Penetrating wounds of lung & pleura

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Section I.

General Introduction.

Clinically Penetrating wounds of the Lung and Pleura in modern warfare consist of:-

- 1. Wounds from Rifle Bullets.
- 2. Wounds from Shrapnel Bullets, fragments of Shell Casing, and Grenade fragments.

Bayonet wounds of the chest are usually immediately fatal.

Shell and Grenade fragments, being of lower velocity than
Rifle Bullets, are more frequently retained than the latter, and
were in many cases observed to give larger and more septic wounds.
For these reasons they are more serious.

In my series of 55 cases there were:-

34 wounds by Rifle Bullets.

21 wounds by Shrapnel, fragments of High Explosive # and Grenade fragments.

of Rifle Bullets 14.7% (5) only were retained, while of grenade and shell fragments 85.7% (18) were retained. This difference is dependent on the difference of velocity to a large extent, but partly also to the fact that the Rifle Bullet travels with a Rotatory movement on its long axis whereas the shell fragment has none. The shape of the missile may also favour retention in the case of the shell fragment.

The question of retention is intimately related to that of the probability of subsequent sepsis for of those cases with retained Foreign Body 34.8% subsequently developed an empyema, while among those where such was not the case, this sequela only occurred in 12.5% of cases.



My cases were admitted to Hospital in periods varying from the day of wounding to 3 weeks after the wound had been received.

Complications of Lung wounds are very frequent and consist of Haemothorax and Pneumothorax, while there is very frequently an associated fracture of a rib or ribs. Hernia of the Lung occurs, but is rare.

Injury to the heart, to the Spinal Cord or to abdominal viscera may further complicate such wounds.

In two of my cases (numbers 3 & 9) there was very serious spinal injury, while in four others (numbers 5, 20, 33 and 43) there was a wound of the liver.

The commonest of all complications is Haemothorax. This occured in 60% (33) of my series. Pneumothorax which is less common occured in 18% (10)

In addition to subsequent diminution of Pulmonary expansion, a variety of sequelae may follow wounds of this character, the EMPYEMA, most notable being Pneumonia, Pleurisy, Pulmonary Abscess & Gangrene of the Lung and Empyema.

These occurred in a variety of combinations and independently.

Empyema occurred in 21.8% (12) of cases - In some of them

PNEUHONIA

Pneumonia was associated, but as an independent condition in occurred in 10.9%, while Pleuritic friction occurred in 9% of cases otherwise uncomplicated.

There were 3 instances of Pulmonary Abscess, 1 of them being associated with Empyema and 1 with Septicaemia.

There was an instance of Gangrene of the Lung and one of





and one of Gas Gangrene of the cellular tissues of the Back, resulting in a very rapid death.

Section II.

Symptoms of Penetrating wounds of Lung and Pleura.

Certain symptoms are common to the majority of such wounds, whether Haemothorax or Pneumothorax be present as a complication or not.

I had the opportunity when serving in the 27th Division in

France of seeing a number of such cases immediately after they
had been wounded. In nearly all cases there was dyspnoea often
urgent and in some cases so serious that it was hardly credible
that recovering could occur. Dyspnoea may however be slight or
absent in uncomplicated wounds of the lung or in cases with a small
amount of Haemothorax.

Pain and Haemoptysis are more variable, but common symptoms.

I found that haemoptysis occurred in 87% of my cases commencing generally immediately after the wound had been received
and lasting commonly from 2 to 10 days. Sometimes pure blood
more or less frothy from admixture of air is coughed up, but later
the blood merely stains of streaks a mucoid sputum. In one case
the Haemoptysis lasted for one hour only - in another, no
haemoptysis occurred until the 5th day after the patient had
received the wound.

In two cases after the haemoptysis had terminated a recurrence was observed - in one of them the recurrence took place after an interval of a month. Doubtless in many cases

Haemoptysis than any here described. The amount of the initial vessels haemoptysis being related to the size of the injured tissues.

The amount of pain is variable and may be slight. Its character is variously described as "stabbing" and "burning" it and is most marked when there is an associated fracture of a Rib or Ribs.

Cough is present in nearly all cases, frequently terminating with the cessation of Haemoptysis. The cough is diffident and restrained since it increases pain.

In all cases where there is Dysphoea there is an increase in the Pulse rate, with an elevation of temperature in the majority. Early fever is most marked in those cases with effusions of blood into the Pleural cavity.

Subsection (A).

Wounds of Lung & Pleura uncomplicated by Haemothorax or Pneumothorax.

Pyrexia and Dysphoea in cases of this class are slight, apart from the development of sequelae.

If Fracture of a Rib is in association * pain will be a prominent symptom and Surgical Emphysema will probably be present, but if there be no such fracture, pain too is slight.

The Physical signs of a wound of this character are often hardly recognisable:-

Perhaps a little transient diminution in air entry in the

locality of the wound, disappearing in a day or two, the only other evidence of Injury to the Lung being the site of the wound or wounds and the history of haemoptysis.

In my series of cases 14 fell into this subsection - THEY included:-

- 4 uncomplicated recoveries without sequelae of any description (Cases 10, 28, 54, 55).
- 1 case where there was a Transient Pleurisy (Case 21)
- 5 cases of Pneumonia (cases 13, 30, 31, 42, 44) in 4 of which Pleuritic friction was audible.
- 3 cases of Pulmonary Abscess (cases 12, 22, 51), one being associated with Gangrene of the Lung (12), one with Empyema (22) and one with Septicaemia (51).
- l case of Gas Gangrene of the Cellular Tissues of the Back (36)

The last four cases mentioned resulted in death - the remaining ten eventually made a good recovery.

Section II.

Subsection (B).

Haemothorax.

Haemothorax is the commonest complication of wounds of the character under discussion - it was present in 60% of my series.

It results as a rule from a wound of the lung, but occasionally from a bleeding Intercostal vessel.

The initial symptoms are such as have already been described - dysphoea of a severity varying with the size of the effusion, cough which is restrained and usually expells a blood-stained frothy sputum, and pain dependent on injury to Ribs or Pleura.

The temperature is raised (commonly from 100° to 102°) and the pulse quickened.

The Clinical signs of a haemothorax resemble closely those of a ser ous effusion into the Pleural cavity. It varies considerably in size but, if paracentesis is avoided and the patient is kept quiet, seldom increases in size after the first 48 hours from added haemorrhage although it may do so as the result of inflamatory mischief.

There is a diminution in the Respiratory movement on the affected side with a Percussion note which becomes progressively less resonant from above downwards.

The Effusion is nearly always to be found at the base of the wounded lung behind but is sometimes more marked below the Axilla.

It uncommonly extends to the front of the chest, even in large effusions, probably for the reason that soon after he is wounded the soldier lies on his Back and the blood collection becomes localized by adhesion of the Pleural surfaces.

In one of my cases (number 35) the Haemothorax was situated anteriorily on the left side above the Pericardium and extending up to the Clavicle and out to the Anterior Axillary Line. Such a condition is however very unusual.

In moderate effusions some of the Impairment of Percussion note may be due to collapsed lung - In large effusions absolute dulness may occur all over the affected side of the Back from the Apex of the lung to the Base.

Vocal and Tactile Fremitus are generally but not invariably diminished and may be absent over the Effusion.

On Auscultation over the haemothorax the breath sounds are invariably found to be diminished, and this difference in air

entry in small and moderate effusions can always be appreciated at a higher lever than can the impairment of Percussion note.

The breath sounds may be faintly Bronchial in type. There are usually no accompaniments.

Some displacement of the heart is present with nearly all moderate sized and with all large effusions but is never so marked as in cases of Pneumothorax under Pressure. Small effusions may be present without any Cardiac displacement.

The air entry into the unwounded lung is generally increased, the breath sounds being louder and ofter harsher than when the lung is acting under normal conditions; but with a small Haemothorax no alteration of the air entry into the uninjured lung can be detected.

The Clinical course of a haemothorax depends on the size of the effusion and the presence or absence of air or infection.

In my series of 33 cases there were 25 recoveries (75%) but as only 3 (cases 2, 17, 48) of the 8 deaths which occurred were due to Intrathoracic conditions (the remaining 5 also involving liver or spinal cord (cases 3, 5, 9, 20, 33)) the rate of recovery was really 89% - of these 25 recoveries 18 left Hospital in from one to four months perfectly cured and fit for duty at the Front - 6 left with very considerable improvement and with merely slight diminution in air entry and Percussion note at the affected Base - these would in all probability become perfectly well within 12 months but I was unable to follow them further - While 1 case was sent to Bizerte, Algiers with very incomplete absorption of the effusion, though able to do work about the wards without dyspnoea.

In my series of 33 there were effusions of various sizes, some giving absolute dulness over the whole of the affected lung behind, some reaching no higher than the inferior angle of the Scapula.

The average effusion extends from the Base of the lung to about midway between the inferior angle of the Scapula and the Spine of the Scapula - I have no dount that the accumulation of blood in the Pleural vavity is in many cases the cause of eventual haemo TASIS in the lung, both by limiting movement and causing local collapse and pressure increase, the haemothorax acting as a splint to the injured lung.

- This may occur quite early following Paracentesis when it may prove quickly fatal or it may occur later from breaking down of Septic lung tissues and merely give a local Pyopneumothorax - Here the type of infection is of importance rather more than Pneumothorax - The development in a haemothorax of an infection by Gas forming organism may account for the late development of a localized Pneumothorax. There were two instances of this in my series (cases 5 & 17).

Pneomothorax may occur as an additional and serious sequelad

* In no cases in my series did serious Pneumothorax of the type first mentioned occur in the course of a haemothorax.

Serious exertion may perhaps induce it, gentle exercise does not, but probably the most frequent cause is Aspiration.

In regard to the development of infection in cases of

Haemothorax - Infection occurred in eight of my cases (24%)
Four of them were however associated with liver wounds of a septic character and one of ther was undoubtedly infected from without
Lip paper was withen flad occasion to the a case of this

Super hicol R.A.H.C. The President had a small Hamothurax time of admirgion. In days later he developed a heft- Priem subarrassment. a Reservin of Rile was performed to reliev Symptom & potrait routhally made a good recovery. Itin Potrait had not left had led up to the think of devaporing a Purandhorax.

a haemothorax having been treated at another hospital by early resection of a Rib (3 days after the wound was received).

The true percentage of Infection is therefore lower than 25%.

The method of development of infection will be dealt with more fully under the heading of Empyema (Section II Subsection D).

Dr. Rudolf has suggested that a contralateral pneumonia is liable to occur in association with a Haemothorax. (Quart: Journal Medicine Oxford 1916 IX 257). There was no confirmation of this in my series.

Should none of the complications or sequelae occur, a haemothorax running a healthy course, if of small size, will often clear up perfectly in a month to six weeks, while a large one will take four to six months or even longer.

The absorption of Blood is accompanied by an irregular Pyrexia, of variable amount and duration. Such Pyrexia arises quite independently of any infection - I have repeatedly drawn off specimens of offusions in these cases which have proved "Sterile" in film and culture.

The amount and duration of the fever is, as might be expected, the greater the larger effusion, and though even in large effusions the temperature chart usually shows a drop to the normal line sometime in the second week, with a gradual tendency to descend, irregular fever nearly always continues till absorption is complete.

With the smaller effusions the fever may be very slight.

The Pulse Temperature Ratio is often disturbed. In some cases this is due to cardiac displacement which is very common in moderate degrees - the Pulse however remains quickened throughout



the illness though sometimes reaching the normal - In one case I noticed that the pulse was sometimes extraordinarily slow (case 4).

This man had two fainting attacks, associated with vomiting while he was in hospital and it is conceivable that the Brachycardia was due to a Reflex or direct stimulation of the Vagus from the pressure of the accumulated blood. The rarity of such an occurrence throws doubt on this however.

The respiratory rate remains increased for weeks in the larger effusions, but this increase is inconstant from day to day. Severe dysphoea rarely lasts more than a day or two excepting Pheomothorax be present as a further complication. A railway journey seems to frequently induce a temporary increase in the Pulse and Respiratory Rate and also a rise in temperature.

The morbid anatomy of Haemothorax is interesting - The effused blood is as a rule soon localized by adhesion of the Pleural surfaces and the position of the effusion ceases to be dependent on gravity.

Clotting of the effusion is usually delayed for a considerable time and is frequently incomplete after weeks have elapsed.

Blood stained fluid may be drawn off with an exploring needle and syringe for a month after the infliction of the wound.

For example in one of my cases exploring with a 20.c.c syringe after 5 weeks I was easily able to withdraw a syringeful of fluid resembling in appearance dark venous blood (case 18)

In another case after 6 weeks I withdrew a thin almost transparent effusion of a bright scarlet colour (case 25).

In a third case a large Haemothorax which had subsided for

for two months, I was unable to withdraw any fl id at all (case 19)

It appears that clotting of a haemothorax usually takes place gradually, that it may not be completed in some large effusions in less than 4 - 6 weeks, that it is subject to much variation, and that it may again be broken down by infection.

The Respiratory movement plays some part in the delay of Clot formation, for though the fluid from a haemothorax often does not clot on removal from the Pleural cavity I have known this to take place within 2 minutes of such removal (case 43).

In this case there was a subsequent Empyema and it is probable that an added production of inflamatory origin induced this liability to clot, although the fluid was bacteriologically Sterile at the time.

Lieut. Colonel Elliot and Captain Henry in a Report to the Medical Research Committee published in the British Medical Journal March 31st, 1917 make interesting suggestions in explanation of the delay in Clot formation:-

"The wound made through the lung is generally a lacerated track surrounded by a considerable amount of haemorrhagic extravasation. From these torn tissues and from the wound in the Thoracic wall, where Ribs are often splintered, fibrin ferment will be liberated in sufficient quantity to coagulate rapidly all the fibrino in the blood that is poured out from the wound track in the lung or chest wall: But the continued movements to which the effused blood is subjected within a breathing chest interfere with its coagulation and prevent its setting into a massive jelly.

The Fibrin is partly "whipped" out and deposited on the Pleural surfaces; irregular lumps of more complete blood clot may



form like mush ice in the haemothorax, especially in the recesses of the Pleural Sac and along the Vertebral groove at the Back when the patient is recumbent. The rest of the defibrinated blood remains as a fluid which resembles blood in depth of colour more or less closely according to the number of Red Corpuscles that have escaped entanglement in the Primary Clot and are floating freely in it. The Fleural surfaces react to the initiation by the blood and a serious effusion containing Lymphocytes and Endothelial Cells with a few Polymorphonuclear Leucocytes is added to the haemothorax. Often the fibrinogen of this effusion also is clotted by the surplus of ferment from the Haemothorax blood, and it reinforces the deposit of Clot laid down on the Fleura, so that adhesions of some tenacity are soon developed at the boundaries of the Haemothorax, and thus separate the collection of fluid and clot from the rest of the Pleural Sac ".

There is I think much truth in this explanation but it hardly. seems to fully explain the circumstances of the clotting which occurred two minutes after removal from the body, in case 43 (as detailed previously).

Ultimately even the largest Haemothorax will generally clear up completely without Aspiration. I had several cases of large Haemothorax which cleared up completely in 4 months, and even though some thickening of the Pleura or collapse of lung should remain, it is seldom, if ever, sufficient to incapacitate the patient in any way or to limit his ability to perform his military duties.

Serious Secondary Haemorrhage is rare in cases of Haemothorax if early Aspiration and Paracentesis be avoided.

Even in cases of a fortnights standing the removal of the effusion has been followed by death from a sudden reaccumulation of fluid in the Pleural cavity.

Subsection C.

Pneumothorax, Hydro-pneumothorax and Haemopneumothorax.

Pneumothorax, the result of wounds, is in actual practice almost always a Hydropne mothorax of a Haemopneumothorax - That is to say it is always very commonly attended by effusion into the Pleural Cavity. The exact proportion of cases in which the effusion is serious or sanguinious in type it is not possible to say, since exploration is frequently quite unnecessary: neither is this point really one of importance, since the course of the case is unaltered by the character of the effusion, so long as it remains free from infection.

Pneumothorax may occur (I) as a complication of the original wound (II) as a sequel, through breaking down of infected lung tissue, accumulation of Gas from a Gaseous infection, or accidentally as in Aspiration or excessive exertion, in the early days of a wounded lung.

Thise may be considered separately as Primary and Secondary Pneumothorax.

The Primary cases of Pneumothorax are of two types.

In one type the wound consists of a hole in the Chest wall, made by some largish fragment of metal, the hole remaining PATENT and air passing freely through it with a loud hissing moise during the movements of Respiration.

Such a wound is frequently discharging great quantities of

serum if seen early, but if later pus, for it nearly always becomes infected.

In the second type the wounds in the chest wall may be quite insignificant and the accumulation of air in the Fleural cavity is more frequently due to a wound of the lung. Such a wound may be valvular admitting the inspired air into the Fleural cavity but preventing its exit - This gives rise to a Fneumothorax of a gravely dangerous character owing to the great cardiac displacement, which occurs and respirate and cardiac embarassment it entails as a result of the Fositive Intrapleural Pressure.

When a wound of the lung is associated with a Pneumothorax the symptoms are greatly increased in severity. In a typical case dysphoea is immediate and is very marked, amounting frequently to Orthophoea - This is the most prominent symptom. The patient looks greatly distressed, is in a good deal of pain and is cyanosed

The temperature is raised and the pulse small and generally quickened.

In a severe case death is very liable to occur, especially if a Positibe Intrapleural pressure remains unrelieved.

Should the case take a favourable course in the course of a few days the patient becomes more confortable and the respiratory distress and cardiac embarrassment becomes lessened though the displacement remains; but a mild pyrexia of an irregular character with increased rate of breathing and pulse is present for some weeks and is induced by slight exertion.

Possibly the fever is related to the effusion which is so commonly present in the early days of a Pneumothorax but which later becomes absorbed. Certainly those cases with a large effusion

display a greater amount of fever than do the slighter ones.

The physical signs of a Pneumothorax vary in degree according to whether the Intrapleural Pressure is a positive one or atmospheric.

The affected side of the chest remains motionless while the movement of the opposite is exaggerated - In the valvular type there is some distension of the affected side. There is in all cases Cardiac displacement towards the uninjured side and the cardiac impulse may be diffuse as the result of the increased work thrown on the Right Ventricle.

The Abdominal viscera are displaced downwards.

On percussion the injured side of the Chest and Back is hyperresonant or of equal resonance to that of the opposite side - "Cracked Pot" percussion is sometimes obtainable but not in all cases - At the Base however there is a shifting dulness due to fluid, the position of the fluid varying with the position of the Patient and being entirely dependent on gravity. Vocal Fremit's is absent. The Breath Sounds are absent or sometimes very faintly heard. "Coff percussion" is in many cases unobtainable. Succussion may be sometimes elicited.

In my series of cases there were ten instances of Pneumothorax - two of them being cases of secondary localized Pneumothorax in cases infected with a Gas Bacilius.

There were no other secondary cases of Pneumothorax.

The remaining eight cases were all complications of the some original wound - all were accompanied by severe effusion the presence of which was in all cases confirmed by the X-ray Sereen.

In some cases exploration showed this to be ser/ous, in some

sanguineous, While in others no exploration becoming necessary, the nature of the effusion remained unidentified.

Of the 10 cases:-

- 2 made a perfect recovery in a comparatively short time - 6 weeks - there was no sepsis in either case (cases 23 & 52).
- 4 cases left hospital with good recovery and re-expansion which would doubtless continue to improve (cases 11, 39, 41, 50).
- l case left hospital after 4 months showing no sign of re-expansion (case 26)
- 3 cases died of which 2 were due to Gas Infection (cases \$, 15 & 17.)

Five of the cases became septic and therefore were instances of Pyopneumothorax - two of these cases were of the type with a large patentwound of the Chest Wall.

The Clinical course of a Pneumothorax varies according to whether the cattal wound be in the Chest Wall or in the Lung, whether in the latter case it be extensive or heal rapidly, and whether infection of the Pleural cavity occur.

A Pneumothorax due to a through and through wound of the chest, with insignificant wounds of the chest wall, and probably a rapidly healing wound of the lung, will sometimes clear up and allow of normal healthy expansion within 6 weeks. Two of my own cases fell into this category - (numbers 23 & 52.) ascultation revealed an equal air entry into both lungs and the X-ray screen showing a diaphragm moving perfectly, confirmed this.

Such an aseptic readily healing Pneumothorax is usually accompanied with but a slight amount of fever, but cases with large effusions may show a considerable amount of fever with conspicuous oscillations of temperature.

It may happen however that a case with equally insignificant

wounds of the Chest Wall will fail to shew any expansion for months, the lung remaining collapsed; but though sometimes remaining so permanently owing to a secondary fibrosis the lung is usually capable of expansion and of improvement for months, and once begun this may proceed comparatively rapidly.

Those cases of Pneumothorax with a large gaping wound in the chest wall almost inevitably become infected and are then in the position of an Empyema and subject to the same possibilities.

The immediate danger of a pneumothorax is Cardiac embarrassment and death, the more remote ones sepsis and failure of re-expansion.

The Secondary types of Pneumothorax are sometimes similar in their alarming characterisation to the Primary cases, but in other instances they are quite localized - the air containing portion of the Pleural cavity being shut off by adhesion, the result of an inflamatory process. Such cases of Localized Pneumothorax are diagnosed with difficulty and the Fluorescent Screen is of value in assisting the diagnosis. They are dangerous rather from an added risk of infection to the Pleural Cavity than from any disturbance of the Intrathoracic Pressure.

Grave Pneumothorax has followed Aspiration, **ometimes with fatal result.

Note: - The X-Ray appearances will be dealt with in the Section on Radiography * Pyopneumothorax included under the heading of Empyema.

Subsection D.

Empyema and Pulmonary Abscess.

Empyema may arise in connection with a perforating chest wound as the result of:-

(I) The Suppuration of a Haemothorax.

- (II) The Suppuration of a Pneumothorax (Pyopneumothorax)
- (III) Contamination of the Pleural Cavity from an infectible compound fracture of a Rib or infected wound of the lung, where neither Haemothorax no Pneumothorax is present.
- (IV) As a sequel to Pneumonia or Abscess of the Lung.

 In my series of 55 there were 12 cases of Empyema (approx.22%)

 Of the 12 cases
 - a. 8 arose as a sequel to a Haemothorax (cases 5,17,18, 20,35,43,48,49) giving an incidence of 24% of Infected cases in the Haemothorax series. It should be added that 4 of these cases were complicated by wounds of the liver which probably increased the liability to infection.
 - b. 3 arose as a sequel to Pneumothorax (15,39, 50)
 - c. 1 arose as a direct extension from a compound fracture of a Rib. This was obvious at the subsequent Post Mortem (case 22).

The occurrence of empyema is closely related to the frequency of retention of a Foreign Body. This was the case in 66% of my cases. As would be expected on this account it is a commoner sequel to shell and grenade wounds than to those caused by rifle bullets.

The presence of an empyema is suggested by an increase in the fever and more particularly in the morning and evening oscillation in temperature, associated with pain, restlessnes and an increase in the rate of Respiration and Pulse. Fever is not invariably conspicuous.

In one of my cases up till a month after admission the temperature had never reached 100°, during the week prior to operation it reached 100° on four occasions (case 18)

In another (case (39) the evening elevation of temperature was never greater than 101° prior to operation.

Thereas in Case 45, a Haemothorax in which Suppuration never occurred but which was complicated by a simple Pleurisy, the Thermometer on several occasions registered 103° and in one instance 104°.

Deep Jaundice occurred in two of my cases - Both of these terminated fatally - one (case 17) was due to a mixed infection of Bacillus Welchi, Bacillus Coli and a Streptococcus - the other (case 5) to an infection of Bacillus Coli with Streptococcus, but in this case there was a complicating liver wound.

Severe diarrhoea was present in one instance (case 20).

The stools which were very frequent contained a quantity of mucus and were very offensive.

The development of an empyema may be long delayed in those cases which are a sequel to Haemothorax. In my series the interval was in one case as long as 5 weeks (case 18) when a blood stained fluid was withdrawn which yielded a slight deposit when centrifugalized, which contained numerous Pneumococci and an excess of Leucofytes.

In another case a specimen taken after an interval of a fortnight proved sterile - a second exploration a fortnight later failed to yield any fluid - while a third still a fortnight later produced stinking pus.

It is evident that the transformation of an effusion of blood into Pus is commonly a very gradual one.

On the other hand this does not appear to be true in cases of Pneumothorax, which if infected shows septic manifestations at an early date.

The physical signs of an empyema resulting from a perforating wound of the chest are the same as those met with in Empyema after

a Pneumonia and need not be detailed, but a few remarks should be made on that type of Pneumothorax which is the result of the development of a Gaseous Infection in the Pleural Cavity.

The symptoms of such an infection hatealready been described but emphasis should be laid on the delay in the development of the condition and its very serious nature.

When the gas accumulates above the level of the Haemothorax the Physical signs are similar to those of a Hydropneumothorax but in those cases where there is a Collection of Gas within the limits of the Haemothorax they are quite distinctive.

The two instances in my own series were of this type.

In one (case 5) the dulness due to a very large effusion was interupted on the front of the chest by a tympanitic band corresponding to the 3rd Right Interspace and extending over a considerable area of the Sternum. Above this was the dulness of fluid, below the dulness of fluid and the liver. A diagnosis of Subphrenic Abscess was entertained.

In this case coin Percussion was quite easily elicited. At the subsequent operation there was a considerable escape of gas.

In the second case (17) there had been a moderately large effusion of blood into the Right Pleural Cavity which had collected at the Base behind. Just in front of the inferior angle of the Scapula was a localized area of "cracked pot" resonance. This was not much larger than a five shilling piece. It bulged when the patient coughed . Coin Percussion was not obtainable.

Such collections of gas at the Base are very likely to be due to the development of Anaerobic or Bacillus Coli infection

and are therefore of very serious and urgent importance.

When an empyema is suspected exploration should be performed without delay.

The naked eye appearances of fluids obtained from the exploration of the wounded chest are very varied.

The following quotations from my own notes show their great variety:-

- (I) A Bright yellow, transparent, ser ous effusion without deposit.
- (II) A Bloody fluid resembling very dark venous blood.
- (III) An orange coloured effusion, clotting almost immediately, containing Bile and some Blood with much Fibrin.
 - (IV) A Reddish yellow, Gas-containing Pus.
 - (V) Pus of a Pinkish Clay colour.
 - (VI) Bloody fluid of a dark but rather Brown colour slightly Turbid.
 On centrifugalizing this gave a deposit containing
 Bacilli, Pneumococci, Pus Cells and Haemathoras
 Crystals.
 Haematoidin
- (VII) A thick yellow, creamy pus free from blood and free from smell.
- (VIII) A brown, almost khaki coloured, stinking pus.
 - (IX) A Coal black, very offensive fluid. (This occurred in a case of Haemothorax apparently opened up 3 days after being wounded).

In many cases it is perfectly obvious that the effusion is purulent - A Septic Haemothorax frequently has an intensely foul smell and may contain bubbles of gas. In such instances no Pathological Report should be awaited before drainage is obtained; but in others a Report is necessary before a final verdict can be given. A failure to discover any callal organism in film (US) preparations does not put out of court the possibility that it

may be revealed in culture.

In my series of cases the following positive Bacteriological examinations were made:-

Cases 48, 49. B.Coli in pure culture.

Case 5. B.Coli & Streptococcus Pyogenes.

Case 43. B.Coli & Staphylococcus Aureus.

Case 17. B. Welchi, B. Coli & Streptococcus Pyogenes.

Case 22. B. Welchi, Streptococcus & Staphylococcus Aureus.

Case 35. Staphylococcus Aureus, B. Frielander.

Case 50. A pure growth of B. Frielander.

Case 20. Pneumococcus & B. Proteus.

Case 18. Staphylococcus & Pneumococcus.

Case 51. Pneumococcus, Streptococcus & Staphylococcus Aureus.

Case 39. A pure growth of Staphylococcus Aureus.

It will be seen from the above table of results that there is a very great difference in the Bacteriology of Empyema as met with in peace and war.

Most conspicuous is the frequency of Bacillus Coli infection and infections with the Gas-forming anaerobes .

The cause of this is undoubtedly the frequency with which contaminated clothing is carried in to the Pleural Cavity - I have seen such cloth fibre still adherent to a shell fragment when removed at operation.

Both cases infected with anaerobic organisms died .

It is interesting to compare the mortality among the cases infected with B.Coli and the Anaerobic organisms, the special infections of wars with that of the Pneumococcal Streptococcal and Staphyloccal Empyemate which are ordinarily met with in Peace.

In the series of Bacteriological Reports submitted 6 cases fall into each category - in the former there were 4 deaths (cases 5, 17, 22, 48) 66,2/3% while in the latter there were 2 deaths (cases 20 & 51) 33,1/3%.

The sequelae of empyema in War are much as met with in Post-Pneumonic Empyema.

Infection of the opposite lung or pleura is not so common as might be expected - one of my cases (51) shewed abscesses in both lungs at Post Mortem and another (5) developed a dry Pleurisy on the opposite side to the empyema, but not a single case of Bilataral empyema occurred.

Acute Pericarditis occurred in 2 cases (17 & 48)

Septicaemia and Pyaemia may follow empyema (Case 51)

Chronic Empyema lasting many months may result (case 18) and in spite of this the Patient may maintain a good state of General health.

Pulmonary Collapse may follow empyema.

It may merely amount to a relative diminution in expansion, capable of still further improvement as time goes on, or to a permanent and complete loss of of function.

If the wound in the Pleura is closed this condition is rather due to Pleural Adhesions than to inability on the part of the Pulmonary vesicles to expand, but ultimately such may be the case.

The longer an empyema takes to heal the less complete as a rule is the ultimate re-expansion of the lung.

Three cases of Pulmonary Abscess occurred altogether in my Series - two of these followed Pneumonia (cases 22 & 51) one being further complicated by empyema.

These two cases had a high temperature with great morning

and evening oscillation, for one month and seven weeks respectively. The fever was accompanied by very marked dyspnoea and a rapid pulse.

In one of two cases the patient finally died of a Septicaemia

- The pus from one of these cases gave a culture of Staphylococcus

Aureus (case 22), the other a culture of Staphylococcus,

Streptococcus and Pneumococcus (Case 51)

The third case was associated with Gangrene of the Lung, the patient dying 10 days after he was wounded. The temperature varied from 100 - 103, the pulse from 100 - 120, the respiration from 30 - 40. The patient coughed up a large amount of very sickly smelling pus during the 3 days prior to death (case 12).

The diagnosis of Pulmonary Abscess may be difficult - It may be suspected when there is much pain, high fever of a very oscillating type, with sweating, with very rapid breathing and pulse and where the Physical signs of the Empyema are absent - the expectoration of Pus is naturally a great help in diagnosise but does not of course exclude empyema - The condition is often only discovered at a Post Mortem examination.

The prognosis is bad - death occurred in all my cases - but occasionally when there is efficient drainage, recovery may take place.

Subsection E.

Pneumonia & Pleurisy.

Pneumonia, unlike the suppurative sequelae of perforating wounds of the lungs, is usually an early sequel.

Eight cases of Pneumonia occurred in my series, excluding two cases in which a certain amount of inflamatory mischief in the lung itself existed in connection with an empyema. All of these cases were admitted within a week of receiving their wounds and in only one case was Pneumonia developed after admission - in this case an interval of 2 days occurring

As with Suppurations there is an increased liability to pneumonia in those cases where Foreign Body is retained.

Haemothorax is said also to favour development of Pneumonia but this complication existed in only 1 case of my series (32)

Chill probably plays some part and this forms one argument, though a subsidiary one against the early evacuation of such cases from Field Ambulance.

The pneumonia under consideration may be of a Lobar or neither

Bronchial type - more usually it falls into with category, being an inflamatory condition of the injured lobe but failing to terminate by crisis as is so common with Lobar Pneumonia.

Termination by crisis may however occur and did so in one of my cases (42).

I found Pneumococci in the Sputum in some cases.

There is generally a certain amount of associated Bronchitis and sometimes the Pneumonia is of a truly Bronchial type.

Pleurisy is commonly present and Pleural Friction was au exedible in 6 cases.

The symptoms comence with a sharp rise of temperature with shortness of breath and moderate increase in the Pulse rate
The pulse-respiration ratio may be altered.

There is usually cough and later a muco-purulent sputum.

The physical signs are those of a variable amount of consolidation and Bronchitis and need not be entered into in greater detail:

Generally the pneumonia affected the side of the Lesion, but in one of my cases, though there was a little general Bronchitis, the actual signs of consolidation occurred in the opposite lung (case 30).

In three other cases the condition was Bilateral.

The course of this disease varies with the type - death occurred were in only 2 of my cases, these complicated with Pulmonary Abscess, and noted under that heading.

Camp in from 4 to 6 weeks - several of the Bronchial type were mildly feverish during the greater part of that time, though in all cases which recovered there was a gradual decent of the Fever, generally and the normal line was reached gradually at sometime in the second week.

Prognosis generally speaking is good. 75% of a cases gave a complete recovery.

Pleurisy, suppuration in lung or pleura, and pleurisy collapse are the important sequelae.

Pleurisy: Pleurisy as a complication of Pneumonia is frequent, but apart from this and suppurated cases, it occurred as a sequelation in Haemothorax, Pneumothorax and wounds of the lung, otherwise incomplicated.

It is generally a dry Pleurisy but in those cases where an effusion of blood is present it is difficult to be certain of this.

In one case (45) Pleurisy occurred on the unwounded side - more usually it is in relation to the wounded lung, as would be expected.

Its clinical features are the same as are met with in civil practice - the patient complains of pain, which is accompanied

by a rise in temperature. Frequently in my series there was audible Pleural Friction. In one case - a Haemothorax - the patient suffered repeated attacks of violent abdominal pain, which was so severe as to necessitate hypodermic injection of morphia - the pain being on 2 occasions associated with audible Pleural Friction (No.45)

One case of Pneumothorax developed an applical Pleural Friction with pain and elevation of temperature 3 months after he was wounded, and when auscultation and the X-ray screen showed that there was a good return of function in the affected lung. (No.41)

Section III.

Radiography.

Radiography is of the greatest value in assisting in and confirming a diagnosis, and in watching the subsequent progress of a case.

"Screening" is especially useful.

A perforating wound of the lung unattended by any complication or sequelae presents in the X-Ray screen the appearance of a normal chest - both sides of the chest are clear excepting for the striction shadow of the Ribs and Clavicle, the normal situation spreading from the hila of the lungs and central mediastimal shadow which extends in a slight curve about 3" to the right of the Sternum and to a much larger extent and in a fuller curve about 4" to the left of the Sternum - Both sides of the diaphragm are usually seen freely moving - sometimes however with such a wound the excursion of the diaphragm is restricted on the side of the affected lung.

Should an effusion be present however this appearance will be varied, according to the size, according to whether air is present in the Pleura or not, and according to the side on which the effusion has occurred. It is also influenced by the nature of the effusion, but it is impossible to determine, from screening alone, whether it be purulent or otherwise. The density of the shadow will distinguish a Haemothorax from a serious effusion which is further still less definite in outline.

A large Haemotherax may give a complete and uniform shadow of density sometimes equal to the mediastinal shadow, the cardiac shadow being increased on and extending further to the opposite side. If smaller it is usual to have a clear appearance above, with a hazy shadow, varying in density according to the amount of blood present, and of definite outline, below. This shadow curves with a concavity upwards from the mediastinal shadow to the Axilla.

. The shadow obscures the diaphragmatic outline on the side of its occurrence and if of moderate size causes some displacement of the Mediastinal shadow with which it blends.

Since such an effusion is rendered immobile by the time the patient reaches hospital and the fluid is independent of gravity in consequence, the shadow itself will appear immobile.

Should there be an associated Preumothorax however, the appearance will be as described below.

In the earlier stages of almost every Pneumothorax, as it occurs in war, there is some effusion. The Clarity above the effusion is abnormally bright and bright by contrast with the opposite side of the chest.

To its inner side, with a concavity outward is the shadow of the collapsed lung blending with the shadow of the Mediastinum internally but not so intense. Below is the shadow of the effusion with a straight, transverse, well-defined edge. This shadow is mobile, since in those cases when effusion is associated with Pneumothorax it is subject to Gravity.

The truth of this can be readily seen by tilting the patient laterally, at the same time being careful to keep the screen in a horizontal position - It will be seen that the fluid keeps its own level.

The displacement of the Mediastinal shadow in a severe. Fneumothorax is very great. In one of my cases (41) a Left Fneumothorax, the Left edge of the Sternum appeared as a straight edge, there being no mediastinal shadow to the left of it, the whole of the Cardiac shadow being to the Right.

The diaphragmatic outline should it not be obscured by the shadow of an effusion is displaced downwards, is immobile, and is flattened.

Displacement is however of a very variable degree and with a small localized Pneumothorax there is none whatever and there may be no trace of effusion - the presence of Gas being recognised by a patch of unusual brightness, resembling the brightness of Gas in the stomach, with which it is often possible to compare it.

Thickening of the Pleura gives a shadow which may closely resemble that of Haemothorax or Pyothorax should it be situated at the Base of the lung.

The differentiation is often impossible without reference to other means.

Pneumonia, if consolidation be extensive gives a slight uniform haziness, more marked centrally, but not approaching in density the shadow of fluid.

With this there may be some flattening of and limitation of the movement of the diaphragm on the affected side.

It is sometimes possible to detect by a localized shadow the presence of a Pulmonary Abscess.

Pulmonary Fibrosis gives the appearance of increased Striation in a more or less collapsed lung with perhaps some displacement of the heart shadow towards the affected side.

In empyema the mediastinal shadow is displaced after operation, towards the sound side - If the empyema has long been draining and especially if several resections of ribs have been made, the ribs become crowded together, giving the effect described as "Tiling",

The frequent use of the X-ray screen throws great light on the progress of a case - The gradual disappearance of the fluid and Pleural thickening can be watched, the presence of complicating Fneumothorax and sometimes of Pulmonary Abscess or fibrosis detected and confirmed, and alteration in the position of the mediastinal shadow observed.

In the case of Pneumothorax previously mentioned in which the Left edge of the Sternum was at one time the Left edge of the mediastinal shadow, a screening at the end of 3 months showed that the heart had almost returned to its normal position, and that the diaphragm on the injured side, was moving freely.

In another of my cases (18) it was possible to detect a small pyo-pneumothorax which had formed on an artificial floor above the pericardium, and was quite localized.

This occurred in a long standing empyema. Careful examination and exploration had both failed to detect Pus in this case.

Large Left sided Haemothorax.
From Case 46.
Taken Dec. 2.1916.

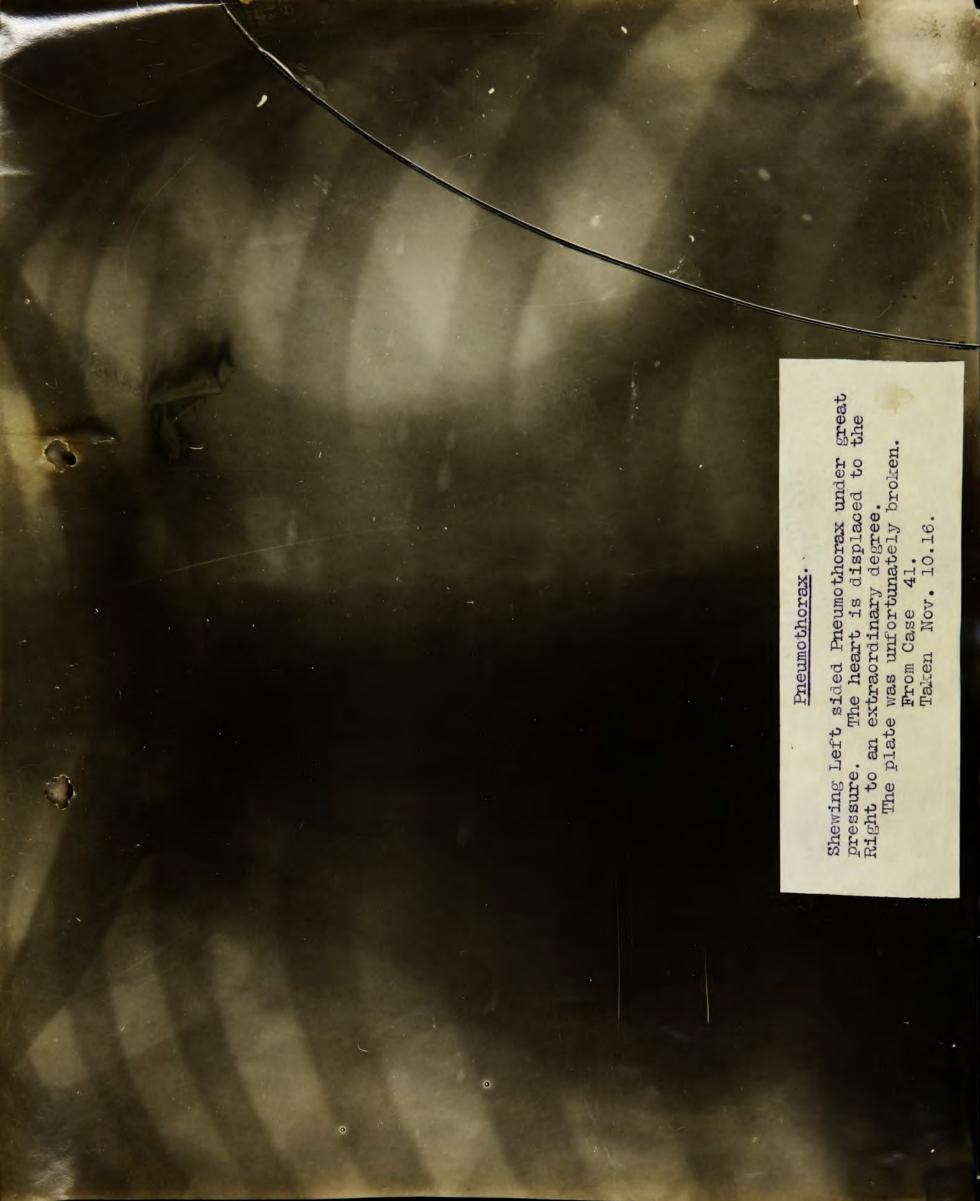
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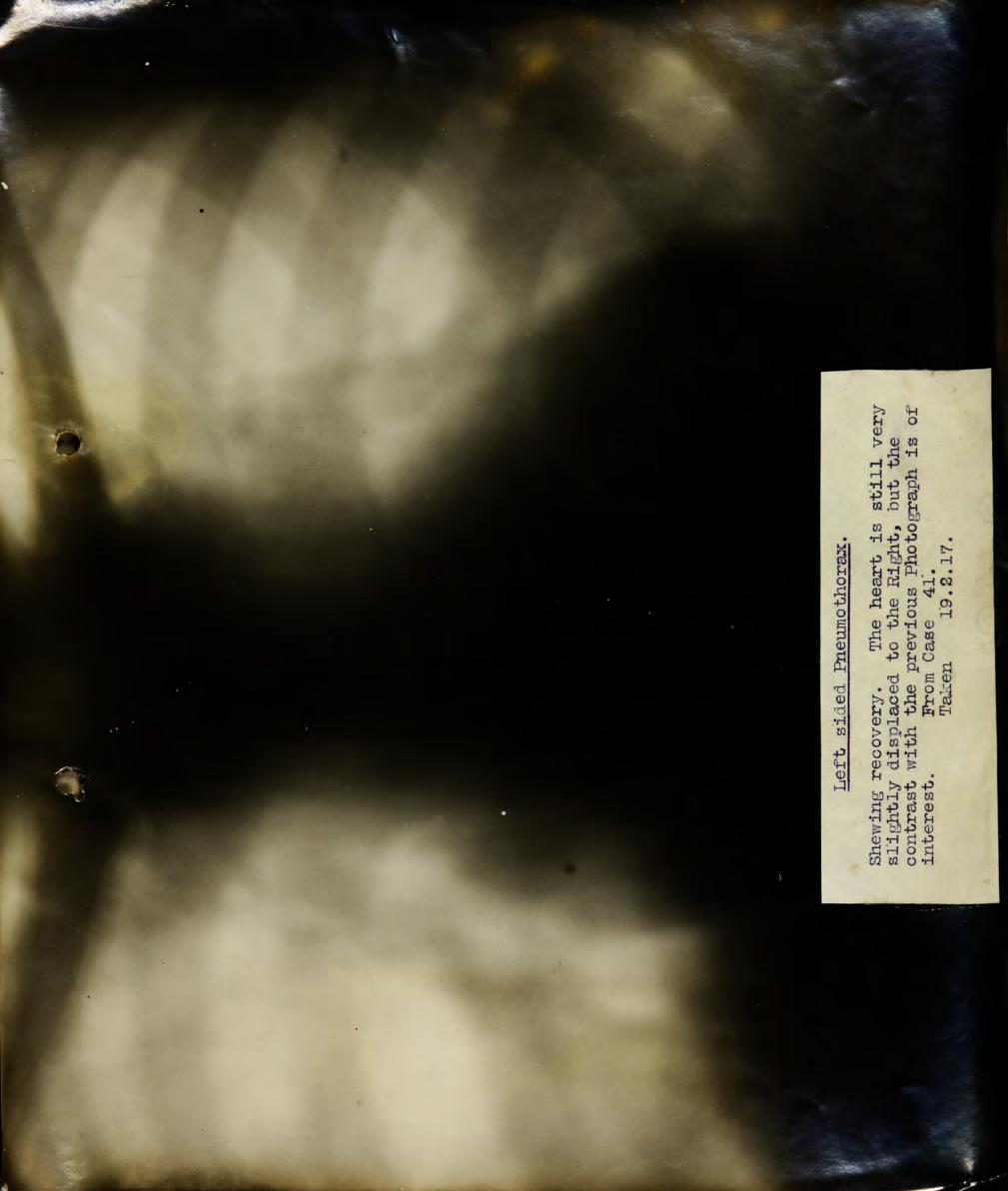
Shewing Effueion of Blood and Bile in the Right Pleural Cavity - the wound of Lung being complicated by a wound of the Liver.

From Case 42.

Taken Nov.17.1916.

Shewing a Right sided Hydropneumothorax.
From Case 26.
Taken Nov. 17.1916.





Shewing a Foreign Body embedded in the Right Lung. The Right Chest had been opened for drainage. Localisation of the Foreign Body shewed that it was 2" deep from the skin surface. From Case 39. Taken Dec. 30.1916.

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I came to the conclusion that used as an adjunct to Clinical examinations X-rays were of the greatest value and chould, whenever possible, come before exploration, which it may prove to be unnecessary, or which it may direct.

It was my practice to screen all cases as soon as possible, after admission to Hospital and to screen them again before they left Hospital so as to obtain accurate results and proof of Clinical signs. In many cases intermediate screening was performed.

Plates are to be preferred for the detection and localisation of foreign bodies and should be taken whenever it is believed that a missile is retained.

Appended are prints from plates taken in my series of cases as examples of the various conditions which may be found.

They are perhaps sufficient for their purpose but there was much difficulty in getting good plates in the existing circumstances.

Section IV.

Treatment of Perforating wounds of Lung and Pleura.

The treatment of these wounds depends on the presence or absence of complications and sequelae, but I am convinced that generally speaking it should be as conservative as possible.

Immediately after receiving such a wound the soldier should, whenever it be possible, be propped up in the sitting position until until such time as he can be carried on a stretcher to the Dressing Station and from thence to Field Ambulance - Oneof my patients told me that he walked two kilometres to his Regimental Aip Post, coughing blood and suffering from considerable dysphoea - This in the early stages of such a wound must have greatly

increased his risk of death from haemorrhage or cardiac embarassment.

At the Regimental Aid Post & gr. of morphia should be administere hypodemically, not by the mouth, as is sometimes done. This checks haemorrhage and relieves distress.

On arrival at Field Ambulance morphia should again be administere and if the circumstances of war permit the wounded man should be detained at Field Ambulance for at least a week, being kept as quiet as possible and under the influence of morphia until serious haemoptysis has ceased.

Immediate Resection of Pib or the puncture of the chest wall and Pleura with a Trocar and Cannula may be necessary to save the patients life in cases of serious Pneumothorax. This may be carried out at the Aid Post or better at Field Ambulance. The type of Pneumotharax where the communication between the Pleural cavity and the air is of a valvular character, and when in consequence an actual positive Intrapleural pressure arises, is the only one calling for treatment of such discription and is of course the only one where it could be advantageous.

The immediate removal of a haemothorax should be rigidly avoided --this point must be emphasised --. The removal is very apt to cause a recurrent haemorrhage and in one of my cases (case 49), where resection of rib was performed within three days of the wound being received, the patient arrived at hospital with a filthy black and stinking discharge of infected blood, resembling Melena in appearance.

Morphia should be administered before and after the journey is made from Field Ambulance to Clearing Station or General Hospital.

The greater part of my own cases were transferred from Field Ambulance direct to General Hospital and it was frequently unfortunately the case that such transfer had to be made within three days from the date of wounding.

Such a journey is very apt to cause an increase of temperature, dyspnoea and pulse rate.

On arrival at a General Hospital the patient should be put to bed and kept there for a period of not less than a fortnight. After that time I find it can generally be left to the patient's discretion and with the Serbian Army was almost so of necessity.

Serious work should be avoided for at least a month or even six weeks, rather from a risk of causing Pneumothorax than haemorrhage. No Pneumothorox due to exertion and no serious haemorrhage occured in my series of cases, yet they certainly left their beds much earlier than Englishmen would have done under similar circumstances.

A wound of the lung uncomplicated by Haemothorax, Pneumothorax, ion or Suppuratine may, if healed externally, be discharged to a convalescent home after a month and should be fit to resume duty after another month has elapsed.

The further treatment then of wounds of lung is a treatment of its complications, and these are best dealt with separately.

Haemothorax should in my opinion be treated conservatively
Removal after a lapse of say ten days is both dangerous and
unnecessary--dangerous from the possibility of a sudden Pneumothorax
or outpouring of a secondary effusion--unnecessary because the

effusion nearly always clears up completely in from a month to four months --- a few cases take a little longer.

In my series which included twenty five non-infected cases were of haemothorax of all sizes there was :-

18 perfect recoveries before leaving hospital.

- 6 good recoveries which left hospital with some diminution in breath sounds at the affected base and in some cases a little dulness.
- 1 with a lot of Pleural thickening and diminution in air entry, but in this improvement would undoubtedly occur.

No one of these cases left Hospital unable to walk or with any serious breathlessness and it was obvious that in the future none of these men would be unfitted in any way by his wound for a strenuous and active outdoor life.

There seight deaths --- three only of these however were directly attributable to wounds of the lung --- the remaining five dying from outside complications: Three from Biliary Fistula due to Liver wounds and two from section of the Spinal Cord.

The three cases complicated by liver wounds all developed a Pyothorax.

Of the three remaining deaths attributable to wounds of the lung purely, two died from sepsis and one from collapse shortly after admission.

This gives including the cases with liver wounds a total of five deaths from sepsis.

Three other cases made a recovery giving a total of 25% of septic cases.

This figure is possibly a little higher than is given when

Pneumothorax and of deaths from recurrent effusion which I believe more more than compensated for any increased liability to sepsis.

If paracestesis is employed it should be used only in the lengest effusions when they show no tendency to improve.

Treatment by Saline Purgation has been said to aid in the dissapearance of a haemothorax but the truth of this is difficult to prove.

The treatment of Pneumothorax should be similarly as conservative as possible, increased Intrapleural pressure and septic. conditions being the only allowable grounds for operative interference.

In this condition, after an interval has been allowed for the lung to heal during which time the patient should be kept as quiet as possible and not allowed to undertake exertion, respiratory exercises are of the greatest value. The indication for these is, I believe, commencement of returning breath sounds.

It is occasionally necessary to drain off a serous effusion if this be in large amount which is seldom the case.

A few words should be said in regard to the treatment of Empyema, Pleurisy, and Pneumonia.

Operation for Empyema should be undertaken as soon as the infected fluid is detected and should be carried out under a local anaesthetic (% Novocain c Adrenalin) or under a local assisted by a light general anaesthetic. Operation under such anaesthetia is attended by less shock than under an ordinary general anaesthetia. Operation should, further, be prefaced by the injection of a one sixth grain of morphia hypodemically, at least the hours before

it is undertaken.

The drainage wound should include the resection of at least an inch of one or more ribs according to the necessities of the case and I prefer drainage in the Scapula line to drainage in the Axilla.

The drainage should be as low as possible and a double split tube inserted so that the liability to blocking may be decreased.

The calibre of this may be diminished and its length shortened in a few days and it is an advantage to do without a tube as soon as this can be done with safety.

The presence of a tube is in itself apt to maintain sepsis.

Rise of temperature due to pocketing or blocking of the tube

with infected clot must be carefully watched for, the latter may be

sometimes dislodged most successfully by exploring with the finger.

In cases when the discharge is offensive and where gas forming organism are present wirrigation of the Pleural cavity is advisable -- 50% Eurol in a 5% Saline Solution or Hydrogen Peroxide (5 volumes) make suitable lotions.

Such irrigation may be easily performed with a Douche Can, a length of Rubber Tubing and a simple glass nozzle.

Before irrigation is commenced as much pus should be removed from within the chest as possible by tilting the patient into a position suitable for drainage. This should be followed by a toilet of the external wound.

The patient should be then supported in such a position that a maximum of fluid can be temporarily retained in the Pleural cavity.

At the request of the patient who will generally indicate any discomfort the fluid may cause him, or at the first onset of coughing his position should be so changed that free drainage of the fluid ensues. This will take place more expeditiously if the patient be

told to cough.

I have never seen any undue fatigue or exhaustion follow this proceedure.

The irrigation should be repeated until the returning fluid is clear and should be carried out daily.

Continuous irrigation would be an improvement, I think, on the method described.

A number of very septic wounds of the limbs which were treated in this manner gave excellent results. I have had no experience of its use in Empyema, but analogy would suggest that it would prove of value, and the experience of others confirms this.

Unnecessary operation interference should not be carried out for the removal of a foreigh body. An empyema will generally heal eventually although the foreign body be retained.

Lieut.Colonel Battle has pointed out (Lancet March 10.1917, page 371) that in those cases of chronic empyemata which refuse to heal, Decortication of the lung may be employed successfully.

He considers the employment of Bismuth paste injections to be unsuccessful in this condition and that decortication is preferable to any modification of Estlander's operation.

Respiratory exercises are of value in the collapse following empyema as from other causes.

The treatment of Pneumonia and Pleurisy does not differ from the treatment of civil practice and need not be detailed, but in such cases as with all penetrating wounds of Lung and Pleura the treatment of the case is dominated by the great necessity for accurate and repeated observations.

SECTION V.

The foregoing observations have brought me to certain conclusions:-

- (a) That the necessity for accurate and differential diagnosis and for careful observation, extending in many cases over a period of weeks cannot be overstated. The frequency with which penetrating wounds of Lung and Pleura are accompanied by complications or sequelae of a serious nature is a constant reminder of this fact.
- (b) That Radiography, more especially the use of the Fluorescent Screen is of much value in assisting and confirming diagnosis.
 - (c) That the presence of infection in an effusion can only be definitely established by exploration and examination of the fluid withdrawn, and that since in 25% of Haemothorax cases infection ultimately develops, whenever symptoms creating suspicion arise, exploration should be at once performed and repeated as often as is necessary to prove or disprove its presence.
 - (d) That the development of a small secondary Pneumothorax in relation to a Haemothorax of some days standing should raise suspicion of gas infection.
 - (e) That the prognosis is especially serious in cases of infection with B. Coli or the anaerobic Bacilli variously described as B. Welchi, B Capsulatus Amgenes, B. Perfringens and B. Malignant oedema.
 - (f) That in all cases, where infection is definitely proved adequate drainage, involving a resection of at least

one Rib, should be performed immediately.

That if at operation the Foreign Body be easily accessible, as for instance if it is lying free in the Sinus Phrenico Contalis, it should be removed, but that an empyema may readily heal though the Foreign Body is not removed.

(h.) That the treatment of Penetrating wounds of the Lung and Pleura, apart from the development of infection, should be as conservative as possible, and that surgical intereferance is rarely justified in cases remaining free from sepsis.

The immediate removal of a Haemothorax is a mistake which may prove serious, the later removal is I think generally if not always necessary.

PREFACE TO CASES.

The patients from whome these data were obtained were all soldiers in the Royal Serbian Army and as such were a little more difficult to deal with than are English soldiers.

One of the greatest difficulties in the treatment of Serbians was to keep them in bed and I frequently found patients who were marked "Bed" walking outside the wards within a day or two of admission. Since on no occasion were ill consequences directly traceable to this disposition I am inclined to the belief that this restriction is often unnecessarily severe and prolonged in English Hospitals.

Another remarkable feature of this series was the frequency with which malaria occured while the cases were in Hospital.

In some of these cases actual infection in the Hospital took place in spite of the use of mosquito curtains and prophylactic doses of Quinine, in other cases however I think the lowered vitality induced by the wound permitted the reawakening of a previous infection. In the series of 55 there were 11 instances of Malaria and always of the Tertian form of the disease.

In setting forth these cases I have endeavoured to submit typical cases of the various complications and sequelae of such wounds in detail, but to do this in all cases would be greatly to lengthen this Thesis and I have therefore stated the facts of the remaining cases as briefly as possible.

In regard to physical examination I have as far as possible made use of diagrams and have used the signs mentioned below to

denote the various conditions occuring.

- + signifies an increase.
- +1 slight,+2 moderate,+3 great.
- signifies a diminution.
- -1 slight, -2 moderate, -3 great.
- P.N. signifies "Percussion note".
- P.N.R. signifies "Percussion note Resonant".
- P.N.R. may be or + as above.
 - B.S. signifies "Breath Sounds".
- B.S.V. signifies "Breath Sounds Vesicular"
- B.S.V. may be or + as above.

When Breath Sounds are "Bronchial" this has been stated in full.

Impairment of Percussion note has been illustrated by "shading" of various degrees of Density.

Rales have been illustrated as dots

The condition of the heart, with the exception of alterations in the rate of beat, may be taken to be that of the healthy organ, unless otherwise stated.

In regard to Radiography -- in the bulk of the series screening only was employed. There was difficulty in getting good plates but prints from cases illustrating various and typical conditions to be found have been submitted in connection with the paragraph dealing with Radiography.

In cases where death occured Post Mortems were obtained whenever circumstances permitted and these have been collected together in a separate appendix and indexed by case numbers.

Cases on which Post Morten examinations were made have been marked with an Asterisk.

UNCOMPLICATED WOUND OF LUNG

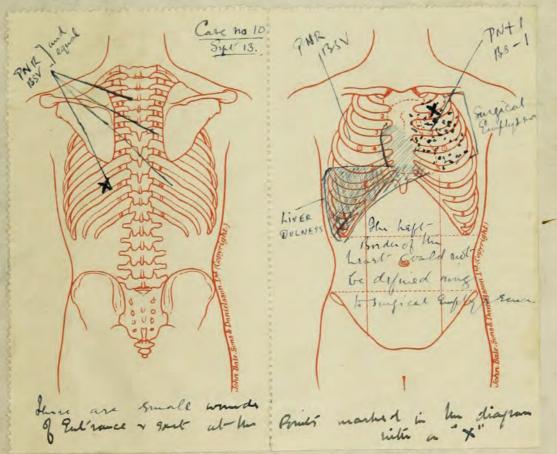
Case 10.

Sept 14. Admitted on September 13th. 1916 wounded by a Rifle Bullet on the day before admission.

On admission he was in a good deal of pain owing to a fractured Rib. There was rather severe dysphoea and general distress. This very soon subsided after admission and when he was under the influence of morphia.

He has a gentle loose cough which brings up a murcoid sputum streaked and patched with blood.

The physical signs on admission are as per diagram.



On the left side over the chest there is considerable surgical Fmphysema and movement as diminished. The percussion note is of increased Resonance. The Breath Sounds diminished. The left border of the heart is obscured by surgical Emphysema. The right side of the chest is resonant and the Breath Sounds vesicular. Over both

In charge of case.

8/15. McA. & W. Ltd. Forms/B. 181/3.

Signature

(3253) W7204—1542. 750,000.

CLINICAL CHART. (To be attached to Case Sheet.) Rank and Name. 0 No.

A.M. P.M. Army Form B. 181, Result Military Hospital Service. Date of discharge. 470 23 Date of admission 27 17 3 61 89 Time Time A.M. P.M. A.M. P.M. 18 **5**/ Disease Temperature Fahrenheit Days of Disease Observation woqu woqu woqu woqu wo

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72 72

Respirations per Minute

Motions per 24 hours

In charge of case.

Signature_

8/15. McA. & W. Ltd. Forms/B. 181/3. (3253) W7204—1542. 750,000. sides of the back the Percussion note is resonant and the Breath sound vesicular, and equal.

Sept. 15. Patient was taken to the X Ray tent and screened.

Both sides of the chest are clear. The right and left domes were of the diaphragm are clearly defined of a normal convexity and freely moving.

The position of the mediastinal shadow was normal but there was thought to be some small extension of the heart shadow to the right.

Sept 15.

Patient is greatly improved and has ceased to cough up blood stained sputum. The dyspnoea has also ceased.

Sept 19. He continues to do well but today there was again a little blood-staining in his sputum.

Sept 28. Until the 27th, the clinical course was uneventful. The Became surgical emphysema cleared up in about 10 days and it was thus impossible to tell from the physical signs in the chest alone that there had been any injury of the Lung.

Yesterday the temperature suddenly shot up to 105degrees accompanied with great headache and pains in the limbs. A blood film was taken and showed the Tertian Parasite of Malaria to be present.

Oct.24.

Patient left Hospital today. The chest was again examined ure before departion the physical signs being those of an unimpaired and healthy chest.

He was evacuated to Convalescent Camp.

Excepting for the attack of a malaria and a relapse of malaria which occured a fortnight later the recovery was uninterrupted.

Treatment. Patient was put to bed and given morphia gr. 1 on admission hypodemically.

He was kept on an "ordinary" full diet. A recurrence of Blood spitting on the 19th. September was treated with hypodemic injection of morphia gr. 1/4.

Patient had two attacks of malaria which were treated with Quinnine Bichloride intramuscularily and by the mouth.

Apart from the rise of temperature due to attacks of Malaria the amount of fever occuring in this case will be seen to have been very slight (in contrast to the Temperature Chart of a case of Haemothorax.

HARMOTHORAX, MALARIA, PYO-PHRUMOTHORAX.

Case 17.

Sept. 21. Admitted with a penetrating Grenade wound of the Right side of the Chest incurred 4 days before admission.

The fragment, which was retained, had entered the Chest just below the Right Axilla.

There was a history of Haemoptysis for 3 days after patient was wounded

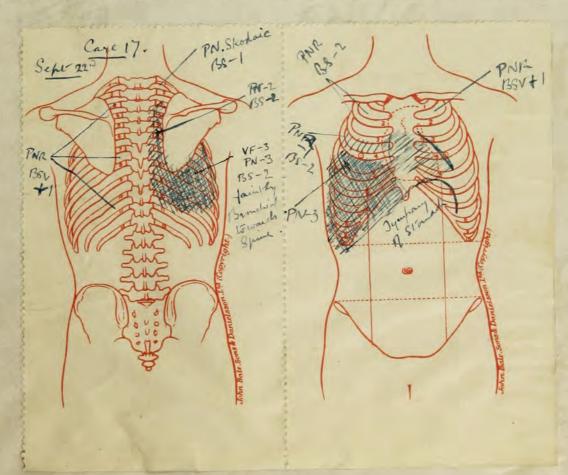
Sept.22. Patient is fairly comfortable but there is moderate Dyspnoea.

There has been no further Haemoptysis.

The physical signs are as detailed:-

On the Right side of the Chest behind there is a very large area of dulness with absent Vocal Fremitus, limitation of Respiratory movement, and great diminution of Breath sounds which are faintly Bronchial, towards the Spine, at the base.

Above this dulness there is a small area of Skodaic Resonance.



Army Form B. 181. Result Military Hospital Service Date of discharge. a 9 (To be attached to Case Sheet.) CLINICAL CHART. Date of admission Rank and Name 29 26 177 No. 27 12 Disease Dates of Observation **T**emperature Fahrenheit 101° 100° 107° 106° 105° 104° 103° 102° 。 66 . 86 97°

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Signature.

In charge of case.

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Respirations per 42 32 Minute

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Pulse per Minute 132

On the Right of the Chest in front there is impairment of Percussion note reaching to the 3rd. Rib. The Breath sounds are only faintly audible.

On the left side of the Chast, back and front, the respiratory movement is rapid and rather exaggerated - the Percussion note is Resonant and the Breath sounds are increased. This is especially noticeable below the Clavicle.

The Cardiac impulse is impalpable but by Percussion and auscultation it appears that the Cardiac apex is in the 4th, space in the nipple line.

Sept 26. Patient has not been so well - he is restless and complains of headache and some pain in the Chest. He is becoming jaundiced.

A Blood examination showed that the Eertian Malarial Parasite was present in the Blood stream.

Oct.4. In spite of Treatment with Intramuscular injections of Quinine there is no improvement and patient is now markedly Jaundiced.

Oct. 10. The General condition is bad.

He is restless, his breathing is hurried and shallow and he is getting much thinner. He is still jaundiced and is becoming anaemic too. There is a flush in each cheek but a conspicuous pallor of the Mucous Membranes.

The physical signs are assdetailed:-

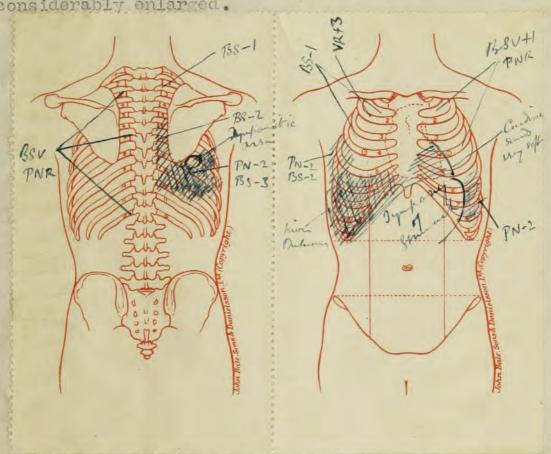
On the Right side, more especially at the base, the Respiratory movement is restricted. The area of dulness due to the effusion is considerably diminished since admission, There is a small area where the Percussion note is Tympanitic near the Inferior angle of the Scapula. This area is a little larger than a 5/- piece. It bulges when the patient coughs. The Vocal Resonance is diminished over the dull area but below the Right Clavicle it is very much increased.

The Breath sounds are much diminished all over the Right side, back and front, but are better heard towards the Apex than at the Base.

On the Left side of the Chest there is an exaggeration of the Breath sounds the Percussion Note is resonant and the Respiatory Plus movement

The Cadiac impulse is impalpable but by Percussion and auscultation the apex is in the 4th. space in the nipple line - It is probably displaced upwards by the distension of the Stomack.

The Cardiac sounds are very soft and hurried. The spleen is very considerably enlarged.



A further examination was made today, and a Pyo-pneumothorax being suspected, an exploration was made in the 7th. space rather behind the Mid-axillary line at the Right side

Oct.11.

As a pesult of this a sample of offensive, rather pinkish pus of creamy consistency was withdrawn. This gave a brown deposit in standing with a clear, reddish, supernatant fluid.

The deposit was found to contain Bacillus Welchi and B.Coli

and Streptococci.

Patient was taken to the theatre 3 hours later and a Resection an of inch of the 7th. Rib performed in the vicinity of the previous A exploration.

The Superficial tissues were thickened and oedematous, indicating that infection had been present some days.

The Empyem was drained; about 2 pints of infected bloody fluid being removed. A double drainage tube was inserted. This operation was conducted under a general anaesthetic. Death followed a few hours later.

Treatment and Remarks.

I think this man's life might have been saved, had a diagnosis been made earlier, before the development of infection had reduced his strength and before Pericarditis rendered his condition so serious.

The fever was thought to be due in part to the presence of a Haemothorax, in part to Malaria. The jaundice too, was supposed to have a Malarial origin, but there is no doubt that exploration should have been performed earlier in this case. The patient was on a milk diet from the time of admission till death.

The Malaria was treated by Intramuscular injections of Quinine. Gr.X. B.I.D.

* Frederico of the Post Horban of: Page 130.

WOUND OF LUNG COMPLICATED BY HAENOTHORAX BECOMING PYOTHORAX.

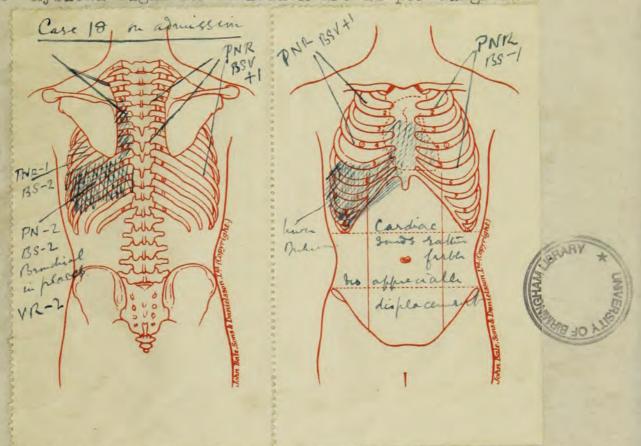
Case 18.

Admitted Sept. 21st. 1916.

Patient was wounded 2 days before admission by a Rifle Bullet - there being wounds of entrance and exit in the left side of the Chest.

Haemoptysis occurred after he was wounded but has not occurred since admission and his condition now seems to be very good.

The Physical signs on admission are as per diagram: -



The Loft side of the Chest is resonant but the Breath sounds are slightly diminished and there is diminution in the Respiratory movement.

On the Right side the Percussion note is resonant and the Breath sounds are vesicular and rather increased.

The Cardiac impulse is not palpable but there appears to be no displacement of the heart. The sounds are rather distant.

Over the Left side of the back there is well marked dulness

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In charge of case.

a Resonant note above the level of the Spine of the Scapula.

The Breath sounds are diminished all over the Left side of the back but much more so at the base where the vocal Resonance is also much diminished. Over the Right side of the Back the note is Resonant and the Breath sounds are Vesicular and a little exaggerated.

"Screening" shows the shadow of a moderate Haemothorax in the Left Fleural cavity - there is no air in the Pleural cavity.

Oct.14. Patient gets up sometimes now and his general condition is good.

His Physical signs are not appreciably altered and there is no

indication of a diminution in the signs of his effusion.

Oct.22. Patient has complained of some pain in the Left side.

Cra

Oct.27. Patient was doing well up to a week ago and his Tempeture has

been remarkably afebrile considering that he has a Haemothorax.

During the past few days he has complained of pain in his Left significant side his breathing has become shorter and quicker and there has been an elevation in Tempeture and Pulse rate.

An exploration was made today in the 6th. Left space Mid-axillary line and a sample of the effusion was withdrawn. This had to the naked eye the appearance of Venous blood.

This specimen was examined and showed Pneumococci and Staphylococci present and a considerable exess of Leucocytes.

Oct. 28. An operation for drainage was performed.

A general anaesthetic was employed and, an inch of the 6th. Rib having been resected in the mid-axillary line, the Pleural cavity was opened and a large drainage tube inserted. Father more than a pint of effusion was removed.

Oct.29. Patient spent a restless night and does not seem quite so well.

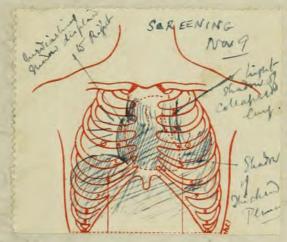
Poth Pulse and Respiration are quickened this morning.

- Nov. 1. Condition much the same but Respiration seems easier wound discharging freely.
- Mov. 4. There has been great improvement during the past two days an area of dulners at the Left Base was explored but no fluid was with-drawn. The drainage tube was removed today.
- Nov. 9. Patient has again had some pain in the Left side for the past two days.

An examination of a Blood film for Malaria showed that a few Tertian Rings were present.

Patient was screened today.

"creening" shows collapse of the Left Lung with a shadow of considerable density and blurred outline taking approximately the line of the 4th. Rib as it curves up to the Axilla. The Right Lung and Pleura appear healthy.



On the Right side over the Chest and Back, the Percussion note is resonant and the Breath sounds vesicular.

On the Left side Pespiratory movement is very much diminished - over the Chest there is rather increased resonance and air can be heard passing freely to and fro through the wound of operation.

There is an area of dulness at the Left base behind, where however there is still slight Vocal Resonance.

The Heart shows displacement to the Right but this is not very marked, dulness extending about 1 inch. to the Right of the Sternum.

There is still a moderate amount of Pinkish, purulent discharge from the wound which otherwise looks quite healthy.

Nov.10. The patch of dulness at the Left base was explored but no fluid was withdrawn - probably Pleural Thickening is present.

Nov.12. Patient is not so well - he has a cough and is not sleeping or taking his food as well as he was - he is getting thinner.

His physical signs show a rather striking change. The discharge is scanty

There is a great exaggeration of the Breath sounds over the first three Intercostal Spaces on the Right side of the Chest - this is also the case in the upper part of the axilla, but lower down the Breath sounds lose this characteristic.

There is no suggestion of fluid at this base (Right).

Nov.13. To-day the dressings are drenched with pus - pocketing evidently having occurred.

Nov.15. Patient's condition has been greatly improved by the re-insertion of a drainage tube.

Nov.23. Continues to do better - still discharges a little pinkish coloured pus through the tube in his wound.

A fine tube is now in use and is shortened daily.

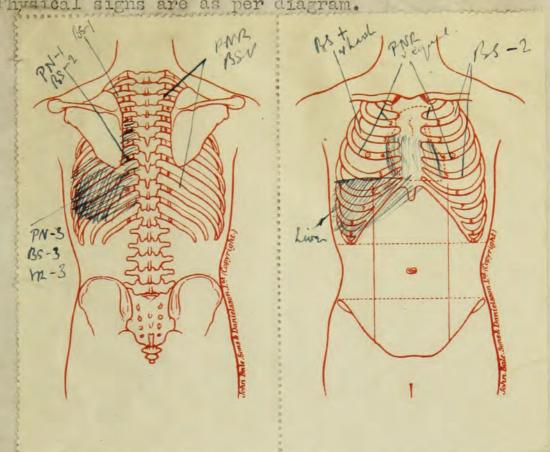
- Nov. 29. Physical examination shows that there is a patch of culness behind his wound apart from this the Percussion note on both sides of the Chest is resonant,
- Nov. 50. Patient is again not so well. A Blood film was examined for Malaria but was negative.
- Dec. 1. Drainage from the wound seems to have stopped and the area of dulness at the Left Base is larger.
- Dec. 2. The Chest was explored through the wound to-day with a long pair of Sinus Forceps a pocket of pus was opened, about 6 or 7 ozs. of Purulant bloodstained fluid being discharged.
- Dec. 10. A Blood film taken showed no Malarial Parasite but a Leucocytosis is present.
- Dec. 11. By introducing a longer drainage tube another collection of pus was tapped through the same wound. This pus is of a yellowish colour and creamy consistency but is not blood-stained.
- Doc. 14. Pocketing has once more taken place.

The General condition of the patient in spite of his imperfect drainage is good - his physical signs show no appreciable alteration from those of the diagram of Nov. 9.

- Dec. 17. Wound again discharging pus freely.
- Dec. Drainage tube removed the discharge having almost ceased.
- Jan. 6. General condition of patient continues to be very good. The wound is almost healed and there is now a distinct air entry into the Left lung.

Jan. 6. (con.

The Physical signs are as per diagram.



On the Right side of the Chest in front and behind the Percussion note is resonant - the Breath sounds being vesicular behind but rather increased and harsh over a large area beneath the Right Clavicle.

The Left side of the Chest is resonant in front and over the upper part of the Back but there is a large area of dulness at the Left Base. The Breath sounds are very much diminished over the Left lung and the Respiratory movement is much impaired on this side.

There is no Cardiac displacement apparent.

For the past three days patient has again had some fever - and Jan. 13. this after 3 weeks of Apyrrexia.

> The Blood has again been examined for Malaria and has again been reported "negative".

A Physical examination was made - the area and intensity of the dulness at the Left base were thought to be a little increased.

An exploration was made through the granulating surface of the

operation wound in the direction of the supposed Pus cavity. The result of this exploration was negative.

Patient has had toothache and has had two teeth removed.

He complains of headache, pains in the limbs and abdomen.

No diarrhoea has occurred neither is patient constipated.

Jan. 14. Under N20 an exploration was again made at a point just to the inner side and below the angle of the Left Scapula.

About 3 ozs. of dark bloody fluid were withdrawn. This was not frothy but probably was nevertheless withdrawn from the lung.

Patient was taken to the X-ray Room and screened.

This was most instructive.

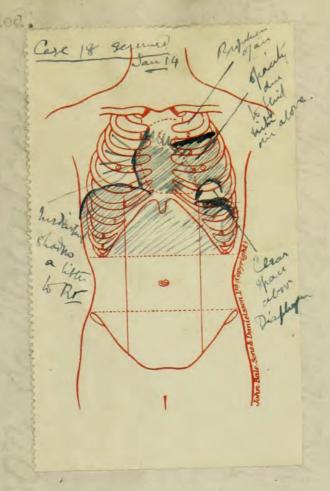
The Right side of the Chest was free from fluid and the Right diaphragm was moving freely. The mediastinal shadow was displaced slightly to the Right.

On the Left side immediately above the diaphragm there was a crescentic clear area and above this shadow, more intense above than below.

The upper limit of this shadow was in the 2nd. Intercostal space-It was transverse, sharply defined and mobile.

In fact the condition existing was one of a collection of fluid in the upper part of the Chest - presumably limited below by adhesion and in relation to air above, (there being a bright area above the upper edge of the shadow)

Jan.14. A digram is appended.



Jan. 15. Patient is very unwell - Dyspnoea is marked.

The Physical signs were again examined. There was no change to remark exepting that on the Left Scapula being pulled well forward Crepitation could be heard with the Stethoscope.

There is no area of Percussion dulness corresponding to the known localisation of the fluid/in the Chest or suggesting any further use of the exploring needle.

Jan. 18. The old wound has broken down and the dressings are once more saturated with pus. Patient is greatly relieved - a tube was reintroduced.

Jan. 25. The discharge having become again very scanty, the tube was removed.

Jan. 26. The Physical signs are now similar to those existing before the Pocketing occurred and the wound is again healing up by granulation.

Teb. 1. It has been necessary to again reintroduce a fine tube.

Teb. 1. In spite of the repeated collections of Pus in his Chest the (con)

General health of the patient remains excellent.

He keeps strong and cheerful and does not waste at all.

Feb. 2. Again "screened" in the X-ray room, the appearance seen at the "screening" on January 14th, has dissappeared.

There is a general haziness of the Left Chest.

There is no apparent Cardiac displacement.

Patient was evacuated to Birzerta. Algiers.

Notes on Treatment.

Tob. 5.

On admission patient was put to bed supported by a bed rest in the Semi-sitting position - an injection of 2 grain of Morphia was then given hypodermically - As the general distress was slight and Haemoptysis had ceased this injection was not repeated. He was kept on a light diet for 2 days and then placed on "Ordinary diet".

The Surgical Treatment of the case has been dealt with among the foregoing data of the case. After operation patients bed was carried outside as frequently as the weather would permit.

The frequency of "Pocketing" in this case necessitated constant observation.

Irrigation was not employed.

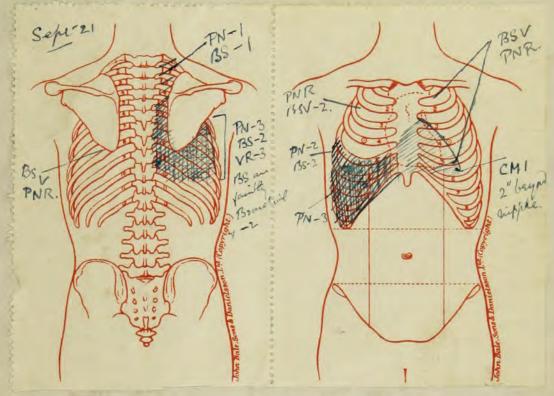
WOUND OF LUNG. HABITOTHORAK.

Case 19.

Admitted to Hospital on Sept. 21st. 1916. having been wounded 2 days previously by a Shrapnel Ball.

Haemoptysis has occurred at intervals since he was wounded. There is considerable Respiratory distress.

. Physical signs on admission.



Sept.21. Respiratory movement is very rapid but is deficient on the Fight side of the Chest. This is resonant in front above the 5th. Rib but below this the Percussion note is dull. The Breath sounds are diminished all over the front of the Right side of the Chest. Behind there is a general impairment of Percussion note amounting to absolute dulness from the base to the level of the Spine of the Scapula. Over this area the Breath sounds are very faint and are Pronchial in type and the vocal resonance is absent. Above this level they are merely diminished.

The heart is displaced 5 inch. to the Left. On the Left side

CLINICAL CHART.

(To be attached to Case Sheet.)

Army Form B. 181.

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In charge of case.

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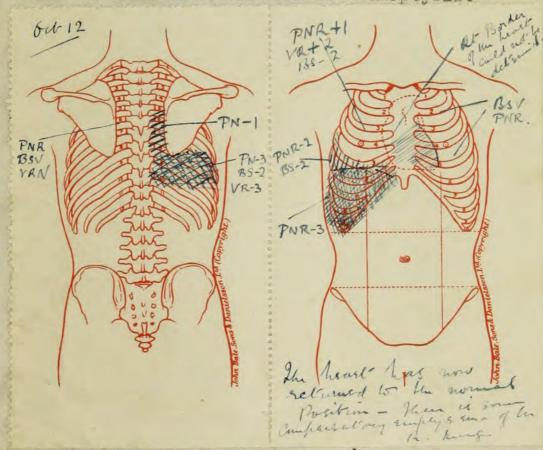
In charge of case.

Signature

back and front the Percussion note is resonant and the Breath sounds are vesicular.

The Heart is displaced 3 inches to the Left by a large effusion in the Right Pleural cavity.

- Sept.24. Haemoptysis has ceased yesterday the sputum was merely streaked and flecked with Blood. The Breathing is easier.
- Sept.30. The Cardiacomaximum impulse is now in the 5th, space in the nipple line. The general condition is improving. Screening shows large Haemothorax displacing heart to the Left.
- Oct. 12. General condition greatly improving Patient gets up a little now and walks about with only slight Dysphoea He still has a slight cough there has been no recumbence of Haemoptysis.



The physical signs show that there has been some diminution in the Haemothorax.

Impairment of Percussion note behind now reaches no higher than the Spine of the Scapula and towards its upper limit has gained in resonance.

The Heart has returned to its normal position but the Right border of the heart cannot be defined by Percussion and is probably obscured by Emphysematous Lung.

The Vocal resonance over the front of the Chest on the Right side is much increased.

On the Left side the Percussion note is resonant and the Breath sounds are vesicular.

Oct. 25. Patients temperature has risen a little during the past day or two but he says he feels well and there is no apparent reason for this rise on examination.

Physical signs are still those of a considerable effusion at the Right base. No appreciable change in the signs since Oct. 12th.

Patient was again screened to-day - The shadow of the Haemothorax appeared to reach approximately to the 4th. Rib. There is no sign of air recognizable in the Pleural cavity.

- Nov. 9. Patient complains of some headache A Blood film examined for Malaria was negative but showed an undoubted Leucocytis.
- Nov. 24. Patient again screened. There is still a small shadow at Right base.
- Nov. 26. An exploration of Chest at Right base failed to draw off any fluid.
- Dec. 6. Patient who has recently been acting as ward orderly is now able to work quite hard without the least apparent Dysonoea.

His physical signs have improved and there remains only now a trace of dulness at the Right base and below the Axilla.

Here there is now only a little Diminution in the Breath sounds on Auscultation - elsewhere the air entry into the affected lung is well heard.

Dec. 24. Patient again screened.

The shadow due to a Haemothorax has entirely cleared up and the Diaphragm is seen to be freely and equally mobile on both sides of the Chest.

Jan. 1. Patient was evacuated to the Convalescant Camp.

Treatment.

Patient was put to bed on admission and 1/6th. grain Morphia was given Hypodermically immediately. He was kept under the influence of Morphia for 3 days after admission i.e. until the Haemoptysis had ceased and Breathing became easier.

Patient was placed on a milk diet for a day or two after admission and subsequently on the "Ordinary" army diet.

He remained in bed for the greater part of 3 weeks after admission.

After patient got up he was instructed in Respiratory exercises which he carried out for 10 minutes three times daily.

WOUND OF LUNG. PNEUMONIA.

Patient admitted on the 18th. October wounded by a Rifle Bullet 5 days previously.

He was very distressed and there was marked Cyanosis on admission.

There was a history of Haemoptysis for 5 days after the receipt

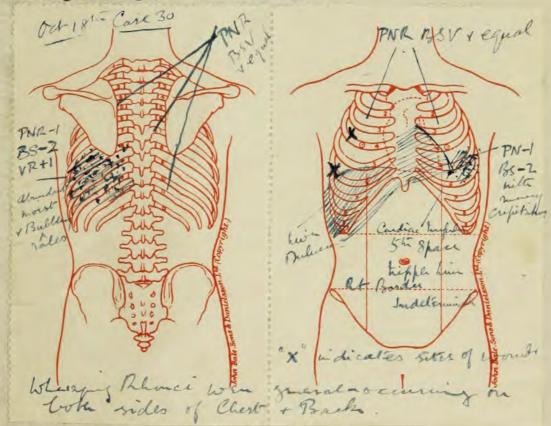
of the wound.

There were wounds of entrance and exit in the Right side of the Chest.

The Physical examination shows that there is a pneumonia of the unwounded (Left) lung with a certain amount of General Bronchitis.

The sputum is abundant, Muco-purulent frothy and bloodstained.

The Breathing is rapid and shallow.



The Physical signs are as in the diagram

At the Left base behind there is an area of impaired resonance extending rather above the Inferior angle of the Scapula. Here the Breath sounds are diminished and the Vocal resonance increased.

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Immediately external to the Cardiac apex there is another area with similar physical signs.

Elsewhere the Percussion note is Resonant on both sides of the Chest and the Breath sounds are vesicular and equal relatively. They are however accompanied throughout the Chest by wheezing Rhonci.

The Right border of the heart cannot be defined by Percussion.

The Cardiac impulse is in the 5th. Left space in the nipple line.

Oct. 21. Patient shows a little improvement and he is less restless.

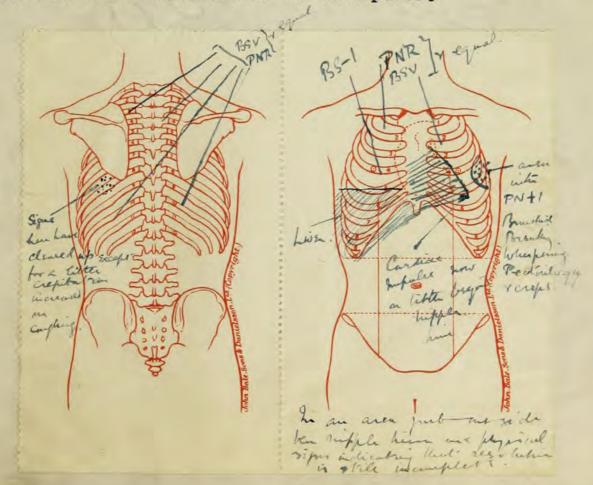
There is still some Cyanosis but this is not so marked as it was.

He is taking his food well and sleeping well

He shows great improvement today, The Breathing is easier and the Cyanosis has cleared up - The Temperature and pulse rate have fallen.

Oct. 30. Patients general condition is very much better and he is now well on the road to recovery but an examination of the Chest shows that resolution of the Pneumonic area is incomplete.

Oct.



The alteration in the Physical signs is in accordance with the general improvement in the patients condition.

The Respiratory movement is much less rapid. On the Left side of the Chest in front there still remains an area, external to the Cardiac Impulse, where the Breathing is Bronchial and accompanied by Crepitation. Here however the Percussion note is nw relatively increased and whispering Pectorilogy can be obtained. The signs of consolidation at the Left base behind are rapidly clearing, there remaining nothing but a few Crepitations as an accompaniement of Inspiration.



The Cardiac Impulse is now slightly external to the nipple line and the Heart sounds are a little soft.

- Nov. 2. Patient continues to do well He left his bed to-day for a short time.
- Nov. 7. There is a persistance of the abnormal Physical signs presenting on the Left side of the Chest towards the Axilla.

The sputum has been examined for T.B. It was "negative".

Gram-negative, Bacilli, Pneumococci and Staphylococci were present.

Nov. 17. Patient's general condition remains good - There is no change apparent in the Physical signs. He still coughs up a large amount of Mucopurulent sputum.

Nov. 29. In the unresolved area near the Left nipple the Breathing has ceased to be Tubular but expiration remains prolonged and the Respiratory murmur is accompanied by moist Rales.

- Dec. 6. The area reffered to in the previous entry seems to be clearing up though Crepitations are still present.
- Dec. 30. The Physical signs have now cleared up and patient who has made an excellent recovery was evacuated to the Convalescent Camp to-day.

Notes on Treatment.

Patient was put to bed in the semi-sitting position supported by a bed-rest. 1/6th. grain Morphia was goven hypodermically on admission, this was repeated B.I.D. for 2 days.

A light nourishing diet of milk, eggs, custard, beef tea etc. was employed during the earlier days of the illness, but patient was on a full "Ordinary" diet at the time of leaving hospital.

Alcohol was used - one table-spoonful of Brandy being given 4 hourly for the first ten days of the illness after which it was stopped.

Hypodermic injections of Digitalin 1/100. grain B.I.D. were given until the Cyanosis cleared up.

In the later stage of his illness patient's bed was carried out of doors whenever possible.

WOUND OF LUNG COMPLICATED BY HYDRO-PNEUMOTHORAX

BECOMING PYO-PNEUMOTHORAX.

Case 39.

Admitted Nov 3rd.

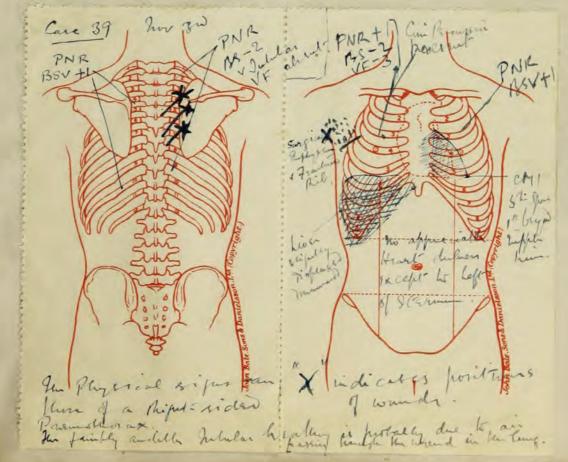
Nov. 3.

Patient was wounded 11 days before admission, by Shrapnel. There is a history of some Dysphoea with pain in the Chest and Haemoptysis extending over a period of 7 days after the receipt of his wound.

of so many days standing it is considered necessary to perform immediate resection of Rib or the relieve the Intrapleural Pressure with a Trocar and Cannula.)

There are three large lacerated wounds over the upper part of the Right side of the back, and a fourth wound over the Right Deltoid muscle, and a fifth in the Right Axilla, where there is a fractured Rib giving rise to a little Surgical Emphysema.

The Physical signs on admission are as shown in the accompanying diagram.



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In charge of case.

The Right side of the Chest is immobile. The Percussion note is hyperresonant and the Respiratory mummur can only be very faintly heard. The vocal Fremitus is absent. Behind similar Physical signs are present on the Right side but the Breath sounds are of a Tubular character.

On the Left side of the Chest, both back and front, the Percussion note is resonant and the Breath sounds are exaggerated.

The Cardiac Impulse which is to be felt in the 5th. Left space is rather diffuse and extends rather more than 1 inch beyond the nipple line; but to the Right of the Stermum and over the Sternum the Percussion note is resonant.

The diagnosis is one of Peumothorax on the right side.

Patient was "screened"

The condition was established as actually are of Right

Hydropeumothorax the amount of effusion being small, There was a

good deal of Cardiac displacement.

Richards of Coll church king of any the stand of any the

Nov. 4. Patient seems very unwell - Breathing continues to be difficult but he managed to sleep fairlt well during the night.

Nov. 8. Patient still seems to be rather distressed and there is evidence of dilation of his Right Heart.

There is a diffuse Pulsation in the 4th and 5th. Intercostal spaces on the Left side near the Sternum.

Breath sounds which can be faintly heard at the affected Base

are of a Tubular character.

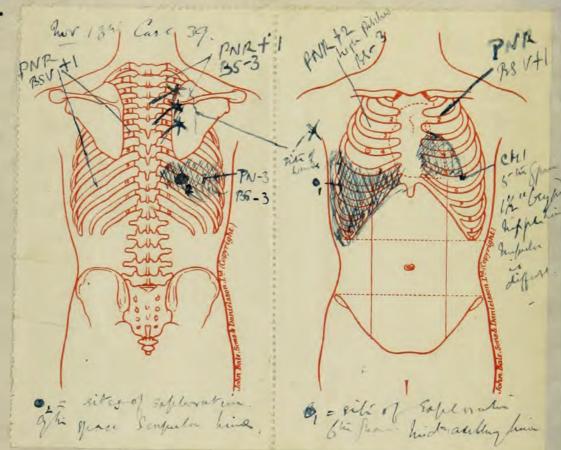
Nov. 9. A Blood film was examined for Malaria and found to be negative but Leucocytes were reported to look "suspiciously granular".

Nov. 13. Patient seems to be having rather more pain in the Chest - The

Dyspnoea continues and there is a tendancy for the temperature to rise.

With the changes in symptoms there are important changes in

the Physical signs:-



The alterations in the Physical signs are noteworthy:

There is an increased displacement of the Heart to the Right and some dilatation.

There is an area of dulness at the Right Base and extending into the Right Axilla with the other Physical signs of an effusion.

There is an increased high-pitched Percussion note over the upper part of the Right side of the Chest and this has now become quite silent on auscultation.

An exploration of the Chest was made in the Right Axilla - and

about 10 oxs of pus being withdrawn - and in the Right Scapula line, another 5 ozs of pus being removed from the Chest through the 9th space.

The pus is thick and yellow and of a creamy consistency & It is odourless.

Nov. 14. An operation for drainage was performed. An inch of the 6th. Rib in the Right mid-axillary line was removed under local anaesthesia (\frac{1}{2}\% Novocain with Adrenalin).

A large quantity of pus was liberated - from two to three pints at least - The fluid resembled that of yesterdays exploration and was free from clot.

A large bore drainage tube was inserted and the wound lightly closed and dressed.

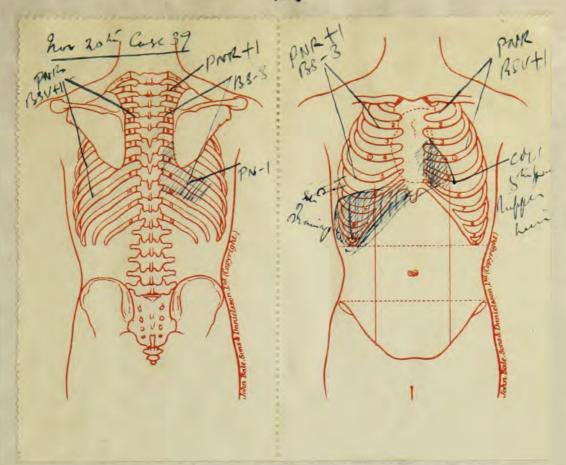
The patient stood operation remarkably well - a striking contrast to the condition in which such patients often leave the table after General anaesthesia.

Nov. 15. Patient seems to be doing very well now - he is taking his food better and the pain in his Chest is much relieved

Bacteriological report.

Examination of the pus shows Staphylococcis Aureus in the Film and culture.

Nov. 0. Patient's general condition is greatly improved.



The Physical signs are shown in the accompanying diagram.

On the Right side the Chest is immobile, the Percussion note is hyper-resonant except at the base behind where there is a little impairment and the Breath sounds are absent,

On the Left side the Percussion note is resonant and the Breath sounds are exaggerated.

The Cardiac Impulse is to be felt in the 5th. space in the nipple line.

Nov. 24. Patient has spat up a great deal of Sputum of a Mucopurulent character but stained with blood during the past 2 days.

The wound is discharging freely.

Nov. 27. General condition shows improvement and the breathing is getting much easier.

Dec. 2. An attempt made to close the granulating surface of the wounds in the back by Sutur has failed - The drainage tube now employed is of a medium calibre - Drainage is still quite free.

Dec. 12.)

Nothing of interest to report.

Dec. 22.)

Dec. 30. A localisation of a foreign body identified in an X-ray plate

(Though not visible in the screen) showed a fragment of Shrapnel at
level of 2nd. Rib on the Right side and about 2" deep from the surface
of the Chest wall. This is almost certainly embedded in Lung.

Jan. 27. Patient has slowly continued to recover - The discharge is now scanty and the wounds in the back are nearly healed.

The drainage tube was removed to-day.

Patient who had become thinner during his illness is picking up again, but the Right Chest wall has fallen in to some extent and the R. Clavicle has become very prominent.

Feb. 1. The wound in the Chest wall has closed excepting for a small granulating surface and the wounds in the back are healed.

An X-ray screen examination was again made. It showed that the shadow had disappeared from the Right side of the Chest and there was moderately good movement of the Diaphragm on the Right side - although there was some "tiling" of the Ribs due to the falling in of the Chest wall.

The mediastinal shadow was displaced only slightly to the Left.

Feb. 7. An examination of the Chest showed that there was now considerable re-entry of air into the Right Lung and that the Patient under the circumstances an exellent recovery.

Feb. 8. He was discharged to Salonica for Bezerta, Algiers, for convalescence.

Treatment.

On admission patient was put to bed supported in a semi-sitting position by a bed rest. \(\frac{1}{4}\) grain Morphia was given immediately hypodermically. This was repeated as often as was necessary to keep the

patient quiet and free from pain.

When signs of Cardiac Dilatation became manifest a mixture containing I.Digitalis mXX and Amon.Carb. gr.V to the dose was given 3 times aday - after 2 days the dose was reduced by half and this medicine was stopped after operation.

A light diet of milk, eggs, bread and butter, tea and champagne was used prior to operation.

After operation the character of the treatment was altered and the diet was increased.

From Nov 24th. to Dec 24th. the Pleural cavity was washed out daily with Eusol at Body temperature.

Whenever possible, and this was very frequently the case, patient was carried out in his bed and placed in the sun.

After his wounds were healed, and before leaving hospital, he was instructed in Respiratory exercises for the future development of the collapsed Lung which had already commenced re-expansion.

WOUND OF LUNG HAEMOTHORAX.

Case 40.

17. A.10.

Patient was wounded 5 days before admission (Nov 2nd) to hospital by Shrapnel.

His wound was attended by a lot of pain and Haemoptysis which had continued up till the time of his admission.

Dyspnoea was only slight on admission and quickly became quieter and easier.

There is a wound at the root of the Neck in the middle line This is of a septic appearance and was about 2" long. It does not
openly communicate with the Chest cavity, the depths of the wound
having closed up.

Examination of the Chest shows that there is a fracture of a Rib on the Left side which has given rise to a moderate amount of Surgical Emphysema extending over the Left side of the Chest in its greater part.

This for the time being prevents a more complete examination being made of the condition of Lung Pleura.

Nov. 4. The Surgical Emphysema has entry partly disappeared and other

Physical signs which had been marked are apparent

The Left border of the Heart is however still indeterminable by Percussion

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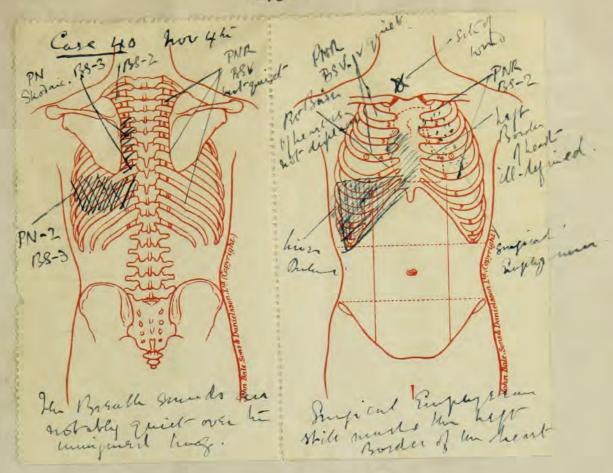
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On the Left side of the Chest in front the Breath sounds are diminished but the Percussion note is resonant. Behind there is an area of dulness at the base, Skodiac above absolute below, extending to the Spine of the Scapula - Over the greater part of thes area the Breath sounds are absent, over the upper part however they are merely diminished.

over the Right side of the Chest back and front the Percussion note is resonant but the Breath sounds are very quiet.

Nov 8. The General condition of patient is very good - He still complains of pain in the region of the fracture.

Nov 10. Patient was screened - The screen showed the shadow of an Haemothorax, uncomplicated by air, reaching to the 4th. Rib, on the Left side. There was no Cardiac displacement.

Nov 24. Chest again examined - Physical signs now show that the Haemothorax is being absorbed - The Percussion note at the Left base is plainly audible.

There is an area of Pleural friction below the Left Axilla.

- Dec 2. No Pleural friction can now be heard. Screening shows a very light shadow extending from the base almost to 5th. Rib on the Left side.
- Dec 11. Chest again screened the trace of shadow has disappeared and the diaphragm is seen on both sides to be moving freely.
- Dec 16. Patient was evacuated to the Convalescent camp having made a complete recovery.

Treatment.

The treatment was a repetition of that employed in Case 19.

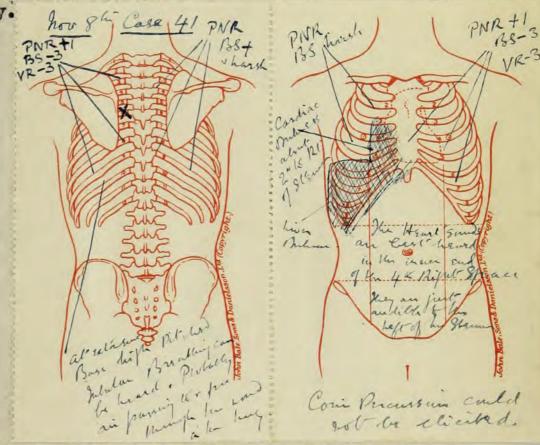
The fractured Rib was treated by Strapping.

WOUND OF LUNG COMPLICATED BY HYDROPNEUMOTHORAX.

Case 41.

Admitted Nov 8th. 1916 wounded by a Rifle Bullet 12 days previously and with a history of Haemoptysis for two days following his injury and severe Dysphoea.

Dysphoea is only slight. The Rifle Bullet is retained there being a small wound, which has scabbed, immediately internal to the Left Scapula at the level of the Spine. There is a fractured Rib in relation to the wound of entry.



Nov 8.

There is alittle increase in the rapidity of Respiration.

On the Right side of the Chest which is immobile back and front the Percussion note is rather increased in resonance but the Breath sounds and Vocal Resonance are absent.

On the Left side of the Chest, back and front, the Percussion note is resonant and the Breath sounds harsh.

No Cardiac dulness can be elicited to the Left of the Sternum But there is dulness for about 2" to the Right of the Sternum in the

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Army Form B. 181.

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CLINICAL

Case 41. (Pape

(3103.) W 7204-1542. 750,000. 8/15. H. & Sp. Forms/B. 181/3.

In charge of case.

Signature

Rank and Name Jak 41 (Pay I No.

Date of admission

Disease.

CLINICAL CHART.

(To be attached to Case Sheet)

Military Hospital

Army Form B. 181.

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In charge of case.

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Respirations per Minute

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H. & Sp. Forms/B. 181/3. (3103.) W 7204-1542. 750,000. 8/15

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Army Form B. 181.

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H. & Sp. Forms/B. 181/3. (3103.) W 7204-1542. 750,000. 8/15.

In charge of case.

Signature

Army Form B. 181. Result_ Military Hospital Service Age Date of discharge 96 08 (To be attached to Case Sheet.) CLINICAL CHART. 9 روه 91/ 48 401 07 87 21 77 93 97 81 96 911 11 12 13 14 15 16 17 18 19 20 21 22 48 28 76 28 86 88 75 76 81 03 07 1 of Superstur Close) HB -31 Date of admission. 81 Rank and Name. 08 77 °7 72 401 28 81 27 77 رمه 48 40/ -8/ 8/ 88 °8 8B 001 81 81 96 88 81 07 07 81 08 Care 4 1 (Pay Corps Pulse per Minute 10 6 8 6 1. M. P. M. A. M. P. M. A. M Time Time T No. Days of Disease 9 // Disease Respirations per Minute Temperature Fahrenheit Dates of Observation Motions per 24 hours 104° 103° 101° 100° **.66** . 86 97° 107° 106° 105° 102°

McA. & W. Ltd. Forms/B. 181/3. 8/15. (3253) W7204—1542. 750,000.

Signature

In charge of case.

4th. space and the Heart sounds are best heard here. They are only just audible to the Left of the Sternum.

The General distress is regularly slight although it is obvious from the Physical examination that the Heart is displaced to the Right to an extreme degree by a Pneumothorax of the Left Chest.

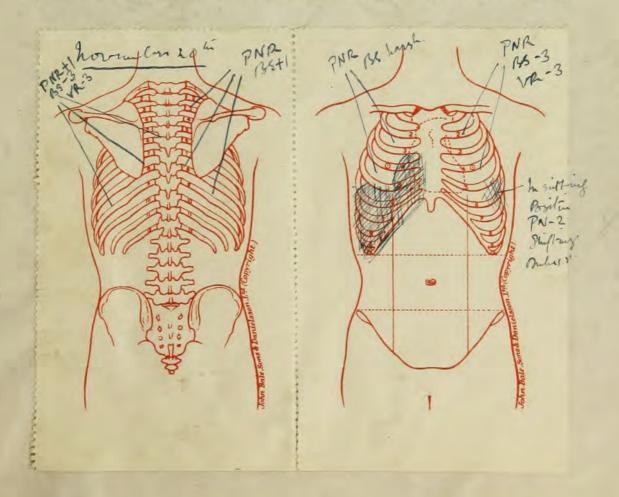
Nov 10. Patient was "screened" and a plate was taken.

The condition was clearly shown to be one Left sided Hydro-Pneume-thorax giving an extreme displacement of the Heart shadow to the Right.
So great was this displacement that the Left edge of the Sternum was
visible as a straight line, There was a small amount of free fluid in the
Left
the Right Pleural cavity.

Patient continues to do well - when I went into the ward this morning he had left it and was walking outside quite free from Dyspnoea.

Nov 20. General condition remains satisfactory,

There are certain alterations in the Physical signs:



There has been an increase in the amount of fluid free in the Left Pleural cavity, there is a definite diminution of the Cardiac displacement.

The blowing Tubular Respiratory murmur audible at the extreme Left Base behind has ceased.

Dec 11. Patient is now getting up quite frequently and cannot be persuaded to remain in bed.

The Cardiac Impulse can now be felt $1\frac{1}{2}$ " to the inner side of the Left nipple.

Dec 22. There is still a slight Cardiac displacement to the Right and up to the present there is no return of air entry into the Left lung.

The fluid at the Left Base appears to have absorbed.

2. There is no longer any appreciable displacement of the Heart apart from this there is no alteration in the Physical signs.

Jan 26. There is now a slight but definate return of air entry into the Left lung.

Patient has been instructed in "deep breathing" exercises.

Feb 1. There has been an unexplained rise of Tempereture - possibly due to Pleurisy but patient looks and feels well and does not complain of pain.

There has been a certain amount of pain in the upper part of the

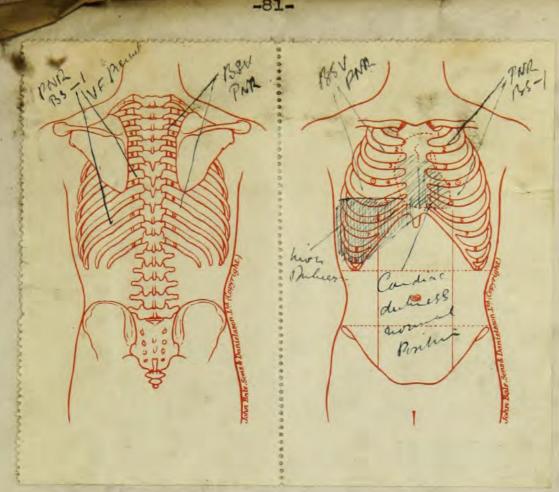
Left Chest and to-day Pleural friction could be both heard and felt

above the Left Scapula behind.

Feb. 24. Patient has made a very good recovery.

There is very good return if air entry into the affected lung though at present it is hardly equal to that into the Right Lung.

"Screening and an X-ray Plate confirmed these observations.



Feb 26.

Evacuated to the Convalescent camp.

Treatment.

In the early stages of the condition - Confinement to bed in the semi-sitting position and hypodermic injections of Morphia gr. 1/6 B.I.D.

After 1 month gentle Respiratory exercises were employed the use of them being increased when the Respiratory murmur became evident in the injured side.

Patients bed was carried out of doors whenever possible.

Pleurisy was treated by "Blisbeing" and hypodermic injections of Morphia.

The diet on admission was of a light fluid character but shortly Afterwards an" ordinary" diet was employed and this was used until patient left hospital.

WOUND OF LUNG PNEUMONIA

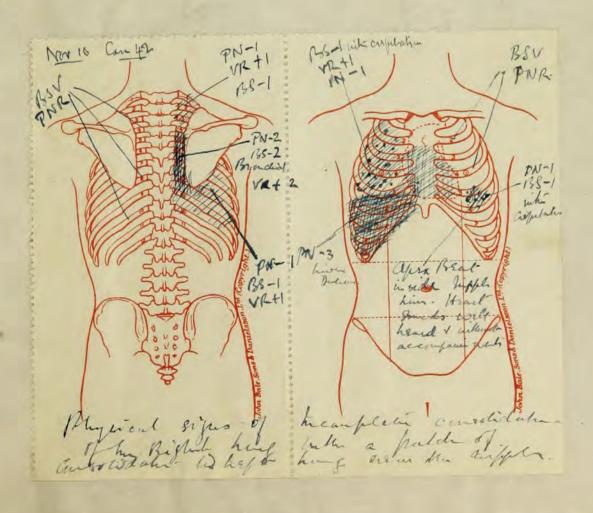
Case 42.

Patient admitted on Nov 10th. having been wounded 7 days previously by grenade fragments. Haemoptysis occured for 2 days after he was wounded.

There are wounds in both sides of the Chest and in the face one fragment having passed through the Antrum of Highmoke into the
mouth.

Patient looks seriously ill - His face shows a greyish pallor and is clammy with perspiration, he is breathing very quickly.

An examination of the Chest shows that the Physical signs of consolidation are present over a greater part of the Right Lung and that there is a patch of consolidation in the Left Lung near the Heart's apex.



-87 -81 Army Form B. 181. رمه do -81 as Š 40/ -81 7 Result -81 Military Hospital -81 Service -88 08 <u>81</u> -81 0% -81 R 88 49 401 Date of discharge. 8/ 8/ -88 B/ 07 CLINICAL CHART. (To be attached to Case Sheet.) 0 E C5/ て// اصه 9Z Date of admission Rank and Name Ward 17.7.11 S 20/ OS 98 رمه Respirations per 10 44 38 38 Minute Can ano 4 Pulse per Minute 20 0 1 1 5 No. Disease Corps Days of Disease Dates of Observation **ល់**ចំ4់រ Motions per 24 hours **8649 8649 86** 107° 104° 106° ° 103° 101° 100° 102° 。 66 . 86 97°

8/15. McA. & W. Ltd. Forms/B. 181/3. (3253) W7204—1542. 750,000.

In charge of case.

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Rank and Name

No.

CLINICAL CHART.

(To be attached to Case Sheet.)

Military Hospital

Army Form B. 181.

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Motions per 24 hours

In charge of case.

Signature.

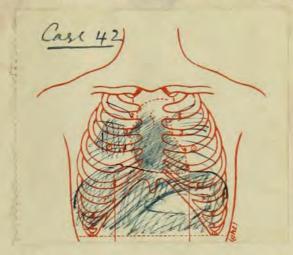
A dignosis of Pneumonia was made.

Nov 14.

Patient was taken to the X-ray room and screened.

There was a light shadow in the middle of the Right Pleural gram. This was not more intense than might be given by consolidation of the Lung.

On each side movement of the diaphragm is clearly visible.

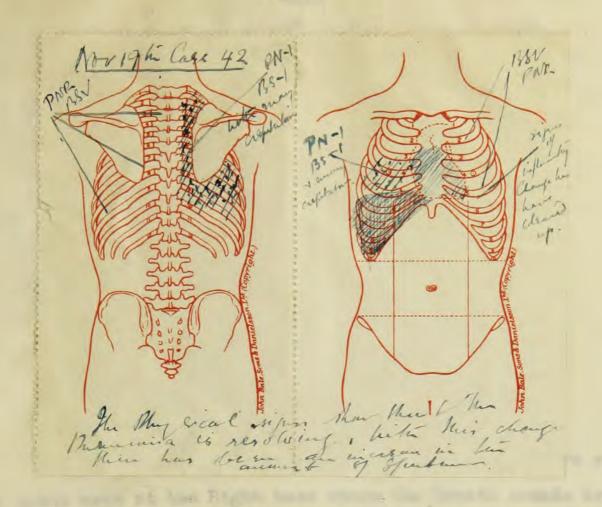


Nov 16. The general condition of patient seems rather worse - His face is a witness to the seriousness of his illness - his expression is anxious and is clammy and of a dirty pallor - His breathing is very rapid.

He is however taking food very well and he gets a fair amount of sleep.

An examination of the Chest shows that there is now a patch with well marked Bronchial Breathing in the area near the Cardiac apex where crepitation was noticed on the 10th. Nov.

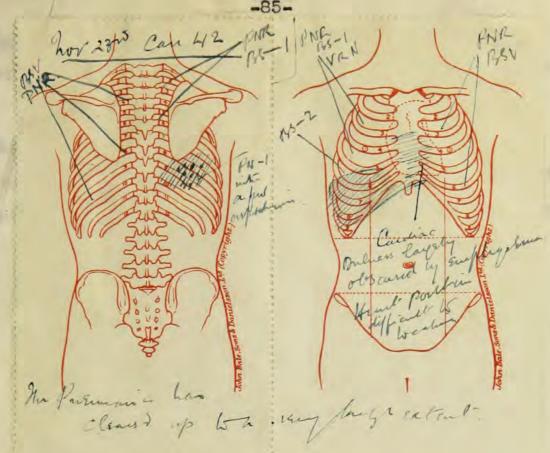
Nov 19. The Temperature has fallen and there has been a great improvement.



On the Right side of the Chest back and front there is an extensive area with impairment of Percussion note, increase of Vocal Fremitus and diminution of the Breath sounds with associated Inspiratory crepitations.

The signs of consolidation on the Left side have cleared up and over the Left lung now the Percussion note is resonant throughout and the Breath sounds are vesicular.

Nov 23. The improvement has continued - Though patient looks sallow and very weary, he is very much better than he was and the Pneumonia is clearing up very rapidly.



The Physical signs show great improvement. There remains now only a small area at the Right base where the Breath sounds are diminished sli slightly in association with a slight deficiency of resonance and crepitation.

The Cardiac dulness is indefinable. The Physical signs on the Left side are those of a healthy lung.

Doing very well - His Physical signs now consist merely of a Nov 27. little diminution in air entry at Right base with a few crepitations.

> There is a tendency to a slight weakening of the Breath sounds all over the more affected lung.

The wounds of the face are very slow of healing - more especially that which communicates through the Antrum with the mouth.

Physical signs in the Chest are now those of a healthy chest -Dec 9. There remains no sign of inflammatory change.

The wounds of the face however continue discharging pus.

Discharged to Convalescent camp. His departure was delayed by the Dec 26. continuance of suppuration in the face wounds.

Treatment.

Patient was kept in bed and given a milk diet with extras; jelly, eggs etc: Half an ounce of Brandy 4 hourly was given during the course of the Fever.

Patient always took his food well and slept well and this must have contributed to his recovery from what was a very serious Pneumonia,

WOUND OF LUNG. COMPLICATED BY WOUND OF LIVER. -PLEURO-HEPATIC FISTULA. HAEMOTHORAX.

Case 43.

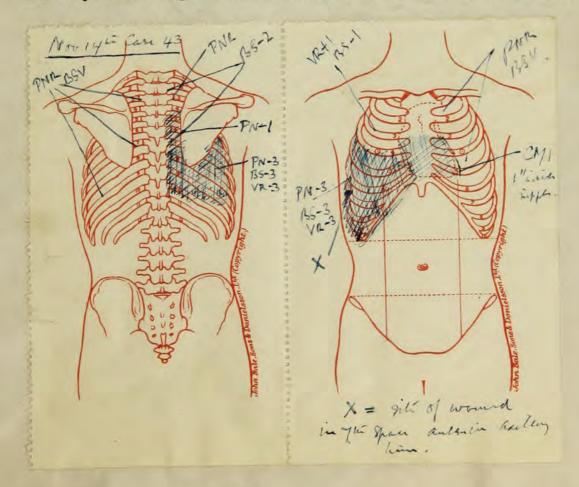
Nov 14. Patient was admitted on Nov 14th. having been wounded 9 days previously with Shrapnel.

He had slight Haemoptysis for 2 days after being wounded. He complains of pain in the Right side and in the Right shoulder but there is no Dysphoea. There is a history of a cough for a period agreeing with that of the Haemoptysis.

There is an entrance wound of small size in the Anterior Axillary line in the 7th. Right Intercostal space. This wound has scabbed over. There is no wound of exit.

There is very considerable tenderness in the immediate neighbour-

The Physical signs on admission were as per diagram.



then 1x pensed. Army Form B. 181. 4<u>z</u> 07/ 7/ or 8/ /قە Result امه cb Military Hospital (Service oz Explused. December. Date of discharge. امه CLINICAL CHART. (To be attached to Case Sheet.) OB 7/1 91/ 23 94 8/ 7// Date of admission BE Rank and Name 00/ 0/7/ Churt Rphon Time Time Time Time Time Time 5/ 0 H 0.8 88 The state of A.M. P.M. A.M. P.W. A.M. P. OB 0% Care 43. 81 07 No. Days of Disease 14 Disease Temperature Fahrenheit Pulse per Minute Respirations per Minute Observation Motions per 24 hours 107° 101° 100° Dates of 106° 104° 103° 102° **.66** . 86 97° 105°

In charge of case.

Signature

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McA. & W. Ltd.

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(3103.) W 7204-1542. 750,000. 8/15. H. & Sp. Forms/E. 181/2.

In charge of case.

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CLINICAL CHART.

(To be attached to Case Sheet)

Military Hospital.

Army Form B. 181.

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In charge of case.

Signature_

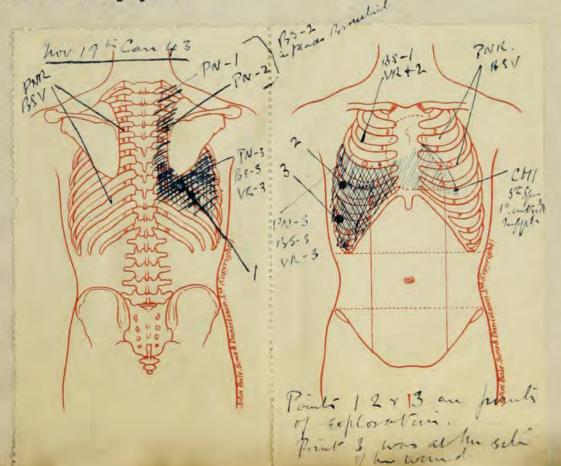
On the Right side of the Chest there is diminution of the Respiratory movement.

There is an area of well marked dulness in front reaching to the 4th. Rib. Breath sounds are absent over this area and above it are diminished although the Percussion note is resenant. Here the Vocal Resonance is increased. Behind the impairment of Percussion note, amounting to absolute dulness below, reaches to the Spine of the Scapula - Vocal resonance and Breath sounds are absent over the greater part of this area, elsewhere the Breath sounds are diminished.

Over the Left side of the Chest both in front and behind the Percussion note is resonant and the Breath sounds vesicular. The Cardiac impulse is inside the Nipple line.

Patient has had an accentuation of the pain in the Right side accompanied by a sudden rise in Temperature and Pulse rate and considerable Dyspnoea.

The effusion appears to have increased in size - There has been no recurrence of Haemoptysis.



Nov 19.

Nov 19. (cont)

Certain changes have taken place in the Physical signs.

The area of dulness behind seems to be a little larger - There is a distinct impairment of Percussion note above the Spine of the Scapula - The increase of Vocal resonance above the level of the effusion is very marked.

The Heart is now displaced to the Left so that the Impulse is an inch to the Left of the nipple line.

Patient was explored at points 1. 2. 3. in diagram.

- (1) drew about 6 ozs. of Bile stained effusion which was semitransparent and rapidly clotted. This from its colour obviously contained some blood.
- (2) drew nothing but a little dark venous blood.
- (3) a needle passed in at the site of the wound and in its assumed direction vix: upwards and backwards. This exploration was negative.

Further a Blood film was taken and examined for Malaria but proved negative.

THE Pathogist reports: Fluid from Pleural cavity contains Bile and Nov 20. Blood and a great deal of Fibrin. This fluid is sterile.

Patient is now very unwell. There is no change in the Physical Nov 24. signs. The stools are regular, and of a healthy colour.

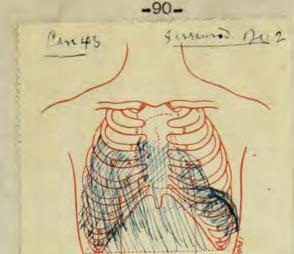
Blood again examined for Malaria and again found to be negative. The general condition of the Patient does not improve. The Physical signs are unaltered excepting that there is a small area of Bronchial Breathing to the Right of the Right nipple.

Patient was taken to the X-ray room and screened.

The screen showed a large effusion giving a dense shadow in the Right side of the Chest displacing the Heart to the Left.

There was no air in the Pleural cavity.

Dec Dec 2.



The Chest was again explored but no fluid could be withdrawn. 5. Dec

> The Physical signs in the Chest show no appreciable alteration except that the Cardiac dulness is obscured to some extent - probably by Emphysema of the Left lung - The Heart sounds are rather distant.

In spits of the very high temperature the general condition of the patient is very good -He has been found sitting outside the ward on two or three occasions and is always cheerful. He has become a lattle thinner than he was,

Patient was again screened - the appearance in the screen was similar to that seen on Dec 2nd.

The Chest was again explored - a sample of Brownish (almost chocolate-coloured) stinking pus was withdrawn from the 8th. Right Intercostal space in the Scapula line.

After administration of 1/6 grain Morphia hypodermically patient was anaesthetised with E2C1 and an operation for drainage of the Employema was performed.

1" of the 9th. Rib in the Right Scapula line was removed the Pleura incised and a large bore drainage tube inserted.

About 12 pints of pus were removed similar in character to the sample of the previously - A finger inserted through the wound in the Chest wall showed that the diaphragmatic surface of the Right lung was adherent to the diaphragm.

Dec 14.

Dec 11.

Dec 15.

Dec 17. Patient stood operation very well - The Chest is draining freely
- The Cardiac Impulse is now palpable in the Left nipple line.

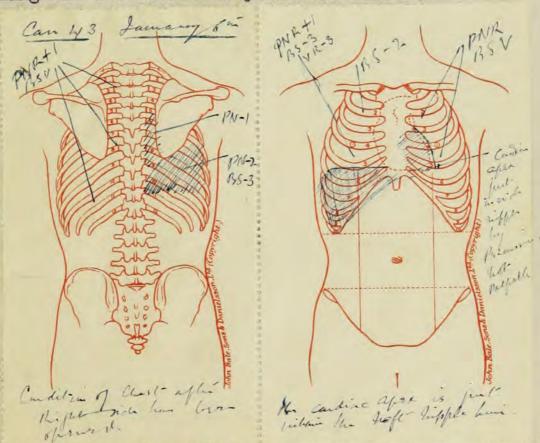
Dec 18. The Pathologist reports the pus submitted for examination to contain: - "Pus cells Staphylococus aureus and B.Coli."

Jan 5

Dec 27. Patient has made great improvement since his operation - yesterday some large clots were removed from the wound with a Gloved finger.

A Localisation of the Foreign Body, causing the original wound, by the Radiograph showed that there was a Shrapnel ball about 2" deep, near the junction of the 9th. Rib into its cartilage on the Right side.

The discharge which has been free from Bile since the operation was a little blood-stained to-day. Lately the discharge has been diminishing and has been of a yellowish colour.



On the Left side of the Chest both in front and behind the Respiratory movement is good the Percussion note Resonant and the Breath sounds are vesicular.

On the Right side of the Chest teh Percussion note is Resonant and rather increased and the Breath sounds are absent. There is no

Vocal Resonance.

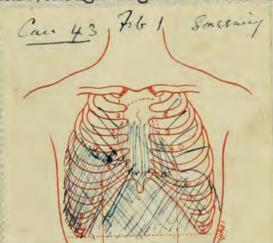
The Right border of the Heart cannot be identified by Percussion but the displacement of the Heart to the Left is slight and the Cardiac Impulse can be felt in the 5th. space just inside the nipple line.

Jan 18. The tube employed recently for drainage has been of Medium calibre - This was to-day remeved.

He still complains of some pain in the Right shoulder but his general condition is excellent.

Feb 1. He has had some pain in the Right side again accompanied by rise of temperature for the last two evenings.

Patient was again screened: Showed a small shadow mounting into the axilla. This shadow was quite dense and approximately equal to that of the Mediastinum though lighter towards its upper Border.



Feb 2. Exploration at the Right Base and immediately above the Liver in the Mid-axillary line proved negative.

Presumably shadow is entirely due to Pleural Thickening.

Feb 25. Patient has continued to improve - The wound has healed and there is quite a fair air entry into the Right Lung - the Heart has returned to its normal position.

"Screening was again employed and showed that there was still some shadow below the Right Axilla and obscuring the outline of the Right Cupola of the Diaphragm, but that this shadow had diminished.

Feb 26. ratient was evacuated to Bizerta, Algiers.

Notes on Treatment.

On admission patient was given a single injection of Morphia hypodermically (1/6 grs.). This was not repeated.

He was put to bed in the semi-sitting position.

The operation treatment of the case has been dealt with in the foregoing data.

Lavage was not employed.

After the tube had been removed and when the wound was granulating over, Respiratory exercises were commenced and were continued until patient left hospital.

ratient's bed carried out of doors whenever possible during the early days following his operation.

WOUND OF THE LUNG. HAEMOTHORAX ASSOCIATED WITH REPEATED ATTACKS OF PLEURISY.

Case 45.

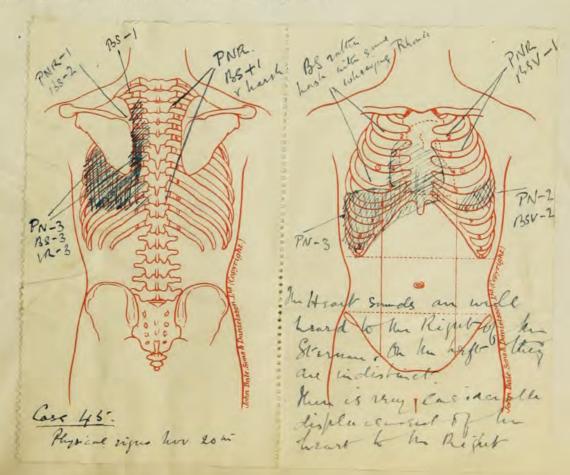
Patient was admitted to hospital on Nov 20th. having been wounded 6 days previously by a Rifle Bullet which had passed through the Base of the Left Lung.

On admission pain and dysphoea were severe. There was no history of haemoptysis, nor did this symptom occur in the whole course of the case.

Small 'scabbed' wounds of entrance and exit are present just below the Inferior angle of the Left Scapula and in the side below the Left Axilla.

Surgical emphysema is not present.

The Physical signs on admission are those of a large Left sided Haemothorax and are shown in the diagram.



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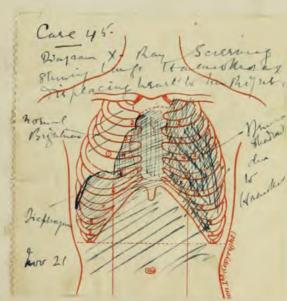
Signature

The Respiratory movement is much diminished on the Left side t
In front the Percussion nowe is resonant but the breath sounds are diminished, behind there is a large area of dulness more intense towards
the Base and shading off into a resonant note above the Spine of the
Scapula. The Breath sounds and the Vocal Resonance are absent over this
area in the Left side.

On the Right side of the Chest, back and front, there is an increase in the resonance of the Percussion note with an exaggeration of the Breath sounds, which are both loud and harsh and accompanied by some wheezing.

There is considerable Cardiac displacement to the Right.

Nov 21. Patient has had very severe abdomanal pain, accompanied by rigidity of the Right Rectus muscle, since admission; exactly resembling the distribution of Appendical pain, and necessitating frequent injections of Morphia. Vomiting has not taken place and the bowels have been opened by enemata.



Patient was taken to the X-ray room and screened.

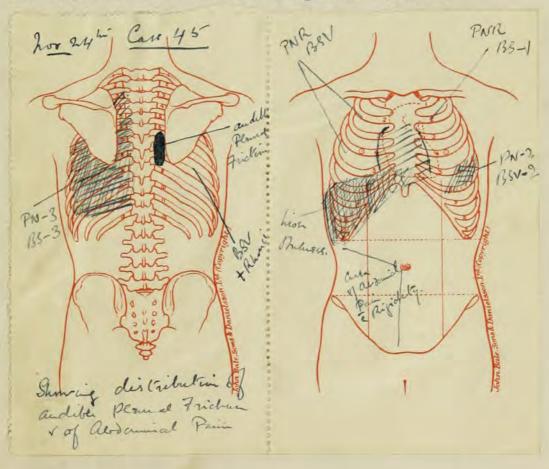
The Mediastinal shadow was seen to be very much displaced to the Right and the greater part of the Left chest occupied by shadow which was less dense towards the Apex than the Base where it equalled

the Mediastinal shadow in density.

- Nov 23. The Physical signs are unchanged Patient looks anxious, is breathing rapidly, and has rather a lot of pain in the Chest and the Abdomen.
- Nov 24. Patient still complains of abdomenal pain, which is associated with localised tenderness and rigidity over the Right Iliac Fossa.

Pleural Friction is now clearly audible over an area internal to the inner Border of the Right Scapula - This association with the abdomenal pain is interesting though probably there is also inflammation of the Diaphragmatic Pleura.

It is also interesting that the Pleural inflammation is affecting the opposite side to the original lesion.



The Physical signs in the Chest are similar to those at the time of admission/except that there is an area of Pleural Friction and that the Cardiac displacement is reduced.

Nov 27. The abdominal pain is now very much less severe than it was.

Patient is now complaining of pain in the Left Axilla. The Breathing has again become more rapid and the Temperature is rising.

Dec 2. The general condition of patient has not been so good during the past two days and his dyspnoea has again become much more troublesome. Examination of the Chest shows that the heart remains still much displaced to the Right, though the area of dulness over the

left side of the Chest behind seems rather smaller ans less intense.

On the other hand the Breath sounds semm to be less distinct all over the Left Chest both back and front.

The area of Pleural friction shown in the diagram of Now 24th. is no longer present.

The Left side of the Chest was explored behind through the 9th. Space in the Scapula line --- no fluid was obtained by this exploration.

Patient was screened: -

1.

Dec

The shadow in the Left Chest was still very extensive and dense but there was a small brighter patch near the Cardiac apex and above the diaphragm ---This was possibly a small localized Pneumothorax but it was impossible to be certain of this.

The shadow in the Left Chest seemed to have diminished a little since the previous screening.

Dec 7. Patient seems much better again this morning.

The area of dulness over the Left side of the Chest behind, now reaches no higher than the Spine of the Scapula and the displace-of the Heart is not more than 1 inch to the Right of the Sternum.

- Dec 19. Patient whose general condition has improved has again had an attack of pain in the abdomen resembling the pain which he suffered on admission.
- Dec 27. Patient again complains of abdominal pain to-night but there is no accompanying rigidity of the abdominal muscles and no tenderness.
- Dec 28. Exploration was again carried out in the 9th. Space, Scapula line in the Left side but again no fluid was withdrawn. The abdominal pain has ceased.
- Jan 15. A Physical examination of the Chest shows that there is a very considerable improvement in the air entry into the Left Lung with a diminution in the area of dulness which is both smaller and less intense.
- Jan 24. Patient complains of pain over the Praecordium. The pain is accompaned by increased rate of Breathing and Pulse.

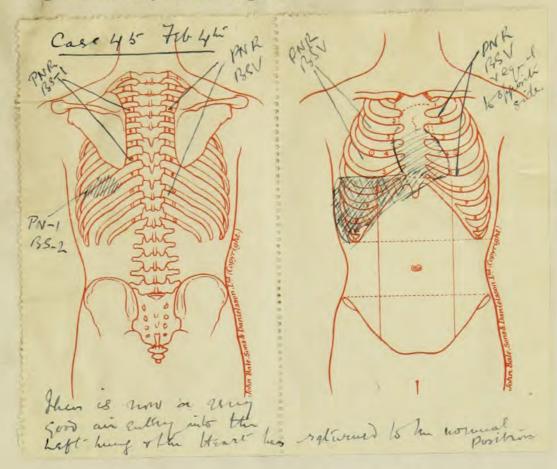
There is no alteration in the Physical signs.

A Blood examination for Malaria was negative.

Jan 27. Patient was "screened". The Screening showed that there was a considerable area of light haziness in the Left side of the Chest but that the heart had returned to its normal position.

Feb 4.

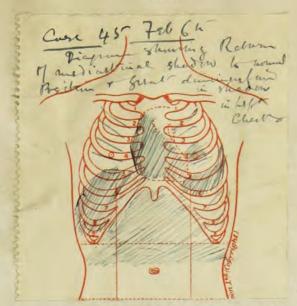
Diagram of Physical signs:-



On the Left side the Percussion note is now of resonance equal to the opposite side excepting over a small area at the extreme base behind---Over the front of the Chest the Breath sounds equal those on the Right side; behind they are slightly diminished especially at the Base.

On the Pight side the Percussion note is resonant and the Breath sounds are vesicular in front and behind. There is no longer any Cardiac displacement.

Feb 6. Patient was again screened. The Left side of the Chest was clear excepting for a moderately dense shadow immediately above the diaphragm and a slight central haziness.



Patient was evacuated to Bizerta, Africa.

Note on Treatment.

Feb

The treatment of this case was exactly similar to that in Case frequent.

19 excepting that the very attacks of pain due to Pleurisy necessitated a much greater use of Morphia.

This treatment of Pleurisy was aided by hot fomentations to the Abdomen and to the Chest.

Patient was recommended for evacuation to Bizerta, Algiers, as it was considered that he would be benefited by a convalescence in a warm climate.

WOUND OF LUNG. PULMONARY ABSCESS. SEPTICAEMIA.

Case 51.

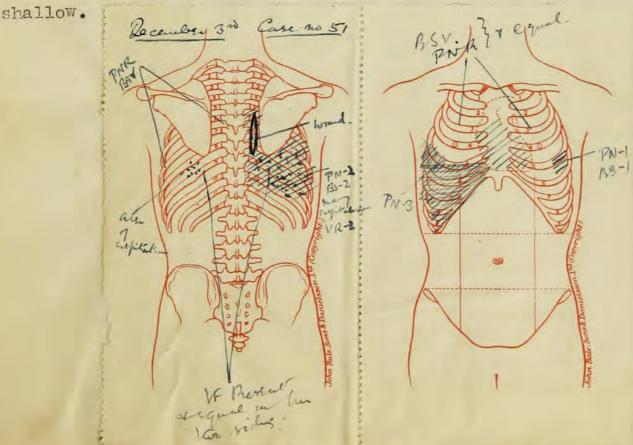
Patient admitted Dec 3rd. having been wounded 15 days previously by a Grenade fragment.

He was very seriously ill at the time of admission -- his face was anxious, pale and sweating and his breathing was very hurried, his pulse rapid and dicrotic, and his temperature high (103°).

There was in this case a history of haemoptysis for 5 days after the receipt of the wound.

The wound is large and of a gutter shape -- It is situated in the Right side of the back parralel and just internal to the Inner Border of the Scapula. There is only one wound.

The Physical signs are those of a Pneumonia, affecting chiefly the Right Lung but not restricted to it. The Respiration is rapid and



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In charge of case.

Signature

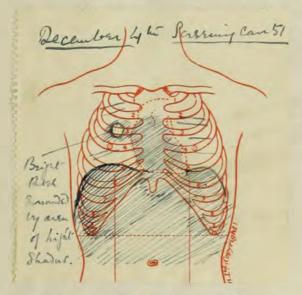
On the Left side of the Chest, in front and behind the Percussion note is generally resonant and the Breath sounds vesicular but there is an area with associated crepitation behind, just below and external to the Angle of the Scapula, and a small area with slight impairment of Percussion note and diminution of Breath sounds below the Axilla.

There is a large area of dulness on the Right side behind extending from the upper limit of the wound to the Base of the Jung-over this area the Breath sounds and Vocal resonance are both diminished and there is much crepitation, elsewhere the Note is resonant and the Breath sounds are vesicular.

There is no recognizable Cardiac displacement.

Patient was taken to the X-ray room and screened.

Dec



The diaphragm was seen to be moving freely on either side and to be defined in outline.

There was no evidence of effusion. There was a small light area towards the centre of the Right Chest surrounded by an area of light shadow -- This was thought to be consolidated lung, with possibly abscess formation.

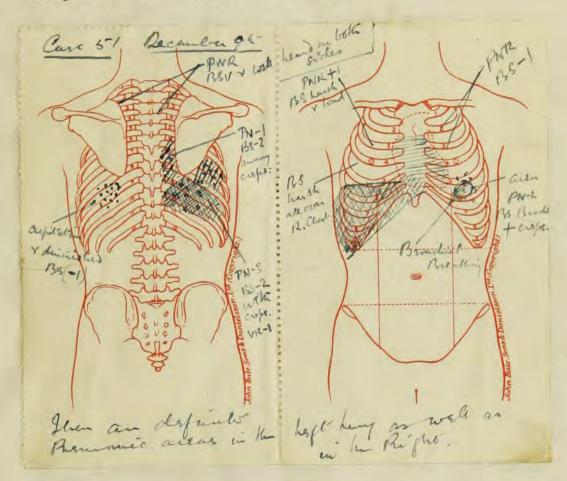
There is no displacement or apparent enlargement of the Mediastinal shadow.

Dec 9. The General condition of the patient is very bad -- He seems to be in much distress -- he is pale but with a flush in his cheeks -- he sweats profusely more especially at nights.

His wound is discharging pus and this seems to be definitely increased and to be bubbly on coughing.

The physical signs are shown in the accompanying diagram.

Respiration is very rapid (38)



On the Right side of the Chest in front there is an increase in the Percussion note and the Breath sounds are loud and harsh.

There is a well marked area of consolidation at the Eight Base behind but there is a diminution of the Vocal resonance as well as in the Breath sounds and Percussion note.

There is well marked crepitation in association with the Respiratory murmur over this area and above it.

On the Left side there is an area with impairment of Percussion

note diminution of Breath sounds, and crepitation below and rather in front of the Axilla; and an area where crepitation accompanies diminished Respiratory murmur behind at the base.

Dec 12. An operation was performed -- The wound was enlarged to secure better drainage of pockets, and portions of the 7th and 8th. Ribs which presented in the wound were removed -- The Lung was intensely adherent to the Chest wall over the explored area and around it and seems as it were to form a floor to the wound of the Pleural cavity.

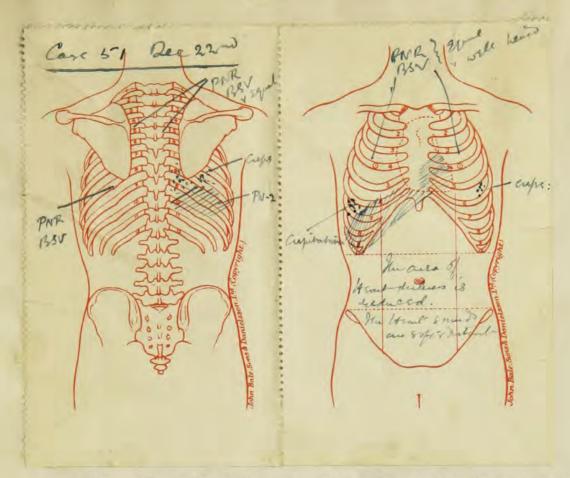
Dec 13.

The Physical signs in the Left Lung show that the Pneumonic areas are clearing up -- The air entry into the Right Lung as heard over the Chest and the upper part of the back is remarkably good -- in fact approximately equal to that into the opposite lung in spite of the resection of Ribs performed.

This is due to the adhesion of the Lung to the edge of the wound in the Thoracic Pleura.

Dec 22. Patient makes no improvement - He is very ill indeed. He is subject to very heavy sweats and this suggests the presence of pus but he is too ill to be removed to the Xoray room.

His Physical signs are shown in the accompanying diagram.



On the Left side the area of diminution of Breath sounds associated with crepitation at the Base behind is no longer apparent. The Breath sounds being vesicular and the Percussion note resonant all over the Left Lung. Some crepitation is however still to be heard below and in front of the Left Axilla.

On the Right side there remains a large area of dulness associated with diminished Breath sounds and crepitation at the Base, elsewhere the Percussion note is resonant and the Breath sounds are vesicular.

The area of Heart dulness is reduced probably by compensatory emphysema -- The Heart sounds are rather soft and distant.

Dec 30. A swelling has appeared in the Right side in relation to the 8th. Rib -- This swelling is white rounded, hot and fluctuating.

There is no other change in patient's condition or in his Physical signs.

The swelling was incised and some thick creamy pus was liberate

at the bottom of the cavity was bare necrosed Rib.

- Jan 3. The necrosed Rib mentioned in the last note was resected today

 a subdiaphragmatic abcsess was suspected but patient became so ill

 in the theatre that it was impossible to make any more extensive

 surgical investigation.
- Jan 5. A sample of the pus taken on December 30th. which was submitted to the Pathologist is reported to contain Staphylococci,
 Streptococci and Pneumococci.
 - Jan 9. Patient died -- death being preceded by a number of Rigors.

 An account of the Post Mortem is given in the Appendix on Post Mortem examinations.

Treatment.

Patient was confined to bed in the semi-sitting position -He was fed on a fluid diet -- milk, beef tea, egg flip etc. and was
given Brandy daily throughout his illness.

An account of the surgical Treatment attempted has already benn included with the other details of the case.

* For details of then
Port northern Examination
in this cash of: Page 137

WOUND OF LUNG. COMPLICATED BY

HYDROPNEUMOTHORAX.

Case 52.

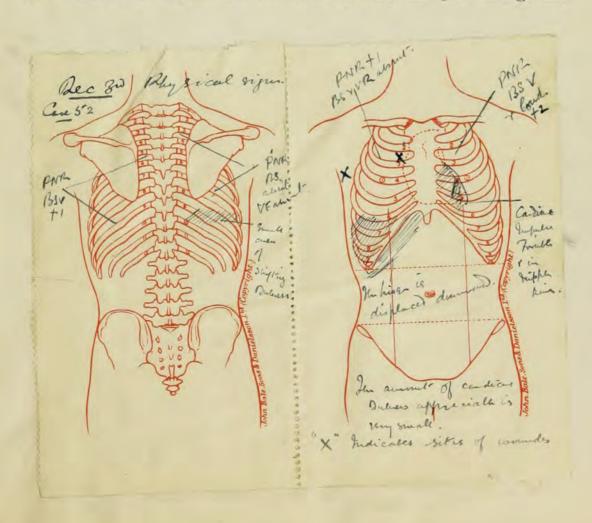
Patient admitted Dec 3rd. 1916 wounded 8 days previously with a Rifle Bullet.

Haemoptysis commenced shortly after he was wounded and he has coughed up a little blood-stained sputum since admission.

The Bullet was not retained -- there are small wounds of entrance and exit in the Right side of the Chest. They have scabbed over.

There is only slight dyspnoea -- Patient is able to lie flat on his back in bed without distress.

The Pyhsical signs on admission are as per diagram:-



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In charge of case.

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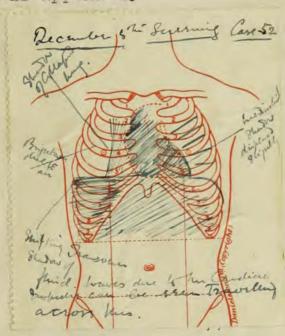
Signature

There is no Resperatory movement on the Right side of the Chest which shows a rather increased resonance back and front with complete absence of Breath sounds and Vocal resonance. There is a small area of shifting dulness at the Right Base.

Over the Left side of the Chest back and front the Respiratory movement is rather exaggerated, the Percussion note is resonant, the Breath sounds loud but vesicular. The Cardiac Impulse is forcible and is in the nipple line, the Heart being slightly displaced to the Left.

Dec. 5. Patient was screened. The srceening showed that there was a Hydropneumothorax on the Right side giving rise however to very little Mediastinal displacement.

A diagram is appended.



Dec 9. General condition very good -- does not shewthe slightest

Dyspnoea -- no change in the Physical signs.

Dec 16. No appreciable change in the Physical signs or in condition of patient.

Dec 22. Ditto.

Dec 31. Breath sounds have rapidly returned in the affected side -the difference between the air entry now into the two lungs is very
slight.

Jan 2. Patient was screened.

The Pneumothorax has absolutely cleared up. There is no trace visible of effusion or collapsed lung, and both sides of the diaphragm are moving freely and equally.

- Jan 11. The Physical signs now are those of a healthy Chest -- Patient has made a perfect recovery.
- Jan 13. Discharged to Convalescent Camp.

Treatment.

On admission patient was put to bed and was kept there for from 2 to 3 weeks. There was no necessity for Morhia as patient was able to lie flat on his back on admission. He was placed on "Ordinary Diet" and remained on this till he left hospital.

Respiratory exercises were employed for the last fortnight of Patient's term in hospital.

ABBREVIATED NOTES ON CASES NOT DETAILED.

Case 1. A through and through wound of the Right Chest by a Rifle sul Bullet reminting in a large Haemothorax. Admitted to hospital 1 day after receiving his wound -- discharged 8 weeks later to Convalescent Camp with a little Pleural thickening at the affected Base but in good health and able to do work in the wards.

Irregular moderate fever was present for 6 weeks. Patient had Malaria while in hospital.

ase 2. A through and through wound of the Left Chest by a Rifle
Bullet. Admitted to hospital 1 day after receiving his wound, died
24 hours after admission.

A large Haemothorax was present and death was apparently due to Haemorrhage. Patient was practically in a dying condition on admission to hospital.

Case 3. A through and through wound of the Right side of the Chest and Spinal cord caused by a Rifle Bullet. Admitted to hospital 1 day after being wounded, died 36 hours after admission.

A Haemothorax was present. There was a fracture of the 3rd.
Rib on the Right side and an area of Surgical Emphysema in relation
to this.

Patient was anaesthetic below the 5th. Rib and there was Paralysis of the lower limbs and the abdominal muscles with retention of Urine. Cystitis was present on admission.

Case

Case 5.

A through and through wound of the Left side of the Chest caused by a Rifle Bullet. Admitted on the day following the receipt of the wound.

There was a moderate amount of Haemothorax. The fever occurring in the course of this case was slight and the Pulse remarkable slow. Patient had 2 fainting attacks with sickness while in hospital. The recovery when he left hospital $3\frac{1}{2}$ months later was incomplete; there being still an area at the Left Base behind where the Percussion note was diminished and the Breath sounds impaired.

A screening undertaken just before the patient's discharge showed no shadow of fluid or marked Pleural thickening but a filrosed condition of the affected Lung dragging the Heart to the Left.

Wounded in the Right side of the Chest below and to the outer side of the nipple by a Shell Fragment. This was retained but subsequently removed from an abcsess which occurred during the course of the case, just below the Left Base behind.

A small Haemethorax was present -- This subsequently supperated and a local Pneumothorax due to a collection of gas in the Pleural cavity occurred. Drainage was carried out through an operation wound below the Axilla -- Gas escaped from the Pleural cavity at the operation and the escaping fluid was foul smelling Purulent and Bile-tinged. The course of the case was attended by high Remittent fever varying from 99° to 104°. Patient subsequently became very wasted and died of a Biliary Fistula.

The occurrence of Malaria early in this case rendered the diagnosis of Empy ema much difficult.

A Pathological report on this case shewed that the pus in this case was infected with Streptococus and Bacillis Coli.

* For delails of the Post mortan examination of: Page 128

Case 6. Patient was admitted to hospital 1 day after receiving his wound which was caused by Shrapnel. The Foreign Body was retained.

A small Haemothorax was present on the Left side. This cleared up perfectly and patient was discharged to Convalescent Camp 1 month after admission.

The Fever occurring in the course of this case was slight.

Case 7. Wounded the day before admission by Shrapnel, which was retained.

A large Right Haemothorax was present. He was discharged 4 months later having made a perfect recovery, as evidenced both by Physical examination and X-ray screen, without aspiration.

He acted as a Ward Orderly for some weeks before being discharged to Convalescent Camp.

The Fever in this case extended over a period of many weeks.

Case 8. Wounded 3 days before admission by a Rifle Bullet which was not retained.

There was a moderately large Haemothorax on the Right side, which cleared up in 6 weeks,

He had Malaria while in hospital.

ot retained. The wound involved a Perforation of the Left side of the Chest and a section of the Spinal cord at the Dorso-Cervical junction.

There was a moderate amount of Haemothorax present on the Left side. -- Patient died 4 hours after admission.

Case 10. Has already been dealt with in detail.

Case 12.

Case 11. Wounded the day before admission by Machine Gun Bullets (3)

One Bullet had entered the Right Chest through the shoulder and was retained -- Pneumothorax was present on the Right side.

Patient was discharged to Convalescent Camp having made a complete recovery 1 month after admissiom.

The amount of Fever occurring in the course of this case was slight.

Wounded the day before admission by a Rifle Bullet. This was not retained. There was a fracture of the 1st, and 2nd, Left Ribs at their junction with the Sternum.

5 days after admission patient coughed up about 6 ozs. of sickly smelling pus of a pinkish colour.

Pulmonary Abcsess and Gangrene were present in this case and patient died 8 days after admission.

Patient's temperature varied from 100 to 103.5 during course of the illness -- The dysphoea in this case was very severe throughout the illness. * The Details of the Post huntim of: Page 129

Case 13. Wounded on the day before admission by Shrapnel, which was retained.

Pneumonia was already commencing in the wounded Right Lung at the time of admission and subsided after 6 days Pyrexia. There was an accompanying Pleurisy on the side of the hernia.

Patient was discharged to the Convalescent Camp 1 month after admission having made a good recovery.

Patient had Malaria While in hospital.

Case 14. Patient was wounded by a Rifle Bullet on the day before admission. The Bullet which perforated the Right side of the Chest was not retained.

A small amount of Haemothorax was present and the Fever was correspondingly slight.

Patient was evacuated to Salonika 1 month after admission the only evidence of the Haemothorax at that time being a slight relative diminution in Breath sounds at the affected Base.

Cas 15. Wounded by Shrapnel 2 days before admission. The wound of exit was patent and have admitted a large sized drainage tube. A pneumothorax at Atmospheric Pressure being present.

From this wound, which was on the Left side of the Chest there escaped at first Blood and a great deal of effusion. In the course of two days this became purulent. Patient died 5 days after admission.

The exact reason for death was not certain and the body was removed from the hospital before a Post-mortem could be carried out,

Case 16. Wounded 2 days before admission by a Rifle Bullet which was not retained.

There was a Maemothorax of moderately large size, reaching to the Spine of the Scapula, present on the Right side.

Patient was discharged to Salonika one month after admission,

Ferer
the Haemothorax having at that time very largely cleared up. The in the case was slight excepting for an attack of Malaria which occurred shortly before evacuation.

Case 17. Has already been dealt with in detail.

Case 18. Has already been dealt with in detail.

Case 19. Has already been dealt with in detail.

Case 20. Tounded by a Rifle Bullet, which was retained, 3 days before admission -- a large Right Haemothorax was present which became purulent.

An operation was performed for drainage and 2 to 3 pints of Stinking Bloody fluid removed: This contained no clots but there being a complicating wound of the Liver patient died 6 weeks after admission of a Biliary Fistula. He was very much wasted at the time of death.

* Translation of the Porthodom 4: Pap 131.

The Fever during the course of the illness was of a very high intermittent character -- the moving Temperature ranging from 96 to 99, the evening Temperature from 101° to 105°.

Malaria occurred in this case.

Bomb Fragment which was tetained but palpable under the skin under the Left Clavicle. This was removed on the day of admission. There was a history of Haemoptysis from the day patient was wounded and at the time of admission his sputum was abundant frothy and Bloodstained.

No Haemothorax or Pneumothorax complicated the wound of Lung which occurred in the case and the only inflammetory sequel was an attack of Pleurisy a fortnight after admission

Patient was discharged to Convalescent Camp 1 month after admission.

Case 28. Wounded 4 days before admission by a Rifle Bullet which penetrated both sides of the chest but was not retained.

The wound resulted in an empyema arising in connection with a fracture of the 2nd and 3rd Ribs in the left side near their angles.

The case was further complicated by Pneumonia and Pulmonary Abscess and death occurred a fortnight after admission.

The fever in this case was very marked and in the morning and evening oscillation of temperature very evident. The temperature varying from 97 to 104.

* For details of ken Post-horism of Pays 132

Case 25. Wounded 5 days before admission by Bullets from a machine gun. One of them had caused a through and through wound of the Right Breast which appeared as if it might be superficial, a second had entered the right side of the Chest and was retained.

This Bullet had entered just above the Clavicle and there was an extensive area of Surgical Emphysema in relation to a une fraction of the 2nd Rib.

There was a history of haemoptysis extending to the time of admission.

The wound of the lung was complicated by a Haemo-pneumothorax.

Pleuritic friction was audible in this case 1 month after admission, but apart from this, the course of the case was uncomplicated and a good recovery was made, the air and effusion disappearing from the Pleural Cavity in 2 minutes, and Physical examination and X-ray Screen shewing a good re-expansion of the affected lung.

Case 24. Wounded by a Rifle Bullet 12 days before admission. The Bullet was not retained.

There was a history of haemoptysis for 1 week.

There was a small Left sided Haemo thorax and a fracture of one of the Lower Ribs on the Left side.

Patient was discharged 5 weeks after admission to the Convalescent Camp, having made a perfect recovery.

The case was attended by fever till within a few days of discharge.

Case 25. Wounded by a Rifle Bullet 5 days before admission. The Bullet was not retained.

There was a history of Haemoptysis extending up to the time of admission.

There was a fractured Rib on the Left side and a moderate amount of Haemo-thorax on the same side.

Exploration after an interval of 6 weeks, permitted the withdrawal of a thin transparent bright red fluid which was sterile.

This cleared up perfectly and patient was discharged to the Convalescent Camp 10 weeks after admission.

The case was attended by a moderate amount of fever extending over a period of 6 weeks,- the fever on only two occasions reached 102°.

Case 26. Wounded 5 days before admission by a Rifle Bullet which was not retained.

There were "Scabbed" wounds of the Right Chest and Right side of the Back.

Haemoptysis occurred for 4 days after patient was

wounded.

The wound of the Lung was complicated by a Fractured Rib and a Right sided Hydropneumothorax.

The course of the case was attended by a considerable amount of fever extending over a period of 10 weeks, and the morning and evening excursion of Temperature being well marked and varying between 98° and 105°.

There was a large amount of serous effusion in the Pleural cavity in the earlier stages of the case, but although this was completely absorbed before patient left Hospital, very little re-expansion of lung had taken place at that time.

Patient was discharged to Salonica for Bizerte' after 4 months in Hospital.

Case 27. Wounded 12 days before admission by the casing of a Rifle Bullet. This had entered the Left side of the Chest and was palpable under the skin on the left side of the Back.

The foreign body was removed on the day following admission.

There was a history of Haemoptysis for 5 days in this case.

A small Left Haemothorax was present on admission. This cleared up in 3 weeks, when patient was discharged to the Convalescent Camp. Fever in the course of this case was slight.

Case 28. Wounded 10 days before admission by a Grenade Fragment which was not retained.

Haemoptysis occurred for 7 days after patient was wounded, the wound of the lung being uncomplicated.

He was discharged to Convalescent Camp 3 weeks after

admission, having made an uninterrupted recovery.

Case 29. Wounded 4 days before admission by a Rifte Bullet which was not retained.

There was a history of Haemoptysis for 4 days.

There was a fracture of the 5th Rib in the Left Axilla, and a small Left Haemothorax.

Patient made a perfect recovery and was evacuated to the Convalescent Camp 5 weeks after admission.

- e 50. Has already been dealt with in detail.
- Case 31. Wounded by a Rifle Bullet 8 days before admission. This was not retained.

Patient was still spitting an abundant Blood-stained Sputum on admission,

Pneumonia was present, the Physical signs being those of consolidation over the Right Base Behind and terminating by Crisis.

Circis 5 days after admission.

Patient was discharged to Convalescent Camp 5 weeks after admission.

Case 32. Wounded 3 days before admission by Grenade Fragments.

These were retained.

There was a history of haemoptysis up to the time of admission.

There were two wounds - one in front of the Right Axilla, another at the Left Apex behind. Probably both lungs were wounded, as Pleurisy occurred on both sides during the course of the case.

There was a moderate amount of Right-sided Haemothorax

and a patchy pneumonic condition of the left lung was present.

Moderate Fever occured in the course of this case for one month, there being an irregular and gradual descent of the Temperature.

Patient was discharged to Convalescent Camp 5 weeks after admission having made a good recovery.

Case 38. Wounded 3 days before admission by a Shell Fragment. This entered the Right side of the Chest just above the Liver and was retained.

There was severe Haemoptysis. Patient spat up two cup--fulls of Bloody sputum on the evening of admission.

A small Right sided Haemothorax was present, but the case was further complicated by a wound of the liver.

Patient died 24 hours after admission.

At a Post-Mortem it was found that the Liver presented a most remarkable condition of gaseous cellulitis due to infection of the wound with a gas forming organism (cf. Appendix on Post Mortem Examinations.)

** For details of Post horizon of Page 134

Case 34. Wounded 4 days before admission by a Rifle Bullet which was not retained.

Haemoptysis occured for 3 days after patient was wounded.

There was a moderate amount of Left Sided Haemothorax.

(realing to the 4th rib).

This cleared up completely and patient was discharged to the Convalescent Camp 5 weeks after admission to Hospital.

The course of the case was attended by a moderate amount of fever.

Case 55. Wounded 4 days prior to admission, by a Grenade Fragment which was retained.

Haemoptysis did not occur until 5 days after patient was wounded. It then continued for 3 days, the sputum being abundant frothy and red with blood.

This case differed from the majority in certain striking details.

There was a Haemothorax, but it occupied an area of the front of the Chest above the level of the Pericardum, and extending out towards the Axilla.

A specimen of this subsequently gave a growth of Friedlander's Bacillus in association with Staphylococus, but Operative treatment was withheld and the case subsequently made a perfect recovery.

He was discharged to the Convalescent Camp 5 months after admission to Hospital.

Case 36. Wounded 3 days before admission to Hospital by Grenade

Fragments which were retained.

There were very extensive wounds of the Right side of the Back and these were in a very filthy condition.

Haemoptysis occured while Patient was in Hospital and there was a history of this symptom since he was wounded. A Plastic Operation was performed for excision of the wounds, but within 24 hours Patient was dead from Gas Gangrene of the Tissues of the Back.

Case 37. Wounded 5 days before admission by a Rifle Bullet which was not retained.

There was a history of haemoptysis for 2 days.

A moderate amount of Left Haemothorax was present. The course of the case was attended by mild irregular fever for six weeks, at the end of which time, the Haemothorax having cleared up and the temperature being reduced to the normal, Patient was discharged to the Convalescent Camp.

Case 38. Wounded 6 days before admission by a Rifle Bullet which was not retained. Haemoptysis occurred in the day of wounding only.

A small Right haemothorax was present, but this cleared up in 6 weeks and Patient was evacuated to the Convalescent Camp.

- Case 39. A Details of this case has been already dealt with.
- Case 40. This case has been already dealt with in detail.
- Case 41. This case has been already dealt with in detail.

- Case 42. This case has been already dealt with in detail.
- Case 43. This case has been already dealt with in detail.
- Case 44. Wounded 5 days before admission by a Rifle Bullet which was not retained, having penetrated the Left side of the Chest Haemoptysis occured for 2 days prior to admission.

 This case was complicated by a fracture of the 8th Rib near the angle of the Scapula and by a Pleuro-pneumonia.

From this Patient made a good recovery and was discharged

to the Convalescent Camp 1 month after admission to Hospital.

Case 45. This case has been already dealt with in detail.

Case 46. Wounded by a Rifle Bullet, which was not retained, 4 days before admission.

There was a history of Haemoptysis for 2 days.

There was a Large Haemothorax on the Left side.

There was irregular fever (reaching 102° at its highest) for 5 weeks, after which, although the Haemothorax had by no means cleared up, the Temperature fell to normal and remained so during the remainder of Patient's term in Hospital.

At the end of 10 weeks, this case was evacuated to Bizerte but the Haemothorax had by no means cleared up, and of its kind it was the most unsatisfactory in any series.

Case 47. Wounded through both sides of the Chest, 4 days before admission, by a Rifle Bullet, which was not retained.

There was a history of haemoptysis for 2 days.

There was a small left-sided Haemothorax which cleared up in a month. There was mild irregular fever for 5 weeks in the course of this case.

Patient was discharged at the end of 1 month to the Convalescent Camp.

Case 48. Wounded 20 days before admission by a Grenade Fragment which was retained.

On admission Patient was extremely ill and a diagnosis of Empyema (Left) was made. There was no haemoptysis in this case.

The wound which was in close relations to the 6th Rib in the Left side, was enlarged, and a resection of Rib performed for drainage under light general anaesthesia.

The escaping pus, which was of a dark brown colour, was of a very foul and striking character, being infected with Bacillus Coli.

A large sized Grenade Fragment was removed at this to operation from the Sinus Phremico Costalis.

Patient remained extremely ill, shewing practically no improvement after operation, and died 6 days after admission to Hospital. * In default of the Post Mostrum of Page 135

A Pathological report shews that the infection in this case was one of Bacillus Coli (in pure culture).

Case 49. Wounded 5 weeks before admission.

Resection of Rib was apparently performed for Haemothorax at an outside Hospital 4 days after patient was wounded.

There was a history of Haemoptysis extending over a period of 10 days after the receipt of the wound, which was caused by a Grenade Fragment. This was large and was retained

At the time of admission there was a very foul black dis--charge, resembling Melena in appearance.

Patient was taken to the Theatre and an operation performed to improve drainage, a resection of a portion of the 9th Rib in the Scapula then being performed.

Subsequently Eusol Lavage was employed, and later this was albeinated with Hydrogen Peroxide (5 when)

A second operation was performed for the removal of the

Foreign Body as suppuration was maintained.

At this operation further resections of Ribs were performed through an enlargement of the lateral wound.

A hand was introduced into the Pleural Cavity. The Lung which was adherent to the Diaphragm was slowly separated but no foreign body was found here or elsewhere in the Pleural Cavity

With the improved drainage and the subsequent collapse of the Chest wall however, patient's condition became much more favourable and when he was evacuated to Salonica, 2 months after his admission, his wounds were healing and the discharge from the Pleural cavity was scanty and there was an absence of fever

A Pathological report on this case shews that the infection was one of Bacillus Coli which developed in pure culture.

Case 50. Wounded 5 weeks before admission by a Grenade Fragment which was retained.

The wound which was in the Right Side of the Back immediately below the Angle of the Scapula, was discharging pus at the time of admission, the air passing freely in and out through the wound with the movements of respiration, the condition being one of Pyopietunsthorax.

The Pus gave a culture of Bacillus Frielander.

Patient was discharged from Hospital 2 months after admission.

The discharge had at that time ceased and the wound was almost healed.

Patients general condition was very good.

Case 51. This case has been already dealt with in detail.

- Case 52. This case has been already dealt with in detail.
- Case 53. Wounded I week before admission by a Rifle Bullet which was not retained.

There was no history of Haemoptysis, but from the position of the wounds, it was obvious that the bullet had passed through the lung.

There was a small Haemothorax on the Right side. This cleared up in the course of 5 weeks for the greater part of which time, mild irregular fever was present.

This case was evacuated to the Convalescent Camp.

Case 54. Wounded 10 days before admission by a Rifle Bullet which penetrated the Right side of the Chest just below the Clavicle.

There was a history of Haemoptysis extending over 5 days.

The wound of the lung was uncomplicated by Haemothorax or Pneumothorax, and the Patient was discharged to Convalescent Camp 5 weeks after being wounded.

The course of the case while patient was in 36th General Hospital, was afebrile.

Case 55. Wounded 10 days before admission by a Rifle Bullet which was retained and was palpable beneath the skin. The bullet was removed. The wound was in the left side of the Chest.

There was a history of Blood spitting for 5 days. No haemothorax or Pneumothorax was present.

The course of the case was Afebrile and patient was discharged to Convalescent Camp 1 month after admission.

APPENDIX ON MORTALITY with POST MORTEM REPORTS.

In this Series of 55 cases, there were 13 deaths, of which 7 only were entirely attributable to the wounds of the Lung or Pleura.

Taking these 7 cases first, the causes of death were:-

Case 2. Haemorrage.

Case 12. Gangrene of Lung and Pulmonary Abscess.

Case 15. Pyopneumothorax.

Case 17. Pyopneumothorax and Acute Pericarditis.

Case 22. Empyems and Pulmonary Abscess.

Case 48. Empyema following haemothorax; Paricarditis.

Case 51. Empyema, Multiple Pulmonary Abscess, and Septicaemia.

In the remaining 6 cases.

Case 3. Section of the Spinal Cord Cystitis.

Case 5. Biliary Fistula.

Case D. Section of the Spinal Cord at Cervico-Dorsal junction.

Case. 20. Biliary Fistula.

Gaseous cellulitis of Liver.

Case 36. Gas Gangrene of Tissues of Back.

This gives on the series of 55 cases, a mortality of 23% but when deaths due to external complications are eliminated from the cases under consideration, the mortality is reduced to 7 in a series of 49, ie to 14.2%.

This figure is in itself in reality unduly high, for I received into my Ward a certain number of serious cases of especial interest, taken over from other Medical Officers.

13 such cases are included, and of them 4 died, and though this inclusion did not appreciably alter, the percentages

of the various complications and sequelae occurring in the series, their exclusion brings the mortality down to 8.3%, and this may be concluded to have been the true rate of mortality.

Post Mortem Examinations were made in 8 cases. These case have been marked with an Asterisk and the reports are as follows:-

- Case 5. The General amaciation of the Cadaverwas extreme.

 Chest. The wound of drainage involves a resection of a portion of the 6th Rib in the MidAxillary Line.
 - Left Side. The Left Lung was pale and emphysematous but other-wise healthy. The Pleural surfaces were healthy and there
 was no effusion into the Pleural Cavity. There were no Pleural
 adhesions.
 - Right Side. The Right Lung was covered over its entire free surface by a shaggy deposit of Purulent Lymph. The Pleural Cavity was divided, excepting in the immediate neighbourhood of the Operation wound, by a sheet of dense adhesion of a very vascular character into two compartments. This Septum was situated laterally and extended from the Apex of the Long to within a very short distance of the wound of operation.

In the anterior of these compartments was a little Bile -stained Pus.

There was considerably more fluid in the Posterior compart-ment, but the fluid here was of the same appearance. There
was certainly half a pint.

The Lung was densely adherent to the Diaphragm below, and was also very adherent at the Apex.

The Lung Tissue itself was healthy except for some con--gestion at the Base. Here there were extensive areas of collapse, more especially immediately beneath the Pleura.

The Interlobar Pleural surfaces were covered with a shaggy deposit of Lymph.

The course of the shell fragment was through the Chest wall rather below and to the outer side of the right nipple, through the Liver and Diaphragm and through the Sinus Phrenico-Costalis just touching the Lung.

The Liver was extremely adherent to the Diaphragm.

The Liver itself was not altered in size and did not shew degeneration excepting in the neighbourhood of the Purulent Track through its substance.

There was sure puckering and tendency to scar at the Anterior end of this Track. At the Posterior end - the end communicating with the Pleural Cavity, there was none.

There was no injury to any other Abdominal viscera.

The heart appeared to be free from disease or obvious degeneration.

The Foreign Body in this case was removed from an abscess which formed in the Bakk during the course of the case.

Death was due to Biliary Fistula.

Case 12. The wounds in this case were small in regard to their drainage to the skin.

The wound of entrance was in the Left Axilla.

The wound of exit slightly larger and discharging pus was immediately below the junction of the Left Clavicle and the Sternum.

The wound in the Axilla was dry and had scabbed over.

Post Mortem examination shewed that the drainage caused by the Bullet to the Chest wall, was much greater than was

suspected. The 2nd Rib was fractured near the Sternum and there was a comminuted fracture at the juncture of the 1st Rib and Sternum. Ther was also a fractured Rib in relation to the wound of the Axilla.

There was an intense Gan rene of the front portion of the Anterior Lobe of the Left Lung, The affected portion being black and filthy. This extended to the upper margin of the Posterior Lobe. There was no line of Demarcation.

Except for some congestion of the beft Base, the Posterior Lobe appeared to be healthy, but the whole of the Left Lung was adherent to the Chest wall. The adhesions being of recent formation. Section of the Gangrenous Mass showed an Abscess cavity of small size.

The Right Lung and heart appeared to have been healthy condition at the time of death.

Death was due to Gangreneus of the Lung.

Case 17. The Cadaver was deeply jaundiced.

The wound of operation involved a resection of a portion of the 7th Rib in the Posterior Axillary Line on the Right side.

There was a large empyema occupying an area corresponding to the Anterior surface of the Lung on the Right side. The Bulk of the pus from this had escaped by drainage lymph through the wound but the Pleural surfaces were covered with a Mick and shaggy deposit of Purulent Lymph. The Purulent surface was prolonged into the interval between the Anterior and Middle Lobes of the Lung.

Extending from the Chest wall into this prolongation, were numerous chords of adhesion containing large blood vessels.

The upper limit of the empyema extended beyond the Apex

of the Lung.

The Pleura on the Posterior Chest wall and on the Posterior surface of the Lung was a little thickened in places with Fibrinous deposits and there were a few adhesions between the two Pleural surfaces more especially towards the Apex.

The Lung itself was reduced to a most remarkable degree of Purulent disintegration, being of a Pinkish colour and of almost semifluid consistency. This condition was present throughout the Lung which was entirely collapsed.

The Diaphragmatic Pleura on the Right side was covered with a layer of Purulent Lymph.

The Left Lung showed congestion and oedema and a few recent adhesions were present between the Pleural surfaces.

The Meart was a little displaced to the Left and there was a very marked acute Fibrinous Pericarditis. The whole surface of the heart presented a spongy appearance from the deposit of fibrin.

The heart inside was poor and thin, especially the Right Ventricle, and shewed a fatty deposit beneath the Pericardial surface.

No endocarditis was present.

The Foreign Body, a Grenade Fragment, was found in the course of the Post Mortem, lying apparently free in the Pleural Cavity.

Death was due to Acute Pericarditis following Empyema.

Case 20. The Cadaver was emaciated.

There was the car of a small wound in the Right Breast just above the nipple, and an operation wound involving a resection of a portion of the 6th Rib in the Right Axilla.

There was a collection of about half a pint of Purulent, Bloody fluid in the Right Pleural Cavity behind.

This was largely shut off by adhesions from the upper part of the Chest, the Lung being adherent to the Chest wall along the 3rd Interspace in practically its entire extent.

The Pleural surface of the Chest wall behind was of a very dark colour.

The Right Lung was covered, in its lower part more especially, with a shaggy deposit of Lymph. Its diaphragmatic surface was very adherent.

The Lung shewed congestion and collapse at its Base but was otherwise healthy.

The Left Lung showed Basal Congestion. Apart from this the condition of the Left Lung and Pleural Cavity was healthy.

The Liver was intensely adherent to the Diaphragm. There was a small penetrating wound through the diaphragm into the Liver. This was situated on the Superior surface of the Right Lobe, rather anteriorly.

The track of the Foreign Body through the Liver was very fine and shewed a purulent grey surface. It was surrounded by change a certain amount of fatty and congestive drainage resembling "Nutmeg" Liver.

The Foreign Body which must have been very small, could not be found. It was probably buried behind in the Posterior Abdominal wall.

The Heart and Pericardis presented a healthy appearance.

Death was due to Toxaemia and Asthemia induced by a

Biliary Fistul.

22.

Case

Chest Wall was bigger than had been anticipated.

There were small wounds of entrance and exit, one immediately above the Left Clavicle and the other on the Right side of the Back about midway between the inner border of the Scapula and the Spine and about 2 inches above the Inferior Angle of the former.

There was a fracture of the 2nd and 3rd Ribs near their angles on the left side - an Empyema had arisen on the left side very obviously in connection with this fracture.

The left lung was adherent along the 3rd and 4th Ribs

forward to within an inch of the Sternum and behind nearly to

the Spine. The 3rd interverbal Space corresponded the the

linear forward track of an empyema, but behind Pus had also track—

ed downwards beneath the Posterior Lobe of the Lung which was

adherent to the Thoracic wall and to the diaphragm. Any

attempt at removal tore the lung substance.

There was a small obscess in the Posterior Lobe of this Lung at the Base near the surface.

There was considerable adhesion between the Lung and Chest wall here and elsewhere.

This empyema was not recognized till after death.

There was a general congestion of the Posterior Lobe of the Left Lung.

The Right Lung and Pleura were in a fairly healthy condition, but there were areas of collapse. in the Anterior Lobe with areas of compensating superficial emphysema.

At the Post Mortem the Liver was very high reaching to the 3rd Rib. The Cardiac Apex was in the 4th SPACE and the Stomach intensely disturbed with gas,

A Custure taken from the Pus in this case at the time of Post Mortem, gave a growth of staphylococus ameus Streptococcus Pyogenes and Bacillus Welchii.

Death was apparently due to Toxaemia from an undetected empyema associated with a Pulmonary abscess.

Case 33. The cadever showed a small wound of entrance of a shell fragment in the 5th Right Intercostal Space in the Anterior Axilliary Line.

There was nothing further to remark in regard to the external appearances.

The Right Pleural Cavity contained from 10 to 15 ozs of Blood. There was a shaggy deposit of Fibim and Lymph all over the surface of the Right Lung Back and Front.

There were numerous Subplemal Haemorhages.

There was congestion and ocdema throughout the Right Lung
The Posterior Lobe was in a collapsed condition. The wound in
the Lung could not be recognized.

The Left Lung shewed congestion and oedema more especially towards the base.

The Left Pleura appeared to be healthy.

There was an excess of slightly Blood stained fluid in the Pericardium and there were a number of small haemorrhages beneath the visceral layer of the Pericardium.

The Shell Fragment had continued its course through the diaphragm into the Liver.

There was a large and very foul wound of the Liver. This wound was much larger than the external wound would have suggested.

A Probe was passed several inches down the Track of the

Foreign Body and this could be felt buried deeply in the Liver substance.

The whole Liver showed a most remarkable condition of Gaseous cellulitis. It was softer in consistency than in health and was of rather a pinkish colour.

It was honeycombed with cavities of varying size, the larger ones reaching approximately the size of a Boot Button.

This condition existed throughout the whole of the Liver and was in the opinion of the Hospital Pathologist, Lt. Forbes, R.A.M.C., certainly Ante-mortem in origin, And the very large size of the wound relative to the size of the Foreign Body suggested itself a rapidly progressing infection.

A small collection of Blood clot was present betwen the Liver and the Diaphragm.

Periconditis was commencing in the Upper part of the Abdomen.

A smear from a portion of the Liver in this case showed numerous gas forming organisms of the B. Welchii type.

Death was in this case apparently due to Toxaemia, arising from a virulent infection of the Liver with a Gas forming organism.

Case 48. The Cadaver presented a wound in the Left side of the Chest involving a resection of a portion of the 6th Rib.

This wound was an operative enlargement of the original wound of entrance of the Foreign Body, a Grenade Fragment.

There was no wound of exit and nothing further worthy of remark in the external appearance of the Cadaver.

The Left Pleural Cavity was divided by a Lateral Septum of adhesion extending from Apex to Base into two compartments.

The Posterior of them which was considerably the Larger, was directly in communication with the wound of drainage and beyond a little fibimous deposit the Pleura was in a comparatively healthy condition - a testimonial to the value of irrigation perhaps. The Anterior cavity had failed to drain efficiently through the operative wound and contained about 10 ozs of Pus, and the Pleura was greatly thickened by Lymph Purulent deposit.

The Posterior Lobe of the Left Lung was congested and very largely collapsed. The Anterior lobe shewed some degree of congestion and ocdema.

The Right Lung shewed extensive Tubercleof its lower lobe.

This appeared to have been of long standing.

There was a considerable amount of congestion and numerous calcarrous deposits were scattered throughout the Lower Lobe which was densely adherent to the Posterior Chest wall, some of the adhesions appearing to be recent in origin but some certainly being of long standing.

There were a number of calcareous deposits in the Toper and Middle Lobes but, apart from this, these seemed to be in a healthy condition.

The Heart showed a recent Pericarditis.

There was a recent fibrinous deposit over an area about the size of 2/6 on the Anterior surface. The Intrapericardial fluid did not seem to be increased in amount.

The Heart murcle was soft and flabby in texture, although this may possibly have been Post Mortem in origin.

There was no endocarditis.

The Foreign Body in this case was removed at Operation.

Death was due to Toxaemia from Empyema complicated by

Pericarditis and possibly Myocarditis.

The Pus in this case gave a pure growth of Bacillus Coli

Case 51. The Cadaver shews a large gutter-shaped granulating wound in the Right side of the Back just internal to the Inner Border of the Scapula.

This was a second wound in relation to the 8th Rib in the Right Side. This was an operative wound for resection of a portion of mecrossed Rib.

On the Right side the visceral and parietal layers of the Pleura were densely adherent more especially behind and over the Diaphragm.

The floor of the gutter shaped wound in the back described consisted of very thickened and freely discharging PleMabut around the edges of this floor the layers of the Pleura were adherent and it could hardly be said that an empyema existed.

In close relation to the floor of the wound there was an area of collapsed lung but this was not very extensive. This contained an abscess cavity about as lenge as a walnut.

There was another small abscess in the Upper Lobe behind, and in this Lobe some degree of emphysema was present.

Elsewhere the Right Lung was surprisingly healthy in appearance and in full agreement with the Physical signs shortly before death which shewed a good air entry into the Right side of the Chest although the Pleural cavity was apparently but not really, in free communication with the external air.

The Left Pleura was healthy but there were 4 small abscesses in the Left Lung - beyond some congestion at the Left Base this lung like the Right one was neither collapsed nor

extensively congested.

The Spleen was congested and enlarged.

The kidneys were pale and shewed cloudy swelling.

The Liver shewed some congestion of its upper surface in relation to the Diaphragmatic surface of the Right Lung.

The condition of the heart was apparently healthy.

The wall of the Right Ventricle was scarred with a red hot iron, a pippette introduced and a sample of Blood obtained.

This gave in culture a growth of Streptococus and

Death was due to Septicaemia.