body was removed as already described. When discovered near one of the margins of the lung, it was found to be an easy matter to excise the lung tissue enclosing the foreign body, and to suture the cut surfaces.

The pleural cavity was then wiped clean of blood clot very carefully and the pleura stitched up. Suture of the pleura proved usually the most difficult part of the operation. In order to facilitate it, subperiosteal resection of a considerable length of rib was performed when necessary.

Catgut threaded on a curved intestinal needle was used as a continuous suture to bring the divided edges of pleura accurately together when the suture was pulled tight. The patient was then roused if necessary, and asked to make a forced expiratory effort with closed lips while holding his nose. The object of this was to produce expansion of the collapsed lung and thus to expel air from the pleural sac. When this had been satisfactorily accomplished the catgut suture was tightened and tied.

In all cases not too widely infected the muscles were stitched up layer by layer. The skin was sutured, and the wound was then closed and no dead spaces were left.

In some cases a small drainage tube was put in almost down to, but not actually in contact with, the pleura, so that there was no danger of its producing a communication with the cavity. If, however, excision had been thoroughly done, and the wound had been irrigated with antiseptics (Dakin's or flavine solution) and rubbed lightly with bipp, it was found unnecessary to use drainage of this kind.

If the edges of the pleura would not come together the muscles and the skin were stitched over. As smooth a muscular surface as possible should be presented to the expanding lung. If neither pleura nor muscle could be brought together, the skin, at any rate, was always sutured. A plastic operation was performed if necessary to permit of this.

Drainage of Pleural Cavity.

No cases were drained unless (1) the chest wall could not be closed owing to the condition of the patient; or (2) if infection of the lung, or of the pleura as distinguished from its contents, was definitely established.

We soon overcame our scruples about completely closing up cases with a streptococcal infection, but we must admit to a more gradual conversion to the idea of closing cases with anaërobic infection. This, however, we have proved to be quite a safe procedure when the precautions we have enumerated are carried out.

In cases in which drainage had to be resorted to—for example, when suppuration was definitely established—the cavity was drained by means of a large tube, half an inch in diameter, with one end reaching just inside the opening in the pleura, and retained in position by one or more stitches. The tube was long enough to reach under the surface of a solution of boric acid in a wide-mouthed glass bottle which stood upon the floor at the side of the patient's bed. The use of such a receptacle and long drainage tube is not only a means of causing a negative pressure in the pleural cavity and of saving expense in the matter of dressings, but the patient was thereby rendered much more comfortable, as he was saved from having to lie in soaked and offensively smelling dressings. When the discharge becomes less in amount it is advisable to cut this tube off one to two inches from the skin surface and to wash out the pleural cavity two or three times daily with Dakin's solution or flavine. To do this it is advisable to pass a smaller piece of rubber tubing—for example, a catheter—through the stitched tube; this ensures a free return of the injected fluid. The patient can help in the

washing out process and the expulsion of the fluid by coughing. When the cavity is not being washed out the wound is covered with an antiseptic dressing, and external to this is a piece of jaconet larger than the dressing. This latter has a valvular effect and prevents the sucking of air into the pleural cavity. The piece of jaconet or rubber tissue may be placed directly on the skin in some cases, no tube being used. By its valvular action the occluding covering favours expansion of the lung.

Anaesthetics.

In the choice of anaesthetics the tendency to inflammation of the hitherto unaffected lung and the frequently irritating property of general anaesthetics must be remembered.

Local anaesthesia has not only the advantage of avoiding this irritation, but of enabling the patient to expand his own lung before final suture, and thus special pressure apparatus is rendered unnecessary. But the surgeon who attempts to operate on chest wounds under nerve blocking and local infiltration purely and simply will meet at first with disappointing results. In this, as in other procedures, practice makes perfect.

The patient must be rendered drowsy first of all if the full benefits of local anaesthesia are to be reaped. For this reason we gave the patient 1 c.cm. of omnopon and scopolamine ($\frac{2}{3}$ grain omnopon and $\frac{1}{150}$ grain scopolamine) one hour before operation, and if he was not drowsy in half an hour another one-third grain omnopon alone was given. The local anaesthetic used was novocain 1 per cent. with 10 minims of adrenalin hydrochloride added to every ounce used. The average amount of solution required was three to six ounces.

In addition to local infiltration around the wound, blocking of the intercostal nerves, at or just internal to the angles of the ribs, was carried out. It is essential to block at least one nerve above and below as well as those involved in the wound. In wounds of the upper part of the chest the descending cervical nerves must be blocked. If the scapula is involved, as is fairly frequently the case, the suprascapular twigs may be anaesthetized by injection of the dorsal scapular muscles all around the injured area.

RESULTS.

Of the 199 cases, 108 were evacuated without operation, 24 died without operation, and 67 were operated on.

Of these 67 apparently forlorn hopes, 34 eventually recovered and were evacuated to the base, and 33 died. Of the 33 fatal cases, 16 had other gross lesions, which were more directly responsible for the fatal result than the chest wounds. Eleven of these 16 had wounds passing through the diaphragm into the abdominal cavity. Two had very septic wounds of the pharynx and trachea, and required tracheotomy. Two had extensive gas-infected wounds of the chest wall. One had a lacerated wound of the pericardium, and the patient became so collapsed that the operation had to be abandoned. In these 16 cases death did not occur, in our opinion, from the injury to the lung or pleural sac, and it may be justifiable to exclude them in estimating the mortality.

If it is permissible to exclude them,

The rate of mortality in the 51 remaining cases was ... 33.3 per cent.
And the recovery-rate was ... 66.6 "

If, however, one includes these 16 cases,

The rate of mortality in 67 cases was ... 49.25 per cent.
And the recovery-rate was ... 50.75 "

More instruction can, however, be obtained from the following tables:

Operation Results.

Class.	No. of Operations.	Recovered.	Per-centage.	Died.	Per-centage.
1 ...	29	10	34.49	19	65.51
2 ...	23	10	43.47	13	56.52
3 ...	15	14	93.3	1	6.6
4 ...	—	—	—	—	—
Totals ...	67	34	—	33	—

Pleura Closed.

Class.	Total Closed.	Recovered.	Per-centage.	Died.	Per-centage.
1 ...	12	5	41.6	7	58.3
2 ...	7	4	57.14	3	42.8
3 ...	6	6	100.00	—	—
4 ...	—	—	—	—	—
Totals ...	25	15	—	10	—

Pleura Drained.

Class.	Total Drained.	Recovered.	Per-centage.	Died.	Per-centage.
1 ...	17	5	29.4	12	70.5
2 ...	16	6	37.5	10	62.5
3 ...	9	8	88.8	1	11.1
4 ...	—	—	—	—	—
Totals ...	42	19	—	23	—

Types of Infection.

The fluid from the pleural cavity was not examined in every case, but of the 35 examined for us by Captain R. L. Thornley—

Streptococci were present in ...	72.7 per cent.
<i>B. aerogenes capsulatus</i> was present in ...	54.5 "
Pneumococci were present in ...	36.3 "
Staphylococci " " ...	27.2 "
<i>B. influenzae</i> " " ...	27.2 "

The *Bacillus tetragenus* was present in 18.1 per cent., and a spore-bearing organism (probably that of malignant oedema) and a diphtheroid bacillus were present in 9.09 per cent. of the cases examined. In the majority of cases a combination of these organisms was found; in four cases only was a single type of organism present.

Results have shown that even although anaerobic bacilli or streptococci are present the pleural sac can be completely closed with success, the wounds healing by first intention. Consequently we are increasingly inclined to disregard the nature of the infection provided that approximately clean surfaces can be left internally.

We feel that in an apparently simple case of haemothorax with increasing severity of symptoms better and quicker results will be obtained by opening the chest as described, and cleansing and closing the pleural cavity, as has been done by Major Gask at another casualty clearing station. We have since operated on several such cases, so far with complete success in every case.

In cases in which streptococci or anaerobic organisms have been found a sharp look-out should, however, be kept for reaccumulation of fluid or deterioration in the patient's symptoms.

By far the commonest cause of death in the chest cases with no other injury was septic bronchopneumonia of the uninjured lung. It was for this reason that we gave creosote as a prophylactic measure and also antistreptococcus serum in severe cases. There is no accurate means of testing the value of these measures, but the impression gathered from their use was favourable.

The whole object underlying early operation in these chest wounds is the rational one of trying to secure early recovery, not only of the patient but of the function of the lung. This involves thorough removal of all possible sources of septic infection, whether in the form of dead tissue, devitalized tissue, infected fluid or blood clot, clothing or other foreign body, followed by closure of the pleura after expulsion of air from the sac.

When this complete operation can be thoroughly carried out before the patient has sunk too low the results are distinctly encouraging. The patient immediately becomes comfortable and his breathing improves. Breath sounds can often be heard over the lung within a few hours. The patient has a good prospect of a quick recovery to normal health with a lung doing its work in a normal way.