Pain in the Chest

During a three month period of clinical instruction in a Municipal Hospital I had opportunity to collect a series of six cases all of which had as a prominent symptom pain in the chest. Not were these cases chosen at random. I have tried to select patients whose clinical condition indicated involvement of some component of the chest wall or of a contained viscus; the scope can be set forth schematically thus:

\[
\text{Chest Wall} \rightarrow \begin{cases} \\
\text{Muscle - Case I} \\
\text{Nerve - Case II} \\
\text{Vessels - Case III} \\
\text{Heart - Case IV} \\
\text{Tubercle - Case V} \\
\text{Tumor - Case VI} \\
\end{cases}
\]

Pain is one of four elementary sensations and the varieties of pain to which we are liable may be classified as either superficial, deep, visceral, referred, conditional or psychogenic. The first three varieties are also known as direct pains. All of these varieties may be encountered in disease of the chest - muscular pains due to strain or even tearing of muscle fibres (deep pain); the boring pain of an eroding aneurysm (deep pain); root pains radiating round the trunk (as in tabes, syphilis, meningitis, tumours of the cord, herpes zoster, rachitis and other lesions which involve the posterior nerve roots - superficial pain); substernal pain on swallowing (associated with aero-digestive obstruction - visceral pain); the pains of angina or coronary ischaemia - referred pain; occasionally referred dysesthetic pain; and so on. A conditional pain on movement, in traumatic cases, is one in which the pain persists long after the injury has...
been fully recovered from. With regard to pain of psychogenic origin it seems to me that when Psyche raises her head she knocks it against the chest wall just below the breast. So constant is this finding that whenever inframammary pain is complained of (usually in the female) the clinician at once considers the possibility of a lesion of the mind.

The possible causes of "pain in the side" in relation to segmental nerves may be depicted thus:

1. Spinal cord - tumour, inflammation
2. Meninges - tumour, dorsal meningitis
3. Posterior root ganglion - herpes,take
5. Peripheral nerve - neuritis.
6. Muscle, fascia, skin - myalgia

These are referred pain - from lung, pleura, mediastinum, heart.
Andrew C. Douglas.
Interrogation:

John Robertson, age 54, married; fruitier and confectioner.
Address - 64, Northfield, Milnbrae, Edinburgh.
Admitted to Western General Hospital on 14th September 1965.
Recommended by Dr. Hannah Reid.
Examined on 18th October 1965.

Complaint:
Agonizing sub-sternal pain induced by exertion.

History:

Present Illness.

The patient states he was in very good health until March 1964, when one day, while washing the dishes (his wife had a broken arm at the time) he felt a pain in the epigastric region which was not very severe and thinking it was indigestion he tried to ignore it. A quarter of an hour later as he sat at tea he was suddenly seized by an agonizing sub-sternal pain and his chest seemed as if it were gripped in a vise. The pain also radiated down the inner and anterior aspects of both arms. Sweat poured from his body and his feet and hands felt chilled. Acute breathlessness also added to his distress. Struggling to get to bed the patient found that he could not lie still and he tried and turned to try to get rid of the pain but all his efforts were of no avail. While in bed a feeling of nausea came over him but he did not vomit. His doctor was called in and by the time he arrived the patient was in a state of collapse. A hypodermic injection was given and the patient was admitted to the Western General Hospital.

From the second day in hospital the patient
was free from pain. For 3 weeks the patient was nursed flat on his back, avoiding any exertion, and after 4 weeks was discharged from hospital after an uneventful recovery. For a week after his discharge he noticed his ankle swollen in the evening and this would disappear after a night's rest.

The patient had a holiday for two months and thereafter gradually returned to work, working half-days at a time at first and going home whenever he felt tired, for he has his own business. He had to avoid the heavy lifts which his work involved and assiduously followed his doctor's advice to avoid climbing stairs or hills or any undue exertion. If perchance he did walk up an incline, which previously he would take in his stride, he could be sure he would be breathless before he reached the top. Apart from his breathlessness on exertion the patient remained comparatively well until October 1945 when one day, on lifting an empty wooden box in his shop he suddenly experienced a pain, cracking in character, behind the lower end of the sternum. The pain did not radiate anywhere and was gone in an instant as soon as he laid down the box. His doctor being on holiday at the time, the patient reported to the Western General Hospital where he was advised to have five days in bed.

Since then till the end of August 1946 the patient remained quite well, untroubled by pain. It was then that he began to experience pain which could be induced by exertion. This pain, originating at the lower end of the left border of the sternum, would shoot up into the neck and across the front of the chest towards the right nipple but never went down the arms. The first experienced his pain
when walking up a slight incline. He was forced to stand still at once and he remained rigid where he was, thinking his end was near, so intense was the pain. After what seemed like years the pain gradually lessened and he continued on his way apparently just as well as ever in body but greatly disturbed in mind.

During an attack the patient would experience a sensation of constriction across the lower ribs and felt as if his stomach was blown up with wind and indeed this sensation was relieved by forced ventilation.

After a few attacks, which were always associated with exertion of like degree, the patient reported to his doctor who advised a fortnight in bed. During this period of complete relaxation the patient experienced no pain. On the Thursday prior to admission he was allowed up and given tablets to take before any expected exertion and sent to the Western General Hospital for examination.

On the following Monday the patient was admitted.

Previous health, social conditions, food and habits:

As a child the patient had measles and mumps. There is no history of scarlet or rheumatic fever or of "growing pains" as a young lad. All his life he has been a healthy specimen and has taken every measure to remain so. He is a total abstainer and five cigarettes a day is all the allowance he owes to body nicotine. Though not over-indulgent in food and drink he likes the best - and usually gets it.

The patient is married, with two daughters to grace his home. Home life is very happy, for, apart from church activities, he has sung in the choir for many
year), it has had all his attention.

Family History:

The patient's mother died in middle age of cancer of the breast and his father slept away at the age of 84. The other members of the family, 3 brothers and 4 sisters, are alive and well.

There is no history of heart disease in his family.

State on Examination:

Hopeful for the best but fully aware of the worst—such was the impression I received of the patient's attitude to his condition as I listened to his story.

He was sitting up in bed, a well-built, average-sized man and it was obvious that, though Nature had endowed him with the broad shoulders one so often sees in those afflicted with his condition and with the worrying disposition which is nearly always found, Fortune had been kind to that frame, for manual labour was foreign to those well-nourished, baby-smooth hands.

His steady smile was out of keeping with his anxious eyes and if anyone, looking forward to the unknown future, "guessed and feared", our patient did.

A glance at his chart showed a steady normal temperature of a patient confined to bed (97°F).

Systematic Examination.

Alimentary System.

Symptoms:

Appetite very good. No thirst, dysphagia, leucorrhoea or watery bowel. Feeling of flatulent distension coincident with attack of chest pain and relieved by eructation.
Bowel movement is regular.

Signs: The lips were of a healthy, reddish hue. Upper and lower dentures well-fitting and clean. The tongue was clean except for the slight yellow deposit posteriorly, the normal appearance. The usual roughness of the papillae was observed.

Lyons and fauces were normal.

Abdomen:

Inspection: Slight fullness of lower abdomen, correlated with the general good nutrition of the patient and his occupation. No striae, scars, dilated veins or abnormal movements.

Palpation: Abdominal wall well covered padded with adipose tissue. No tenderness, rigidity or resistance. There was no fecalidity and the rectal muscles were in equal tone. There were no palpable masses. The umbilicus was not emaciated and was freely movable.

Examination of individual organs: The stomach contained an air bubble of average size. Liver, spleen and kidneys were not enlarged.

Haemopoietic System.

No symptoms.

Lymph glands in groin, axillae and elsewhere not enlarged. Spleen not enlarged.

W.B.C. 24/1/45 8,200
4/10/45 7,200
9/10/45 7,200.

Haemoglobin 90%. The blood W.B. is negative.

Endocrine System.

Panecles - No thirst or glycosuria.

Thyroid - No alteration in size. No upset in metabolic role. Temperature normal.
Parathyroids - No bony or changes in tone.
Spleen - No pigmentation or firmness.
Sincipital - No skeletal changes or changes in sex character.

Respiratory System.
Symptoms: - Undue dyspnoea on slight exertion.
Signs: -
The patient's broad chest was well covered and symmetrical. Movements of chest on normal and deep respiration were equal on both sides. Vocal fremitus and resonance equal on both sides and normal. Breath sounds vesicular, all over chest with no accompaniments. The bases were clear.
Respiratory rate 20/min.

Integumentary System
No symptoms.
Skin sallow coloured, slightly moist with no abnormal pigmentation and no skin eruptions. The nails show no changes and no clubbing of fingers or toes.

Nervous System
No symptoms.
No evidence of upset in mental functions. Reflexes present and equal on both sides. No motor or sensory impairment detected in cranial and peripheral nerves.

Urineary System
No symptoms.
Signs: - Kidneys not palpable.
Urine is lemon coloured. SG 1025, acid, with no abnormal constituents.
Circulatory System.

Symptoms:—Subternal pain on exertion and undue breathlessness. No palpitation or faintness.

Signs:—

Arteries:—Pulse rate 80/minute, regular in force and rhythm; pulse wave of average excursion without well sustained. The vessel wall was of a rubbery consistency but there was no turbidity. The pulse is equal in all respects on both sides.

Arterial pressure 120/80 mm. mercury.

Vessels:—No distension, varicosity or pulsations.

Capillaries:—No cyanosis, droopy or pulsation.

Heart:—

Precordium normal in shape and well covered. Apex beat diffuse and in the fifth left interspace 2 1/2" from the mid-sternal line. The area of cardiac dullness was not enlarged.

The heart sounds were closed in all areas but rather faint because of the thick chest wall. There was no X-ray available.

Diagnosis:

Angina Pectoris, with old, healed Coronary Thrombosis.

Differential Diagnosis:—

Angina pectoris must be differentiated from—

1. Coronary Thrombosis, by the absence of relation to effort, the relatively long duration of the pain and the symptoms of shock, all of which characterize coronary Thrombosis.

2. Aneurysm of the aorta, where the pain is persistent due to erosion of the bone.

3. Tuberculosis of the intercostal muscles, which also gives a persistent pain which is more superficial and
is not related to effort, other than that causing contraction of pectoral and intercostal muscles.

6. Neuroasthenia. In this condition a "stabbing" pain localized in the nipple area is usually described, with the free use of superlatives, in the midst of a long and detailed history. From the general appearance and manner of the patient introspection is usually fairly obvious. The pain described by the neurotic is more prolonged than an attack of angina, is often alleged to be present continuously for long periods and is not noticeably increased during exertion, though it may be aggravated after exertion or by emotion or excitement. Often there is striking hyperesthesia in addition. Unlike angina, such pain is not characterized by immobility and holding of the breath but rather by restlessness and agitation.

The diagnosis of angina pectoris is often one of considerable difficulty, particularly when, as often happens, the patient is not seen in an attack. In such a case the history of the patient is of the greatest importance. The important factors are:

1. The age: angina pectoris is very rare before about 40 years of age.

2. Diminished exercise tolerance: The great majority of sufferers from angina are unduly dyspnoic on slight exertion.

3. Evidence of a cardiovascular lesion: Most patients who suffer from angina will show objective evidence of disease such as cardiac enlargement or aortic valvular disease. Thickening of the radial or subclavian arteries may be the only clinical evidence of arteriosclerotic change, but X-ray examination may show that the aorta is
dilated or that a doubtful heart is really enlarged.

It is important to realise that a normal electrocardiogram in no way precludes the occurrence of angina though electrocardiographic changes are the most valuable sign.

Although physical examination in this case proved entirely negative there is no hesitation in giving the diagnosis for in angina pectoris the diagnosis is made, essentially, on the history. Perhaps the most significant point in the diagnosis of angina is that in this condition the attacks of pain are induced by exertion and relieved by rest. Any substernal or precordial pain in a patient of middle age or over, which has these characteristics, must be viewed with grave suspicion. In the more severe types, where the pain comes on spontaneously, there is likely to be confirmatory evidence in the form of objective evidence of cardiovascular disease, and the attacks are also likely to be sufficiently typical to justify the diagnosis.

**Prognosis:**

This is grave, since sudden death of coronary thrombosis may occur at any time. William Heberden, in his classical description of angina in 1768, remarks "The termination of angina pectoris is remarkable, for, if no accident intervene, but the disease go on to its height, the patient all suddenly fall down and perish almost immediately. Of which indeed their frequent faintness, and sensations as if all the powers of life were failing, afford no obscure intimation. The outlook in angina pectoris is
rather better -
1. If the attacks are infrequent, e.g. every three months or so.
2. If they require severe effort before they are brought on.
3. If the patient can restrict his activities to a moderate amount of exercise and
4. If he is willing to co-operate as regards the treatment, e.g. to retire from business and
   live in the country.

As we have seen, with regard to 1 and 2, the integrity of soma has been gravely disturbed
and the prognosis becomes grave still when we
realize that psyche, with regard to 3 and 4,
is adverse. The patient is too conscientious to
be content to look on in his work - his first
experience of anginal pain occurred when he
was disregarding his doctor's order to avoid
lifting things at work.

Nevertheless, with careful treatment and
wise advice our patient may enjoy quite a few
years of happy, if idle, life. The aetiology of
the condition in this case is also a point in
favour of a not-too-grave view of the future.
We shall discuss this point more fully later.

Treatment:

The treatment of actual attacks of pain should be
looked upon as a very minor part of the treatment of
a case of coronary disease. Reduction in the number
of attacks is of vastly greater importance, and a great
deal can be done by wise management to achieve
this end. Much more will be achieved by regulation
of the mode of life at work and play, of habits
regarding meals and the use of alcohol and tobacco
and by advice on other mundane matters than by
the administration of drugs. It is a tragedy of one's
therapeutic knowledge to diagnose a case as one
of effort angina and to send him away merely
with a box of angle nitrite "pills" and instructions
to take one when the pain is felt.

A large proportion of cases, and our patient
is included in this group, one of the over-weight,
thick-set type, and in these reduction in weight
is probably the most potent therapeutic agent.
The loss of one or two superfluous stones greatly
lessens the burden imposed on the heart and usually
leads to striking improvement in the exercise
tolerance without the use of any drugs. The suffer-
ners from angina should be encouraged to attain a
weight slightly under what is average for
the height, age and sex. This can be achieved
by simple dietary restrictions, provided the
co-operation of the patient is secured. Thyroid
extract as a weight-reducing agent is not to be
recommended in angina cases, in view of the
increased cardiac load it imposes. A further
dietetic point hinges on the well-known
tendency of attacks to occur when exercise is
taken soon after a meal. Heavy meals are to
be avoided, and a rest or short sleep after
lunch or dinner may greatly reduce the frequency
of attacks in some patients.

A large proportion of cases occur in the
active type of business man around fifty years
of age, and in these a careful consideration of
the case will reveal what steps can be taken
to reduce the demands that are made on the
circulation. The avoidance of business worries, relegation of as much work as feasible to juniors, the giving up of work involving responsibility and strain e.g. the bargaining at the wholesale fruit market etc. are all points requiring consideration. Physical effort can be reduced considerably by taking a little thought — having his bedroom on the ground floor, going late to work and leaving early and thereby avoiding the bustle and rush inevitable when the usual morning and evening train or bus is taken between suburb and city, avoiding heavy lifts at work and so on. Each case demands careful assessment, and great judgment in weighing the risk involved by continued work against the financial worry and hardships that will follow invalidism. The history of previous coronary occlusion adversely affects the prognosis and, while I believe that enforced retirement would be more detrimental than life-preserving yet I think, although that I would probably not agree, that a heart-to-heart talk explaining the results to be expected from negligence of the rules related to physical work would pay a good dividend in useful years, for the patient is such as would appreciate and observe such advice.

It is always possible, whatever other measures are taken to spare the heart, to arrange that the patient can have at least eight hours’ sleep each night, with the additional rest of Saturday and Sunday afternoon in bed if required. The period of hospitalisation of the patient at present is being carried out as a result of the
observation that at the outset of treatment in
some cases considerable betterment is frequently
obtainable by an initial period of two or
three weeks' absolute rest in bed. The relief from
attacks so attained may persist after return to
activity, usually as an increase in the amount
of work required to provoke an attack. Periodic
spells of bed-rest of this type are of value
and should be stressed in this case.

The use of drugs is of minor importance but
nitroglycerin has been proved to be valuable
in preventing, as well as in cutting short,
attacks of pain. A patient, such as one, who
habitually gets pain on doing a specific
act may prevent such attacks by taking 1/1000 or
1/50 gr. of nitroglycerin a few minutes before
performing the act. Since cold is a well-
known precipitating factor it would be well
to advise the use of nitroglycerin on coming
out of a warm church, theatre etc. The patient
must be warned that the tablets are intended to
allow him to pursue his essential daily business
at a very low level of energy expenditure, and
are not to be taken with the object of allowing
him to return to a more strenuous mode of
life. The amylnitrite 3 m. glass capsule is of
Think better held back, up one's sleeve as it were.

There are disadvantages to its use —

a) it does not work in a third of cases
b) the action of inhalation is conspicuous

c) the action is very transient,
d) it causes a burning sensation in the head,
e) also I feel that a potent, quick-acting
pain reliever in angina defeats Nature's purpose
Pain is Nature’s cry for help; in this case the cry of an anoxicemic muscle for oxygen. When a patient finds in his hands a powerful pain reliever it seems natural to suppose that all we have suggested on the previous pages will go by the board and exercise, for above the capability of the oxygen-starved heart, will be undertaken since he knows the remedy is at hand. I cannot believe that such repeated assaults on the cardiac muscle will leave it untouched.

A combination of Theophylline and Ethylene diamine, sold as aminophylline, is probably more efficient as a coronary vasodilator than the simple purine itself to be extensively used and is worthy of trial should nitrites fail, and can be given as a tablet by mouth in doses of .15 to as a suppository .36 G., repeated in either case twice or three daily.

The operative measures for angina pectoris have on the whole proved effective. Anyway, there is no reason to suppose medical treatment will not be successful in this case; the freedom from pain while in hospital proves this.

Again, for the reasons given above, I think that the wholesale use of alcohol for paravertebral injection of the first five dorsal nerve roots and the varied operations for cervical sympathectomy, unless performed for pain which is not controlled by medical treatment, probably does more harm than good for the apparent increase of the patient’s Threshold and range of effort is not, indeed, effected and only the cardiac muscle at first
recognizes this. The next stage, if not the aftermath of a painless infancy, is a fast-moving heart occurring probably years before its time. Had Nature's warning mechanism still been functioning.

As we shall see presently, the basic lesion in this case is not such as can be cured or controlled by treatment.

Discussion:

The history of this patient is so typical that in spite of negative findings on physical examination no doubt exists in my mind as regards the diagnosis. This is further strengthened by the history of a typical attack of coronary occlusion. Atherosclerosis and arteriosclerosis affect the coronary vessels in the course of the heart, while syphilis affects only the origins from the aorta. A normal blood pressure and absence of retinal and cardiac thickening serve to exclude arteriosclerosis in this case. Also, there is no history to suggest such a condition. For atherosclerosis is usually firmly established and of some standing before coronary involvement becomes apparent. The blood Wassermann is negative, excluding syphilis as a possible cause of the condition.

Atheroma, a fatty degeneration especially affecting the aorta, the coronary arteries and the cerebral arteries, is therefore left a clear field. In this condition, which does not cause hypertension, there is intimal proliferation and degeneration often with deposition of calcium in the form of plaques. The surface layers may give way and form “atheromatous ulcers.” These changes are associated with a reduction in the lumen of the vessel and a tendency
to Thrombus formation within the vessel. The leucocytosis present on admission and which has now settled is interesting. That this is a feature of coronary occlusion where the blood supply to a portion of the cardiac is prejudiced by disease is well known. Perhaps the raised white cell count in this case can be explained on a similar basis. Thrombosis has occurred to the stage of producing pain and the muscle compromised will undergo the changes usually seen in nature when the blood supply to a highly-specialized organ is diminished, namely, the change to the almost avascular and easily-nourished fibrous tissue. The peripheral blood picture has probably been reflecting such a change.

Severe anemia and paroxysmal tachycardia are also to be mentioned and dismissed as causes of anginal pain, for they have no part in this case.

The history of swollen ankles after the attack of coronary thrombosis indicates that it was touch and go at that time whether the injured cardiac muscle could perform as usual. Whether or not a second similar assault could be overcome is very unlikely.

The patient's statement of a sensation of constriction across the lower ribs can be explained by the visceromotor reflex. The stimuli resulting from visceral distress reach the cord and spread to the motor cells of the cord in at that level and results in muscular spasm. The stimuli are also referred as pain to that portion of the skin whose sensory nerves enter the cord at the same level ($8^\text{th}$-$6^\text{th}$). This is the viscerosensory reflex.
The patient complained of a feeling of gastric distension and discomfort behind the sternum, accompanied and relieved by eructations from the stomach. Nevertheless, this was not indigestion but angina pectoris.

I must confess that when I approached this patient with a view to physical examination I was prepared to find evidence of cardiac involvement and it was when the methods of examination available to me revealed no apparent disease that the value of the history in a case of angina as the most important factor in deciding the diagnosis was impressed upon me. The electrocardiogram, the stethoscope and all the other devices in the armamentarium of the clinician are only of value in confirming the diagnosis and seeking out the cause. The diagnosis is made, in the first place, from the patient's lips. Heberden's account of the condition, originally written in 1768 when the only aids to diagnosis were the physician's senses, is, even today, with all the accessory aids to diagnosis, an accurate and comprehensive account to which little has been added. A few extracts from this description will not be amiss. It can serve as a standard of comparison for the case we have been discussing. He writes: "...it is a disorder of the breast marked with strong and peculiar symptoms considerable for the kind of danger belonging to it, and not extremely rare, which deserves to be mentioned more at length. The seat of it, and sense of strangling and anxiety with which it is attended, may make it not improperly called Angina Pectoris.

"...they who are afflicted with it are seized while
They are walking (more especially if it be uphill, and soon after eating) with a painful and most disagreeable sensation in the breast which seems as if it would extinguish life if it were to increase or continue; but the moment they stand still all this uneasiness vanishes.

"In all other respects, the patient are, at the beginning of this disorder, perfectly well, and in particular have no shortness of breath, from which it is different. The pain is sometimes situated in the upper part, sometimes in the middle, sometimes at the bottom of the chest, and often more inclined to the left than to the right side, and likewise very frequently extends from the breast to the middle of the left arm. Males are most liable to that disease especially such as have passed their fiftieth year.

"After it has continued a year or more, it will not cease so instantly, even on standing still; and it will come on, not only when the persons are walking, but when they are lying down, especially if they lie on their left side, and obliges them to rise up out of this bed ---

"I have seen nearly a hundred people under this disorder, of which number there have been three women and one boy twelve years old. All the rest were men near men near, of past, the fiftieth year of their age."

The lesson to be learned from this case is that if a man over 50 complains of a spasmodic, smothering pain behind the sternum on exertion or excitement, no matter what the results of physical examination, angina pectoris is present.
Interrogation:

Thomas Purichard, age 58 years, married; Snevaughman
Address - 106, Craigentinny Road, Edinburgh.
Admitted to Western General Hospital on 19th September 1945
Recommended by Dr. Shaw, Edinburgh.
Examed on 2nd October 1945.

Complaint:

The patient was admitted complaining of pain in
the epigastrum and vomiting, occurring regularly
after meals and substernal pain induced by exertion.

History:

Present Illness:

Since 1936 the patient has been troubled, on and
off, with his stomach. This condition began, he describe
like weekly attacks of bile with diarrhoea and
vomiting which would come on suddenly and leave
him completely felled. This pain began to be a
feature, coming on about half an hour after a
meal usually and disappearing spontaneously
after an hour or two if left alone. Occasionally
the interval between food and pain was as long
as one and a half hours. Baking soda gave
quick relief and temporary relief could sometimes
be obtained by taking food but the pain soon
recurred. A feeling of nausea accompanied his
pain and vomiting, which, he declares, consisted
of froth and mucus only with no evidence of
food taken at the previous meal, relieved the pain
to a certain extent but still left a dull ache.
The pain experienced before vomiting occurred felt
as if "somebody had given him a kick in the
stomach" and that after the vomit was as if his
stomach were in the grip of a mailed fist slowly clenching and unclenching. While the pain lasted the patient observed, the epigastric region was exquisitely tender to the touch and even between pangs the epigastric area of the abdominal wall seemed to present the presence of his meal. The pain would occur with absolute regularity after a meal and, in time, he began to dread the next meal with its inevitable consequences. His weight (he was over 13 stones then) showed a marked drop over a few months and it was this which compelled his doctor to advise an operation to which the patient gave his consent; in November 1926 a gastro-jejunostomy was performed on him.

Surgical aid, however, proved of little value for the patient had an almost continual vomit, which was green in colour as if he had been chewing grass and was putrid and foul, night and day for the next 9 months when he was operated on again for what he calls a "nicious circle:. This time a very sick man. He made a good recovery and for 18 months remained perfectly well with no pain of vomiting and then, for some reason, the gastro-jejunostomy was undone. There followed a further year and a half of freedom from symptoms and then the old condition began again with no pain and vomiting after meals which recurred periodically with gradually shortening intervals of freedom till the clinical picture was, once more, that of the latter half of 1926.

The patient was then referred to Mr. Graham in the Royal Infirmary who, when the X-Ray revealed ulceration on both stomach and duodenum, referred him to a medical ward under Dr. Goodall...
where he was advised on matters of diet and general regime. After 10 days in the ward he was discharged with instructions to rest in bed for six months. This the patient did and at the end of the time had been free from symptoms for about 4½ months and, generally feeling very well, he decided to return to work.

On returning to work he was troubled with occasional stomach pain but it was then that a new feature, namely pain in the chest, made its appearance. The patient gradually began to experience pain at the lower end of the sternum, and deep to it, which was definitely brought on by exertion. This pain would come on when he was hurrying, digging in his plot, climbing hills or stairs or when he was involved in an argument. The pain could be induced by a definite degree of mental or physical exertion eg., after climbing a definite number of stairs or when an argument became heated and his words were flowing fast. The chest pain would come on. The pain was of a tight, gripping character and would radiate through to the back between the shoulder blades and down the inner side of the left arm and was accompanied often by excess salivation which made him swallow. At first he thought it was his stomach pain in a severe degree but he gradually the pain in the chest became so severe that twice he actually dropped down in the street with it. It would gradually last away when he remained at rest, which the pain compelled him to do, and rarely lasted longer than about two minutes or so. If he were walking in the street and he felt the tinge he would stop and look in a shop
window till it eased. Then make for the nearest trim for home. The pain, he declared, began to make him round-shouldered for he felt as if his chest were being drawn in and this feeling established the habit of stooping which is evident today. Gradually the patient began to appreciate his threshold for pain and by restricting activity to his pain-free range was able to carry on his work as a tram driver which necessitated little physical exertion. All this was superimposed on a background of epigastric pain and vomiting after meals which was the patient's number one complaint.

After a particularly bad bout last year of epigastric pain and vomiting, when nothing would lie on his stomach for days, the patient called in his doctor who sent him up to The Royal Infirmary where he was seen in the out-patient department and put on the waiting list for admission. Two weeks later a letter arrived asking him if he would go to The Western General Hospital, which he did, and was admitted on the 1st. of August to that institution. He was treated there for 2½ weeks and left, feeling in the pink with no symptoms. While having a month's holiday, which the physician had advised him when he was in hospital, the pain and vomiting returned with renewed violence and the patient once more reported to the hospital and was thereupon admitted.

At no time in this long history of dyspeptic symptoms has the pain or vomiting altered, either in their character or in their relation to food. The patient was firm and emphatic in his statement
of this fact, he has never noticed blood in his vomit nor any darkening of his stools, since his admission to hospital. There has been no vomiting and pain ceased from the second day of confinement to bed. The occasional flatulence with foul emanation which of late had been a distressing complaint has now altogether disappeared but constipation which, he noticed, was in a degree proportional to the severity of his pain, is still a feature of his condition.

**Previous health, social conditions, food and habits:**

Apart from the usual ailments of childhood the patient's early years were very healthy.

The patient has been a tram driver since 1919 and has always liked his work although his meals were irregular and at erratic intervals. He feels that this irregularity was at the root of all his stomach trouble. A typical day in his life went thus:

The patient awoke at 4.30 a.m. and ate a piece of toast along with some tea before setting out to work, with a flask of tea and bread-and-cheese sandwiches in his pocket. If he were "lucky to get a shift" (not he acted as spare driver, filling the breach should anyone sleep in) he would heat up his tea in a kettle at 9 o'clock and eat his sandwiches. The last food he enter his stomach till 3.30 in the afternoon when he would go home, have a good meal, turn sick and vomit. If he didn't get a shift he would help in the garage till about 9 o'clock then go home till about 11 am when he reported for duty on the mid-day trams.
In the afternoon about 4 o'clock he would make a dive of his sandwich whenever he could and at 8 o'clock would go home to his usual routine of a good meal — and vomiting. Some days he would receive a note telling him to report at 8 am when he would be on duty till 1 am. The following morning;

Truly the life of a space man was not for anybody with a sensitive ulcer.

After his 6 months rest mentioned above, the patient was given a steady job on the night-shift but actually conditions were worse rather than better as regards regularity in meals and as he came home at 9.15 am he could see in the mirror his face was drawn, grey and tired. He felt he would have done well on the shift had he been able to get his rest but he could never sleep during the day and always went out to work at night feeling worn out.

Home life has been very happy and his little-circle was the pride of the patient's eye. When it was broken by the death of his youngest son in Normandie a year past June he "let himself go to moan and moan," he says, and his stomach pain became very bad. This was the time when he was first admitted to hospital.

The patient smokes 5 cigarettes per day and has no use for alcohol. As for his food, this has largely been determined by the reaction of his stomach to certain articles of diet. Chocolate, cocoa, sour oranges and acid apples, fried food and cooked vegetables — all these were sure to precipitate a violent dyspeptic attack. He makes a rather amazing statement regarding his tolerance of
vegetables. While he was working away in his allotment it was his custom to eat raw vegetables such as turnips, pieces of cabbage leaf etc. and this did not upset him in the least. Yet, if he as much as ate a mouthful of cooked vegetable he could be sure of a violent attack of pain within the next half-hour or so. It was after such dietary indiscretions that heartburn, so severe that he was often glad to make himself sick with his fingers, would occur.

**Family History:**

The patient's father died at the age of 54 of angina pectoris. He had got up one night for a drink of water and suddenly collapsed and died. His mother died of diabetes mellitus. The patient is one of a family of ten and, as far as he is aware, all the others enjoy perfect health, none of them suffering from complaints similar to his own.

The members of his own family, 2 boys and a girl, are all well.

**State on Examination:**

The patient was sitting up in bed, a pleasant, good-natured, likeable sort of fellow but his drawn face showed that pain had for long drained the inner essence. For his face was haggard and lean, even aquiline in appearance and the corners of his mouth drooped giving his face a rather hard look. He was of good stature however and his lips were ruby red, an unexpected finding in such a patient.

5 ft 6 ins. in height and 7 st 5 lb. in weight,
The patient's frame was well developed but the nutrition was poor. He had a worried, anxious look on his face and he seemed resigned to the fact (though not apathetic) that his burden in life was his stomach.

There was no sick sin at his bedside. His temperature was 99.0F.

**Systemic Examination.**

**Alimentary System.**

**Symptoms:** Since admission the patient has had no vomiting and his pain has also completely gone. His appetite is good and under the ordered regime in hospital now seems to enjoy rather than dread his food. There is no flatulence, heartburn or waterbrash but there is still obstinate constipation.

**Signs:** The lips are of a surprisingly healthy hue for such a patient. Both upper and lower dentures are clean, well-fitting and used. The tongue is moist and clearly coated with yellow deposit. There is no evidence of any infection in the mouth and throat and the gums and fauces are normal.

**Abdomen:**

Inspection shows a rather concave abdomen. Here being obviously little fatty reserve in the abdominal wall. The abdomen moved freely on respiration and movement. No equal and unrestricted on both sides.

Two upper abdominal paramedian scars are present yet three operations are recorded. Perhaps two scars are incorporated in one and indeed the left sided one’s dots seem unusually extensive. There are no sign of abnormal veins present.

**Palpation:** There is no tenderness, rigidity or resistance
to be felt anywhere in the abdomen. Even firm pressure
not in the epigastrium was not unduly tender. The
patient states that mid-line tenderness disappeared
on the third day after admission, yet he himself
noticed it. The rectus on both sides presents no
abnormality of tone which is equal on both sides.
There are no palpable masses. The umbilicus is
of normal shape and appearance and is mobile.

Examination of individual organs:

The stomach air bubble is of average size and
otherwise no abnormality is apparent. The liver is
hyperexpansible and no masses palpable.

Lungs, spleen and kidneys are of average size.
The descending colon feels rather prominent but
this is due to its being loaded with faeces for one
can feel the semi-solid contents with the finger.

Faeces:

The colour of the faeces is dark brown. There is
no mucus or frank blood present and the motion
is rather hard, clearing out the patient’s statement
of diarrhoea.

The Benzidine Test is positive, with one plus.

Haematological System.

There are no symptoms.

The lymph glands accessible for palpation are not
enlarged nor is the spleen enlarged.

Blood Count - W.B.C. 7,200/c.mm.

R.B.C. 5.4 millions

H.B. 106%.

The haemoglobin and red cell figures are rather
amazing in a patient with septic ulceration. There has
been no transfusion of blood and no specific
therapy for anaemia.
Endocrine System:

Pancreas: No thirst, polyuria or glycosuria.

Thyroid: Of average size and consistence. There is no nodule in metabolic rate. Temperature normal.

Parathyroids: No localized or changes in bone.

Suprarenals: No engorgement. No neurones.

Vitally: No skeletal changes or changes in sex characters.

Circulatory System:

Symptoms: Subternal pain on exertion. The patient is not easily breathless, never feels faint and does not suffer from palpitation.

Arteries: Pulse rate 76, regular in rhythm and force. Pulse wave of average excursion and equal in amplitude. Intense wall mobility in consistence but is not grossly thickened and is not tortuous.

The pulse is equal in all respects on both sides.

Arterial Pressure 120/80 mm. mercury.

Veins: No distension, varicosities or undue pulsation.

Capillaries: No cyanosis, edema, or abnormal pulsation.

Heart:

Precordium of normal shape but poorly covered. The apex beat is localized in the fifth left intercostal space just within the mid-axillary line. There is no enlargement of the area of cardiac dullness. There are no thrills felt over the precordium. The heart sounds in all areas are rather soft in character but no impurities were are present.

No X-ray of the chest is available.

Respiratory System:

No symptoms.

Signs: Chest symmetrical in shape but poorly
coughed. There is definite flattening of the whole thoracic cage accentuated by the rather stooping attitude and the forward flung shoulders.

The breathing is regular at 20 per minute and without effort. Movements of chest equal on both sides. Vocal fremitus and resonance equal on both sides, and normal. Breath sounds vesicular all over. The chest, with no accompaniments.

**Urinary System.**

No symptoms.

**Signs:** Kidney not palpable. No bladder distension. Urine is straw-coloured, SG 1.014, acid, with no abnormal constituents.

The Nervous, Integumentary, and Locomotory systems all yielded negative results when examined for evidence of disease.

**Diagnosis:**

a. Gastric ulcer of benign type.

b. Angina Pectoris.

**Differential Diagnosis:**

Angina pectoris has been discussed at length in the previous case. The etiology in both this case and the last is the same, the WR being negative in this case as well. They differ however in their respective prognoses, but more will be said of this later. We will concern ourselves here mainly with the alimentary condition.

A diagnosis has got to be made from chronic gastritis, duodenal ulcer, carcinoma of the stomach and cholecystitis. The X-Rays of this
patient were not available to me, being for some
reason at the Royal Infirmary at the time I had
opportunity to examine the case. This is not a
serious drawback in this case but in a less typical
case radiographic examination might have been of
paramount importance. Although the symptoms
of chronic peptic ulcer are usually fairly
characteristic, there are many occasions on which
even a careful consideration of the patient's history
and a thorough physical examination fail to point
to a diagnosis of a peptic ulcer, which may yet
be demonstrated without doubt by X-ray examination.
Conversely, X-ray examination may be negative
when on clinical grounds an ulcer is almost
certainly present.

The following Table summarizes the points in
the differential diagnosis of this condition.

<table>
<thead>
<tr>
<th></th>
<th>Gastric Ulcer</th>
<th>Duodenal Ulcer</th>
<th>Carcinoma</th>
<th>Cholecystitis</th>
<th>Cholecystolithiasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relation to meals</td>
<td>½ - 1½ hrs</td>
<td>2 - 3½ hrs</td>
<td>Often</td>
<td>Irregular</td>
<td>Usually slight</td>
</tr>
<tr>
<td>Relief by food</td>
<td>Uncommon</td>
<td>Usually</td>
<td>Never</td>
<td>Irregular</td>
<td>Usually slight</td>
</tr>
<tr>
<td>Relief by alkali</td>
<td>Usually</td>
<td>Usually</td>
<td>No relief</td>
<td>Irregular</td>
<td>Usually not</td>
</tr>
<tr>
<td>Appetite</td>
<td>Moderate</td>
<td>Good</td>
<td>Very bad</td>
<td>Usually</td>
<td>Usually not</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Common</td>
<td>Very rare</td>
<td>Very common</td>
<td>Usually</td>
<td>Usually not</td>
</tr>
<tr>
<td>Hematemesis</td>
<td>Common</td>
<td>Fairly common</td>
<td>Coffee grounds</td>
<td>None</td>
<td>Usually not</td>
</tr>
<tr>
<td>Occult blood in stools</td>
<td>Constant</td>
<td>Constant</td>
<td>Irreducible</td>
<td>Sometimes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Acid in test meal</td>
<td>Normal</td>
<td>High</td>
<td>Almost or</td>
<td>Variable</td>
<td>Usually low</td>
</tr>
<tr>
<td>Loss of weight</td>
<td>Slight</td>
<td>Slight</td>
<td>Early and</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

A further point in cholecystitis is local tenderness on
salivation over the gall-bladder, especially when the
patient takes a deep inspiration.
Although the clinical picture is more in accord with a diagnosis of simple rather than malignant ulcer, the latter condition can only be excluded definitely by the X-Ray screen. Some 5% of all chronic gastric ulcers undergo carcinomatous change and all gastric ulcers which do not heal under strict medical treatment should be regarded with suspicion. The change to malignancy is unaccompanied by any change in the clinical features. Later there is increase in the pain which tends to become more persistent with increasing anorexia, vomiting, and loss of weight. There is no reason to believe, however, that the loss of weight in this case has been recent and it can quite well be imagined that a person whose weight should be 11st 9lb. can weigh only 9st 5lb. when the long history of dyspeptic symptoms is considered. The X-Ray screen examination is invaluable in the diagnosis of early malignancy. The early malignant ulcer is shown to be refractory to treatment and mistakes may be seen to stop short of its ulcer owing to early infiltration of the walls of the stomach.

Treatment:

We need only consider the modifications necessary in the life of a patient who has been free from ulcer symptoms for a period as a result of treatment. They may be grouped briefly as what may be called the Decalogue of Peptic Ulcer.

1. Three to four meals to be taken a day at regular hours with interval feeds of milk, etc. and a feed before going to bed.

2. Meals to be eaten slowly, food thoroughly chewed and a short rest taken when possible before and
after meals.
5. Large, heavy meals, indigestible, chemically-stimulating and mechanically-irritating foods, very hot and very cold foods to be avoided.
6. Smoking permitted only immediately after meals. In view of the coincident anemia in this case this habit should be broken altogether.
7. If alcohol be a necessity it should only be taken with meals and well-diluted. If sot, hot, both alcohol and tobacco are neurotrogogues, increasing the acid output of the stomach, and being reckoned a factor in the perpetuation of ulcer.
8. Constipation must be avoided.
9. Teeth to be attended to by dentist every 6 months. If dentures are required they must be well-fitting — and used.
10. Adequate sleep to be ensured.
11. Anxiety and worry reduced as far as possible.
12. This regime must be followed indefinitely.

More emphasis is now being placed on the mechanical quality of the food rather than its type in the treatment of peptic ulcers. It used to be the custom to send the peptic ulcer case home with his mind filled with a series of "don'ts" altogether out of keeping with the opportunities available to the ordinary man. When the list of "Thou shalt not" with regard to food were was reckoned up it was remarkably little left to eat and it is difficult to see how a patient could derive much mental (and therefore physical)
satisfaction from the physician who prescribed such a régime. The results obtained by Muntengraaff in the treatment of haematemesis have undoubtedly caused a great revival in medical thought and work on the dietetic treatment of peptic ulcers. Briefly put, they imply a simplification of treatment for patient, nurse, and doctor, feeding no often than at certain hourly intervals, and the use of a dietary which, while completely fulfilling all essential requirements, is of a kind, variety and bulk much more closely approximating to that of the normal individual. Four essential requirements must be fulfilled in all modern dietetic systems used in peptic ulcers:

1. Small meals, frequently repeated, to ensure as far as possible continued utilization of hydrochloric acid.

2. Protection of a healing ulcer must be provided.

3. The diet must contain adequate calories to maintain health and strength throughout treatment.

4. The essential vitamins must be provided. [The regulation of life necessary for nursing care as in case 1]

Prognosis-

According to the four-point assessment of the original case (see case I) the prognosis in our patient is by no means gloomy, and there is no real reason to believe that with a strictly regulated régime the patient will not enjoy quite a few useful years. The fate of his fellow sufferers remains for him a distinct possibility.

As for the stomach condition there is little one can say dogmatically. There are so many ifs and buts concerned that the realization of them all seems remote. Probably a change of occupation to a job
allowing of regular meals would be as potent a remedy as any. It may be said that as regards chronic ulcers, permanent cure, whether by medical or surgical treatment is improbable -

ivy. if the patient is over 55 years of age.
by. if the ulcer has been present for over 15 years.
y. if the patient's temperament is such that he is unlikely to submit to prolonged treatment and certain permanent restrictions.
y. if the environment, economic or domestic is unfavourable.

As we have seen in this patient the problem resolves itself into a. b. c. d. versus c. and d.

Discussion:

The cause of peptic ulcer is as yet unknown. Hyperchlorhydria is usually present, especially in duodenal ulcer and it is logical to suppose that the coincidence of excess acid and ulcer formation is not fortuitous and that, while perhaps not the important factor in the production of the condition, it is probably the factor perpetuating the condition. Ulceration in the stomach is considered to be due to digestion of a denaturalized portion of the mucous membrane by pepsin and hydrochloric acid. Various theories have been advanced to explain such local tissue denaturalization.

a. Local ischaemia. The common sites of peptic ulcer, namely the lesser curvature and the first part of the duodenum, are supplied by terminal arteries, embolism or thrombosis of which would cause tissue necrosis. There is no proof that such lesions occur. On the other hand long-continued vaso-constriction of the arteries of the stomach
or duodenum may have the same effect. This is widely held to occur as a result of disturbances in sympathetic-parasympathetic regulation due to such psychological factors as the prolonged nervous tension associated with domestic or financial anxieties, or with heavy responsibilities, or with the competition and excitement of modern life.

These emotional factors are in fact encountered in a large number of patients suffering from peptic ulcer. This is a pleasing theory but emotion implies raised sympathetic tone and although this is in accord with sphincteric vasocostriction, it is contrary to the fact that in peptic ulcer there is a condition of vagotonia. In the stomach the vagus is both motor and secretory while the sympathetic antagonizes these actions. It seems illogical that a mechanism producing the initial mucosa denudation should be succeeded by another and entirely antagonistic mechanism which is known to perpetuate the condition. The effect of atropine in reducing acid secretion and quietening the peristalsis of the stomach is well known and its action is produced by antagonising the vagus.

Ephedrine, by raising sympathetic tone seems to give as good results. I certainly cured the pain. I asked two friends of mine who have ulcers symptoms to try the effect of 2 gr. of ephedrine without. They felt a pain coming on and they later assured me that the attack of pain was absorbed in about 10-15 minutes if the tablet was taken early and that there were no unpleasant side effects, such as those sometimes occur in the use of atropine. The dose of course was small. Indeed atropine to be successful has to be "pushed"
to the stage of dry mouth and visual disturbance. Perhaps ephedrine in small dosage might be of value in treatment by decreasing thirst and thus giving the ulcer a chance to heal.

b. Acute gastritis and duodenitis. Many authorities believe that a chronic peptic ulcer may develop as the result of the failure to heal of an acute erosion of the mucous membrane in acute gastritis and duodenitis. The experiments of Wolff and Wolff have cleared away much of the darkness with regard to normal stomach function by direct inspection of the mucosa in various mental states of the subject who had a fistula opening on the abdominal wall. Many startling revelations were made. Indeed it may now be said that the stomach is the mirror of the emotions. It may bluish with shame or grow pale with rage, white in anger or stiffen with fear. The importance of these reactions in relation to peptic ulcer needs no emphasis. Even the touch of a glass rod on the mucosa when it was congested was sufficient to cause a surface erosion with bleeding. Since, however, the vast majority of acute erosions heal completely, the occasional development of a chronic ulcer must be due to some additional factor such as hyperchlorhydria, or continuation of dietary indiscretion or excessive muscular activity or sexual infection. Puri of infection in teeth, tonsils, etc., are present in a high proportion of cases of peptic ulcers. Whether this is of etiological importance in the production of an ulcer is doubtful, for the gastric juice is capable of killing most of the organisms likely to be present in the respiratory tract or
Sympathetic
- Vasoconstriction

Parasympathetic
- No effect on gut vessels

- Relaxed Stomach

- Hypermotile Stomach

? in relation to peptic ulcers.

= antagonistic to healing.

= favourable for healing.

Ephedrine is therefore inferior to atropine because of its effect on the blood vessels.
after alimentary tract infection, and especially in this the case in the Helicobacter pylori of peptic ulcer. Infecion may, however, be of importance in maintaining ulceration.

4. Tobacco. Smoking causes increased gastric secretion and motor activity and vasoconstriction and aggravates the symptoms of established peptic ulcer. It is not known whether tobacco is capable of causing ulceration or only of hindering healing.

5. Trauma. Along the lesser curvature of the stomach the mucous membrane is firmly adherent to the submucous layer and has not the loose resilience found in other parts. The stream of food passing through the stomach is in close contact with this area. It is held that these factors render this area liable to trauma by rough or insufficiently chewed food and therefore favour the localisation of ulcers along the lesser curvature which is in fact the commonest site for gastric ulceration. Another area exposed to such trauma is the first part of the duodenum which is the site of duodenal ulcers.

It is an interesting study to correlate disease and its incidence with the habits of those it afflicts. If we survey these countries where peptic ulcers is a common complaint we find that in them all the flour used for the making of bread is milled to remove the outer germ from the grain. It is known that in milling the Vitamin B of the grain is removed. It is also known that in conditions of Vitamin B deficiency e.g. scurvy, the alimentary mucosa shows atrophic change. Could it be that Vitamin B deficiency causes the initial denudation of
gastric mucosa and does it lead to imbalance of the autonomic nervous system with subsequent vagotonia and therefore higher secretion of hydrochloric acid with what as the result?

Allingworth by means of inflated rubber bags in the stomach has shown that the ulcer stomach is hydromobile. But patient himself gives evidence of this when he says he never brings up food when he vomits, indicating a rapidly emptying stomach but it is difficult to believe this statement in its entirety. Nevertheless we can take it that a goodly proportion of his meals was not vomited, evidence of a quickly emptying stomach which is often found in the peptic ulcer case.

Twenty years is a long time and perhaps it is asking too much to expect an accurate history of the onset of the disease. Yet so definite was the patient's description of the "weekly attacks of bile" which heralded the full blown ulcer symptoms that, although this is not exactly the common picture of the onset of peptic ulcer, in this case one can be certain that such attacks did occur. Whenever I come across a discrepancy in a patient's story, and more especially if true suffering has been a feature of his illness, I am inclined to believe it, recalling John of Gaunt's words as he, a sufferer himself, says:

"O, but they say the tongues of dying men
Enforce attention like deep harmony,
Where words are scarce they are seldom spent in vain
For they breathe truth that breathe their words in vain"

It is very interesting to observe in this case the definite relation of anxiety and emotional
slices to deterioration of the patient's condition and exacerbation of his symptoms. The patient's reaction to his son's death shows the close relationship between the state of one's mind and the state of one's stomach as. The rapid response to change in environment and an ordered regime is also well illustrated.

The extremely high haemoglobin is also, surely, worthy of note. Not is this the first patient I have seen recently whose mucous membranes behind his condition. One especially I think on whose florid face and ruby red lips would have suited a diagnosis of polycythemia better than that of peptic ulcer.

One may wonder why the patient was discharged from hospital, apparently well, only to return a fortnight later. This may be simply explained. It is found that when an ulcer occurs in the stomach the muscle fibres on the proximal side of the ulcer relax, the ulcer therefore lying on the distal side of the duodenum produced.

\[ x = \text{ulcer} \]

This duodenum crater may disappear after a few days if the ulcer be covered by a heavy meal used in treatment but this does not mean a cured ulcer. Perhaps this was the reason for the patient's early discharge and his quick return.

The operations undergone by the patient are also rather puzzling. A gastro-enterostomy obviously had not been the operation of choice at the outset as the result showed. From the patient's history it is difficult to see why the operation should have been done at all.
The nature of the operations was probably as follows.

The gastro-enterostomy (A) was a failure for the reason shown. The second operation (B) gave some relief probably because the food passed quickly through the opening C. If the opening is made in the direct line of the passing food, the third operation returned the stomach and intestine to normal again.

This reminds one of the woman "which had an issue of blood and had suffered many things of many physicians, and had spent all that she had, and was nothing relieved, but rather grew worse."

The predominant symptom in this case was vomiting and one of the opinions that much of it was voluntary in an effort to relieve pain. The fluid in reading William Buchanan's "Domestic Medicine, a Compendium of Anatomy" that much was actually advocated as a method of relief. "When the pain in the stomach is most violent after eating," he writes in 1827, "there is reason to suspect that it proceeds from some fault either in the digestion or the food. In this case the patient ought to change his diet, till he finds what kind of food agrees best with his stomach, and should continue chiefly to use it. If a change of diet does not remove the complaint, the patient may take a gentle vomit, and afterwards a dose of two of rhubarb." I am sure Buchanan would be able to...
record not a few cases with his empirical methods.

Lastly, with regard to the angina, it is interesting to note the family history of the condition, its association with abundant flow of saliva which is suggestive of a viscero-secretory reflex and the difficulties attendant on an early diagnosis because of the coincident valve pain.
Interrogation:

David A. Walker, age 54, married; wholesale chemist.
Address - 4, Ramsey Lane, Portobello.
Admitted to Western General Hospital on 24/10/45.
Recommended by Dr. Black, Haymarket.
Examined on 11th November 1945.

Complaint:

"Pain in my left side." Such was the patient's complaint, and on further questioning, it was made out that the pain was in the lower half of the left side of the chest.

History:

Present Illness

The patient states he was in good health until about a week before admission when one evening he was caught in the rain, without a coat, and returned home drenched. Next day he felt his head "stiffened" and his nose began to run and he arrived at the conclusion, I think correctly, that he had contracted "one of these colds again." He went about his work as usual, feeling a bit off colour but not unduly so, and we now come to the real reason for his admission to hospital.

At about 4 o'clock in the morning of October 23rd, the patient was suddenly awakened by a sharp stabbing pain in the left side of his chest. Deep breathing and coughing aggravated the pain and he himself noticed that his breathing was shallow and rapid. The only way he could breathe without prostrating himself with pain was found to lie on his left side considerably easing the pain. Coincident with the onset of the pain.
The patient felt cold and shivery, with a general ache all over his body. He dosed himself well with aspirin, phenacetine and codeine compound tablets but as the pain continued with the same intensity as before, his doctor was called in. Pneumonia was diagnosed, and since the doctor was of the opinion that the patient required oxygen, he was admitted to hospital after a day during which he had fainted somewhat and a short, shock, painful cough made its presence felt.

“M & B” Therapy was begun at once in full doses and, as the patient himself remarks, “he got on champinon”. In 24 hours his temperature fell from 102°F to 97°F, the respiratory rate dropped from 25 to 25 per minute and his pain had completely gone. He was so well he felt he could have got up the next day. He continued to improve until the fourth day after admission when suddenly the whole clinical picture deflected above was re-painted. This time in colours of a more striking hue. The chest pain was excruciating, dyspnoea was marked and after an initial shiver his whole body became as “hot as fire” and he was dejected in perspiration. Under treatment with penicillin the condition has gradually improved but this is still a gnawing discomfort in the left side which becomes actual acute stabbing pain on coughing or deep breathing.

Course of The condition and therapyemployed Till 13/11/45 :

At the onset of the exacerbation of symptoms penicillin therapy was begun and on the whole the patient had fairly good night aided by morphia in
In gr. doses which, however, did not fully ease the pain. Temperature, pulse rate and respiration rate which had shot up to levels higher than those recorded when the patient was admitted were slightly improved the following day and the pain was a little easier. X-Ray, which on admission showed a small effusion in the costophrenic angle now revealed a massive left sided pleural effusion almost obscuring the whole lung.

Paracentesis Thorax was performed but in spite of the X-Ray appearances only a few cc's of a clear, yellow fluid were withdrawn which showed, on examination a few degenerate cells but no organisms either on smear or on culture.

The patient's general condition improved steadily with a gradual fall in temperature and in pulse and respiration rates but not until 5/14/45 did the fluid show any signs of diminution and from the X-Ray appearance on that date it appeared as if the fluid were loculated, possibly partly in the interlobar tissue.

Paracentesis on 6/1/45 in the anterior axillary line in the 6th space gave 40 cc's of clear, yellow fluid and 63,000 units of penicillin in 10 cc. saline were injected into the pleural cavity. Further X-Rays have shown that the effusion is diminishing slowly.

Histological examination of the pleural fluid
revealed that the cells were scanty and pyknotic. Those present consisted of large macrophages, small round cells, eosinophil cells and an occasional polymorph. No malignant cells were detected.

It was at this stage that I first saw the patient. I have thought fit to give the above information gleaned from chart and X rays so I believe it is essential in the further consideration of the case.

Previous health, social conditions, food and habits:

The patient stated that previous to the present illness (excepting the usual ailments of childhood) he enjoyed very good health and, indeed, “never knew what it was to be ill.”

He lives and acts as anyone in his social position would. He likes the best of food and by various ways seems to have been able to secure it these last few years. Twice regardless a day and “alcohol in moderation” are the only entries in black ink in his balance-sheet of life.

Family History:

His mother and father died (aged 89 and 94 respectively) having lived a full and useful life unmarred by illness except for minor, trivial ailments. His brothers and sisters are all alive and well and, as the patient says, likely to continue so “for we are of good stock” — a fact to which the longevity of his parents readily testifies.
State on Examination:

A well-built, well-nourished man, the patient was obviously in some distress as he lay propped up with pillows. His breathing was rather rapid and shallow, interrupted now and then by a harsh, loose cough which produced a white, mucoid sputum. Cyanosis of lips and ears was obvious. Although well-nourished and of average build his muscularity was not marked, there being a definite tendency towards obesity, his complexion was sallow but the conjunctiva was of a good enough colour, considering the obvious cyanosis seen on the lips. In spite of his comatose and rather somnolent and volatile attitude of his ability to "get over things" one could not fail to appreciate a deep-seated anxiety in his expression.

Temperature 98°F. Respiration rate 28. Pulse rate 80.

Systematic Examination

Alimentary System.

Symptoms:

Appetite good ("can eat all I get - and more")
No thirst, dysphagia, pain, distension, tenderness or waterbrash. Slight constipation.

Signs:

The lips showed a marked degree of cyanosis.
Both deniers were well-filling and clean. The tongue was moist but coated with a leaey, yellow deposit over the posterior two-thirds. The usual roughness of the papillae was absent. The gums were rather congested and especially so in the lower jaw. The fauces showed no abnormality.
Abdomen:

Inspection - slight fulness over lower abdomen. No striae, scars, dilated veins or abnormal movements.

Palpation - no tenderness, rigidity or resistance. There was no fluidity of the abdominal wall and the recti were in equal tone. There was quite a thick layer of subcutaneous fat. No masses were palpated. The umbilicus was freely movable and was not everted.

Examination of individual organs: The stomach air bubble was of average size. Liver, spleen and kidneys were not enlarged.

The faeces were quite normal.

Haemopoietic System.

No symptoms.

Lymph glands in groin, axilla and elsewhere not enlarged. Spleen not enlarged.


WBC 12,400. RBC 4,200,000. Hb 85%.

Endocrine System.

Pancreas - no thirst or glycosuria.

Thyroid - no deviation from average size of the gland. No upset in metabolic rate. Temperature raised, but is due to other causes.

Parathyroid - no slowing and no change in tone.

Suprarenals - no fluctuation of nervousness etc.

Pituitary - no skeletal changes or changes in sex character.

Circulatory System.

Symptoms: No palpitation or faintness. No precordial pain of cardiac ischaemia type.
Breathlessness was marked but not attributable to disordered cardiac action.

**Activity:**

Pulse rate 80 per minute, regular in rhythm and force, pulse wave of good excursion and well sustained, renal mural not palpable. Art. pres. 120 mm Hg. The pulse is equal in force and rhythm on both sides.

**Vital Signs:**

Skin: No distension, varicosities or pulsations.

Capillaries: Cyanotic, but no edema or abnormal pulsations.

**Heart:**

The precordium was well concorded. At the lower end of the sternum the tone was markedly concave. Onwards due to the patient's height and position, the tone was difficult to assess. The apex beat was diffuse and only just palpable in the fifth left interspace about 3 cm from the midclavicular line. The area of cardiac dullness was slightly enlarged to the right. I could not properly define the left border of the heart because of the proximity of the lung lesion.

There were no Thrills over the precordium.

The heart sounds in all areas were faint because of the thick chest walls but were regular and closed.

X-Ray showed a heart just within the normal limits of size and slightly displaced to the right.

**Musculoskeletal System:**

No symptoms.

Skin very moist, not pigmented, and there are no symptoms. There is no clubbing of fingers or toes.
no other evidence of disease in the nails.

**Urinary System.**
No symptoms.
Signs: - Kidneys not palpable.
 Urine 12/11/45 is lemon-coloured, SG 1023, with no abnormal constituents.

**Nervous System.**
No symptoms. Reflexes present and equal on both sides. No disturbance of motor or sensory function.

**Locomotive System.**
No deformity or changes in bones or joints. No muscle symptoms and no signs of abnormal muscle function.

**Respiratory System.**
Symptoms: -
Pain and discomfort in the left side of the chest, made worse on coughing and deep breathing. Harsh, irritating but loose, productive cough. Sputum white and tenacious. No haemoptysis.
Signs: -
The sputum was copious, white and tenacious with no characteristic odour.
The chest was of average shape, well-covered and symmetrical. The costal angle was of average width for a male.

On inspection it was observed that on the lateral aspect of the left side of the chest there was an obliteration of the normal intercostal sinuses, contrasting sharply with the corresponding part of the right side of the chest.
The movement of the chest on respiration was markedly diminished on the left side. Viewed posteriorly, at every inspiration the right scapula would move up more so than the left and it appeared almost as if the right side were actually making extra large excursions to compensate for the left. The breathing was rather laboured and increased in rate (28 per minute)

The sternal area did not move on respiration. There was no obvious muscle wasting.

Palpation verified these observations and elicited a marked decrease in vocal fremitus over the area shown in the diagrams (marked in red), on the left side. The right lung revealed no change in vocal fremitus. There was no myopathic irritability over any part of the chest.

Over the area marked in red a flat note was obtained on percussion and a sense of resistance and even discomfort was experienced in the applied finger—typical "stony" dullness. The right side yielded a normal percussion note.

On auscultation over the marked area the breath sounds were found to be absent. Vocal resonance in this area was markedly reduced, indeed almost absent.
At the periphery of this area the expiratory phase was prolonged almost to equal inspiration and at the height of inspiration coarse dry sounds mingled with abundant expectorations were heard.

The character of the breath sounds was not blowing but was considerably harsher than the normal vesicular sounds on the right side. Over the rest of the left lung the breathing was vesicular and in life accompanied by scattered moist and dry sounds. The moist accompaniments were most readily appreciated over the lower third of the lung, at the height of inspiration, and were exaggerated by coughing. Also, at the periphery of the affected area, extending for about an inch as a band round the area.

The spoken voice had a slightly nasal quality, especially in the upper part of the chest and was slightly diminished in comparison with the right side.

The above findings are in accord with a diagnosis of a sharply defined collection of fluid and x-ray confirmed the opinion that a localized effusion was present.

Trachea still slightly displaced.

x Ray appearances 12/8/45.

Diagnosis:

Pleural effusion secondary to an infective process in the lung substance. The peculiar course of the disease would suggest that the condition was actually an empyema quickly rendered sterile by chemotherapy.
Differential Diagnosis and Discussion:

It is remarkable how very often one sees cases in a medical ward whose illness never seems to conform to the typical text-book picture. Indeed, many such have a symptom-and-symptom complex all of their own which only goes to impress upon us that no two people are alike in their make-up or in the reaction of their make-up to disease.

Perhaps in no other system is this more obvious than in the respiratory system. Since the advent of chemotherapy with all its potentialities for stunting disease half-way, the clinical picture is often more confused and text-books in the near future will probably have to deal more with these half-way processes and their effects than with the full-blown disease which is seldom seen now when the appropriate treatment is administered. Whether we do rightly in cutting infection short this is not disputed, yet in the odd case (perhaps it is in such a case that there would have been no recovery in pre-sulfonamide days) we see rather unfortunate and often baffling results of this intermural of the normal struggle of the body against infection. It is said that 20% of pneumonias today do not resolve. This is indeed a serious state of affairs when the potentialities of unresolved pneumonia are considered and it seems to be a fact that the body's scavenging and repair system is not so effective with the "nipped in the bud" pneumonia as with the fully-developed clinical condition. It is with this thought in our minds that we consider the case of David Walker.

The typical onset of an acute lobar
Pneumonia, the typical course of the disease and the typical early response to sulpha-therapy—these are the building stones for our diagnosis. Difficulty was encountered from the outset. Clinically the condition was diagnosed as a deep seated left basal pneumonia and radiologically the findings indicated a slight effusion at the left base with the rest of the lung fields (as shown on an antero-posterior film) clear. After an apparent successful exhibition of sulphadiazine the condition relapsed and X-Ray showed that a massive effusion had developed within the course of 4 days. The culminating blow was the demonstration of the fact that the fluid present was sterile, non-haemorrhagic and without no typical cell content. That the condition was the result of an initial pneumatic focus in the lung and that the effusion was actually infected (which fits in with the toxic condition, temperature etc. of the patient) but was quickly sterilized by chemotherapy seems to be the probable explanation but it must be stated that in this case this tentative diagnosis can be advanced only when other clinical conditions have been excluded.

These are:

1. Primary Neoplasia in the Lung

The chief symptoms of bronchial carcinoma, the commonest primary neoplasm of the lung, are cough, expectoration, shortness of breath, pyrexia and pain. No satisfactory information can be obtained regarding any pulmonary upset of some duration in this case nor is there any history of a blood-stained spuion or loss of weight. But
There are symptoms of the advanced case usually what we are more concerned with is a comparatively early case which may have manifested itself by plugging a bronchus with the resulting effect of retained secretion which has become septic and the development of a sterile "reactionary effusion" which was not given the chance to become infected. A lateral X-Ray would probably have discarded this possibility once and for all or established its presence, had it been done on admission. As it is, from the first X-Ray the only possibility is for the neoplasm to have been behind the cardiac shadow. Further lateral X-Rays have been obscured by the effusion.

The age of the patient is in accord with the age incidence of tumour. The reappearance of pain is certainly a point in its favour also, especially when we consider that the pain did not disappear with the development of the effusion and instead was made worse at the onset of the effusion and has persisted in a lesser degree of intensity up to the time of examination—16 days. (That this feature may be produced by a fat loosened condition will be explained later when we consider the method of production of the pain.) We might have expected a bloody-stained effusion with perhaps a malignant cell or two, but these findings are by no means pathognomonic and the fact that the fluid is sterile is highly suggestive of such an underlying lesion—but perhaps we are underestimating the value of Fleming's discovery!

At the present stage one cannot completely jettison the idea of a tumour of the bronchus in
favour of the suggested diagnosis. It were better to follow Sir Roger de Lisle and state “much may be said on both sides.”

3. Pneumonic abscess as a result of suffusion of a pneumonic area is much less common in lobes than in bronchopneumonia. True, it develops a day or two after inhalation of infected material and is obscured somewhat by a preceding pneumonia but although the antecedent pneumonia and the time interval were present in this case and cough and pyrexia did occur the sputum was at no time tinged with blood, was never as profuse as would be expected in lung abscess and did not contain lung tissue. X-ray also revealed no evidence in favour of an abscess and the lung fields now shown by the reeding fluid seem quite clear.

3. Empyema following a pneumonia must be given a prominent place, however. The white cell count at the onset of the effusion was 28,500 (it was 20,000 on admission). This would indicate the presence of infection and the relative increase in polymorphs which was noted is also valuable confirmingatory evidence. The onset four days after the false pneumonia crisis and the febrile, remittent temperature, loss of appetite, pain in the chest and sweating are all in accord with a diagnosis of empyema. But the severity of these symptoms and signs was not such as to warrant labelling this case “empyema” nor indeed was the character of the effusion. One has often heard the expression “a fleeting pneumonitis” as an explanatory description of empyema. Perhaps the case under consideration could be aptly described by the
words "an empyema gone sterile."

4. Atypical pneumonia which is a non-fatal form often seen in young adults is another condition where a sterile effusion occurs but this effusion usually shows atypical cell content of lymphocytes or mononuclears.

But a far more common condition and one which may simulate an atypical pneumonia very closely is

5. Tuberculosis of the Pleura.

This condition often appears as an apparent primary manifestation, sometimes related to a history of a chill "pleurisy a frigore," we can say. That when a pleurisy is labelled "idiopathic" the majority of these are Tuberculous. In about 60% of such cases, within 6 years, Tuberculosis of the lung is manifest. This figure is thought to be over-pessimistic by some who believe that if the primary pleurisy is adequately dealt with, the number who develop active lung tuberculosis is small. We can say definitely that in the case of David Walker no underlying Tuberculosis of the lung was clinically detectable and X-Ray substantiated this.

There is much to be said for a possible diagnosis of Tuberculosis of the pleura in this case. The condition is more common in males than females and may occur at any age. Sometimes the attack is provoked by exposure to cold or follows very heavy exertion. A history of exposure to cold was obtained in this case. The onset is often acute with a sudden development of severe chest pain and a very high temperature and the condition may simulate
an acute pneumonia very closely. The pain is aggravated by breathing and is usually in the region of the breast below the nipple line. Fluid forms fairly early and the usual outcome is effusion and with its appearance the pain usually goes. The cough which is at first irritating and more becomes easier and may disappear altogether with the onset of effusion for it is a reflex cough. The temperature may settle when fluid forms but in an acute case may be 102–103°F for 5 or 6 weeks.

Such a condition could quite well account for our patient’s illness. Indeed, the only contrary feature is the nature of the effusion for over the gradual fall in temperature which was attributed to penicillin could be filled in with a diagnosis of tuberculous pleurisy.

The exudate in tuberculous pleurisy is usually serofibrinous (and we have reason to believe the patient’s effusion was such –iloculation etc.), of a clear yellow or slightly greenish tinge containing flocculent coagulated fibrin and occasionally it is blood-stained. But usually the cell content is typical and this feature is lacking in the case under discussion. Usually in tuberculous effusions the majority of cells are small lymphocytes but in the early stages a preponderance of polymorphs may be found. Effusions which are aborting frequently contain high proportions of eosinophils.

The microscopic findings in this case did not conform to any of these. Not were tubercle bacilli found by direct examination but this does not exclude tuberculous for even culture of guinea pig inoculation may have to be repeated to obtain a positive reaction. The results of culture
and inoculation are not yet to hand but should
they prove positive it will not be difficult to
reconcile such a diagnosis with the clinical
findings.

And so we conclude that, in our opinion,
the possibilities in order of preference are
1. An empyema gone sterile.
2. Tuberculous pleurisy. Proton in its manifesta-
tion this condition must always be borne in mind
when investigating pleural effusion.
3. Primary Bronchogenic Carcinoma.

The prognosis in this case is, at this
stage, a matter for the crystal gazer. The first of
the above possibilities carries with it a very good
prognosis indeed. Should the second prove to be
correct, treatment for at least 3 months in bed
with a further 3 months on sanatorium lines would
give the patient a reasonable chance but as has
been said already the possibility of a concomit-
ant lung tuberculosis making itself manifest is ever-
present. The third carries with it a very grave
prognosis. The effusion would suggest that extension
had probably reached the visceral pleura and it
is well known that operative success is prejudiced
by such an occurrence.

Treatment will largely be dictated by the
course the illness takes over the next few weeks,
and by the result of further investigation. If the
tests for tuberculous are negative it would be
wise to pass a bronchoscope. If any hiatus is
present it must be at or near the left hilum.
At present general measures can only be observed
— good food, care of the skin etc. As soon as
possible, however, breathing exercises should be
begun. Wolff bottles are of some value and to some extent, amusing, but the emphasis is laid on expiration. Maximum inspiration to fully avert the lungs is what is aimed at and this is achieved admirably by the teaching of simple breathing exercises, e.g., pulling gently on the costal margins during inspiration; pushing the arm on the same side as the lesion over the head to increase the air entry, during inspiration.

As to the residual fluid, this is probably better left. It is always wise to leave a clear sterile effusion if it is not causing respiratory embarrassment, for in most cases it is tuberculous and the effusion is indeed Nature's splint for the diseased lung and the degree of collapse produced does the patient good. The replacement of the fluid with air or other gas is now frowned upon for it tends to lead to adhesions which later may render an artificial pneumothorax impossible should such be required. Should the effusion cease to be absorbed indicating a probable thickening of fibrosis of the pleura it should be aspirated to allow of full expansion of the affected lung.

The feature of pain in this case is of some interest. It was for long believed that the pain of pleurisy was due to the rubbing together of two inflated surfaces. This seemed a likely possibility when it was correlated with the fact that the pain disappeared when effusion occurred. But in chronic lung tuberculosis the friction rub is often heard. The being no associated pain; also a patient with a pneumothorax may develop a pleurisy with an acute and constant pain although the two layers of pleura are widely separated. It is now
believed that the pain in pleurisy is due to stretching of the inflamed parietal pleura. The pain is most intense at the end of inspiration. Anything which lessens the tension in the pleura helps to reduce the pain—immobilization of the ribs by strapping of the chest or by the accumulation of subpleural fluid, or diminution of the oedematous swelling of the membrane itself. It is interesting to note that the pain goes as soon as the effusion appears, long before the ribs are effectively immobilized by the effusion, a fact which indicates that the outpouring of fluid releases tension in the pleural membrane in much the same way as the opening of an abscess releases tension.

Could it be that the exhibition of chemotheraphy has in some way prevented the complete drainage of the pleura in this case and the result that pain has continued in spite of effusion?

The case is of interest in that it illustrates well how the employment of chemotherapeutic agents may confuse the diagnosis. In assessing the patient we have to consider his physical make-up and the possible reaction of that make-up to disease. The possible complications of putting out the fire of infection too soon thereby leaving the body to get rid of a greater amount of embursted material, so it were, instead of a few, fine, acute and lastly the nature of the precipitating factor.

It is unsatisfactory to be faced with these possibilities such as we are at present. Especially when these possibilities differ so widely in their diagnostic significance. At present one is justified in being vague and non-committal with regard to the future and only when the etiology is
definitely proved can more definite statements be made, but as the case stands today, most will agree that our patient may well expect a happy issue out of all his afflictions.
INTERROGATION:

Alexander Ritchie, age 65 years, single, interior decorator.
Address - 2 Comuna Place, Leith.
Admitted to Western General Hospital on 2nd November 1945.
Recommended by Dr. Butler, Charlotte St., Leith.
Examined on 6th November 1945.

Complaint: - "The whole of my body complaint is 'bronchial' - and I might add, weakness," these were the patient's words as he replied to my question regarding his complaint. I would draw attention to his afterthought. As we shall see, it seemed pride of place.

HISTORY:

Present Illness.

On the evening of Friday, 23rd October 1945, the patient, who had been feeling rather miserable all day, suddenly developed a feeling of chill in his body and his cough, which had troubled him for many years but is usually loose, became harsh, with a sore, scratchy feeling of roughness behind the sternum as the evening wore on. His spit, usually white and frothy, became yellowish and purulent and very profuse, and a pain over the right and left costal margins made its appearance. This pain, which was worse on the right side, was acute and stabbing in character, made worse on breathing deeply and was certainly aggravated by his spasms of coughing. A sensation of tightness was also experienced over his chest extending like a girdle around the middle third of his thorax. Dyspnoea was marked, pain limiting the inspiratory phase.

The patient, however, was not febrile and next day felt fit enough to attend his work but bad to come home early as he was feeling too exhausted to carry on. He saw his doctor on the Monday morning, who advised him to go to bed and prescribed a course of one of the sulphur drugs. The pain lasted till the Thursday of that week but his doctor, desiring further investigation of the case had him admitted to hospital on the following day.
The patient states that attacks, similar to the above, have been the rule for the last 20 years. Fond of cycling, when he came in often from a brisk run a chilly feeling used sometimes to pass through him. Next day a cough developed and a bronchitis with soreness in the chest and a profuse, prevalent sputum would be the result. He believes the trouble all began when he had double pneumonia at 8 years of age. It was at this time that his doctor remarked, from the appearance of his chest, that he had had mumps.

The patient can relate times, over the last 20 years of so, when he had bad spells, sometimes requiring the doctor to minister to him during the night. His last bad attack was in July 1943. While waiting in Waterloo Station for a train, he suddenly experienced a ringing in his ears and about an hour later, on the train, he developed a tightness in his chest, dyspnoea and a pain across the lower half of his chest, sharp, stabbing and aggravated by deep breathing. By the time he reached his destination an hour or so later he was baffled with dyspnoea, so great was his respiratory distress. A harsh cough developed the same evening. This is the only occasion he can recall when pain in his chest was present without cough preceding it.

The patient sweats a lot, even at rest, and after exercise he is sure to be covered with perspiration when the sequence: cold in the head → sore dry throat → cough with sputum, first white then yellow, and perhaps pain, very often follows.

Occasionally, as he related his story, the patient would relate that he had often felt weak as a result of his attacks of chest trouble. A few months ago, during a severe bout of coughing, the patient noticed some blood in his sputum—"just a fleck," he hastily added. His blood, he observed, was bright red in colour. For the last five years he has been experiencing breathlessness on exertion and this has been steadily becoming worse. For the last four months or so he has only been able to walk up one flight of stairs at a time without having to stop to regain his breath. Such was the patient's story.
It was when I saw him attempting to sit up in bed that I was prompted to pursue his symptom of weakness a little more fully. It was obviously a laboured movement. The head hung back till first one then the other shoulder was leaned forward and then was flung forward with a final effort.

It appears that weakness of the limbs, especially the arms, had been noticed as long as 18 years ago. Lifting heavy weights at his work would make him lose his grip (fail etc.). In addition, he noticed recently that when trying to get off a train with his hand on the rail it took a second or two to let go. His hand muscles for a brief space just would not relax. My interest in the case was greatly quickened when the patient, asked about the others in his family, remarked that one of his sisters had weakness in her arms and legs.

Previous health, social conditions, sport and habits:

As a child the patient contracted and overcame the various ailments of childhood — measles, whooping cough, chickenpox, mumps, adenoid hypertrophy which necessitated operation removal; but the recovery period for him was always longer than that of the other little boys at his age. As a boy the patient always felt he was below average and was always exhausted at play before the other children. Adolescence showed him weak and ailing, with a long, spare figure tending to droop and a constantly recurring, loose cough. The patient has had X-Ray examinations of his chest and innumerable examinations of his stools with a view to excluding tubercle. All such examinations have yielded negative results. Since the age of 20 onwards the patient's life has been one long story of chest trouble and progressive weakness. While still an apprentice about 20 years ago the patient made an interesting observation on himself. When taking his clothes off to prepare for bed one might be noticed that his body from the root of his neck to the knees was covered with little blisters each about 1/8” across. They were not itchy and he could not
explain this. There were no other symptoms at the time and next morning the rash had completely gone. This was unassociated with any chest complaint.

He also relates that when walking along a road 3 years ago a shooting pain was experienced over the lower half of the right side of his chest which made him halt and after about half a minute it lasted away. This sort of thing has happened four times in the last 20 years he declares, the first attack occurring about 20 years ago and the others occurring at widely spaced intervals. He has not been troubled with this pain for the last three years. This pain did not radiate anywhere and has always occurred when he was walking, i.e. on moderate exercise.

The patient is a bachelor and lives alone, a housekeeper looking after his home during the day. His food he says, is "as good as it goes", but he has little appetite for it and therefore eats very sparingly. He smokes 10 cigarettes a day and is a total abstainer. He likes to go to the cinema but prefers cycling and swimming as pastimes for he enjoys the fresh air.

The patient has few friends and lives very much to himself.

As I talked with him about his illness I could not but notice the monotony of his voice and the laboured way in which he spoke as if every word were being forced out.

Family:

His father and mother are dead. He could give no information regarding the cause of his death. It is interesting to know, however, that his mother died when he was very young, considering that his father died in 1941, his mother must have been quite a young woman when she died. I could get no exact information about their age, and I can understand this for his father was a fisherman and seldom at home, and the boy Alexander was sent early to his aunt when his father married again not long after the death of his first wife. The patient knows nothing of his step-brother and step-sister who are all in England but it has a
Deep affection for his sister who lives in Edinburgh and whom he visits weekly. It appears that she also is beginning to complain of weakness in her arms and legs, especially the arms.

**Stall on Examination:**

The patient was propped up with pillows so that he was almost in the sitting position and although he had slipped to one side and was in what seemed to me an uncomfortable position, made no effort to right his posture. 5 ft 8½ in. in height and 9st 5½ lbs. in weight, he was very poorly developed, his frame was thin and poorly covered and his musculature in general was extremely poor. One could see clearly as he moved his head that both upper and lower muscles were almost non-existent being represented only by what appeared to be a pair of fibrous cords. Sitting forward was accomplished only with extreme effort and when he lay back from this position his whole body slumped back with a lump. Frontal baldness was marked and the remaining hair was jet black, fine and silky and streaked with grey. His complexion was extremely pale and a pinkish malar flush stood out prominently against the yellow background of the skin was thin, inelastic and moist. He looked haggard with dark circles round his sunken eyes. An excoration on his upper lip testified to the fact that his nose had been running - so bad that his handkerchief had had to be used to excuse and the nose was its result. His conjunctiva were rather pale but the patient was not nearly so anaemic as first impression suggested. Breathing was laboured and colleting, and an occasional wheeze, loose cough with a copious white glutinous sputum made his whole body quiver with the reaction. His long, thin, sensitive fingers showed no evidence of clubbing.

Long years of chest trouble had obviously played havoc with the ego of Alexander Ritchie. Afety was evident in his face yet one could not fail to notice the undertone of desire to be cheery which seemed to try to struggle through and, indeed, sometimes did. That was more than a giving up of
Systematic Examination.

Gastrointestinal System:

Symptoms: Afflicted foot, no thirst, dysphagia or abdominal pain. Occasional flatulence. The patient tends to be very constipated and has been thus for many years.

Signs: The lips are pale than normal but there is no definite rigor. Both upper and lower dentures were well fitting and clean. The tongue was moist with a heavy yellow deposit extending to the lips. The papillae appear quite healthy. Gums and fauces presented no abnormality.

Abdomen:

Inspection revealed a rather scaphoid abdomen with obvious evidence of recent wasting. No tenderness, rigidity or resistance was experienced on palpation and the rectus muscle on each side was of equal tone, and, I believe, that muscle tone was slightly increased. Examination of individual organs revealed nothing abnormal. The stomach and bubble was of average size. Liver, spleen and kidneys were not enlarged. The feces showed nothing abnormal.

Examination of the testes was also carried out at this stage. To reveal extreme gonadal atrophy, the testes on each side being only the size of a coffee bean.

Circulatory System:

Symptoms: No complaints referable to the cardiovascular system.

Signs:

Arteries: Slight pulse, regular in rhythm and in force. Pulse were fairly large with good, well sustained, vessel wall palpable. The pulse is equal in force and rhythm on both sides. Arterial pressure 120/70 mm. Hg.
View:—No distension, venousity or pulsations.

Cirrhotics:—No cyanosis, oedema or abnormal pulsations.

Heart:—

Precordium is very poorly covered and shows evidence of abnormal bony growth at the costo-chondral junctions, which present themselves as a series of knots on each side of the chest. The area of dullness is localized in the 5 th interspace 4 " from the mid-sternal line. Area of cardiac dullness slightly reduced.

No thrill felt over the precordium. Heart sounds closed in all areas. X-ray shows slight enlargement of the right auricle.

Respiratory System:—

Symptoms:—

Stabbing pain over right and left costal margins anteriorly and laterally, aggravated by his constantly recurring, loose, productive cough. Between spasm s of coughing the pain settles somewhat and persists as a dull ache until the next bout of coughing occurs which changes the pain to a stabbing sensation. The pain is worse on the right side. The sputum is white and mucinous with an occasional yellow streak. The patient is obviously dyspnoeic, the difficulty being apparently in the inspiratory phase.

Signs:—

I could not detect any signs of cyanosis.

The artificial areas of cardiac and left auricular dullness were slightly reduced. Here was drooping of the ribs and the costal angle was narrow. The physical signs in the chest were bilateral. There were—

a. Diminished movement. The chest being held in the position of inspiration.

b. Hyperresonance on percussion.

c. The breath sounds were rather faint and distant but were harsh vesicular in type. With prolongation of the expiratory moment.

Rhonchi could be heard all over the chest in both phases of respiration and scattered here and there medium and coarse ronchi could be heard towards the end of inspiration. The ronchi were better appreciated after the patient had given a short cough. The rhonchi were of medium pitch, not the high-pitched
Nervous System:

Mental Functions — Intelligent, memory very good, no sign of mental deterioration. Has always been a worrier over small things.

Cranial Nerves — I was especially interested in the first, but there was and never has been any difficulty with vision. I examined the eyes for color, but found none.

The other cranial nerves responded satisfactorily to all the tests.

Peripheral Nerves:

Motor Functions.

It is convenient at this juncture to discuss the locomotor system, at least its muscle component, along with the function of the peripheral nerves. We will consider the trapezius and sternomastoid here for convenience — They are supplied by the spinal (not the cranial) part of the accessory, anyway, along with branches from the anterior primary rami of 3 and 4 cervical, so perhaps we are justified.

As has already been observed, the sternomastoid on both sides is in an extreme state of atrophy. The trapezius also show evidence of bilateral wasting yet the innervation is not disturbed for the muscles respond to the nerves but the response is weak. Further evidence of abnormality in the muscles is seen when the patient makes a fist.

The finger flexion is well performed but on attempting to bend the fist it is as if the fingers were fixed in mid-air in the half-way position i.e. There is difficulty in relaxation — a condition of myotonia. The hands and arms on both sides are thin, all the muscles showing in the atrophy. The fingers on both sides show this wasting well. The grip is weak, especially on the left. The movement of opposition of the thumb and little fingers is weak on both sides. The action of the extensors of the hand, the flexors and extensors of the elbows and the shoulder muscles...
is quite good. By giving the index muscle a jerk one can feel a slight persistent contraction with the fingers over the belly of the muscle. There is no marked individual muscle wasting in the legs but muscle action is weak. The patient could not raise his toes and plantar flexion is more powerful than dorsiflexion of the foot and toes is. This is a tendency to drop foot. The trunk muscles showed obvious atrophy and weakness as do also the muscles of temporal muscles.

There are no fibrillations to be seen in any of the muscles.
The reflexes are difficult to elicit in the arms and for all practical purposes are absent. The difficulty is due to the extreme thinness of the muscles. The abdominal reflexes are brisk and the recti tend to retain their tone after demonstrating this reflex. The knee jerks are present but weak. The ankle jerks are absent. Both plantar reflexes are flexor in type.

There are no sensory changes whatever.

**Integumentary System:**

No symptoms.

Skin moist and shiny, not pigmented and there are no eruptions.

The nails show no changes. There is no clubbing of fingers or toes.

**Respiratory System:**

No symptoms.

Urinalysis: 6/1/25 is urine coloured, specific gravity 1030 with a trace of sugar as the only abnormal constituent.

**Endocrine System:**

The gonadal atrophy and the high-pitched voice of the patient probably go hand in hand. No other endocrine abnormality detected.

**Hematopoietic System:**

Lymph glands and spleen not enlarged. Hemoglobin 85%.

RBC 4½ million/c.mm.
Locomotory System:

Bone: - Show no deformities other than enlarged costo-chondal joints.
Joint: - No pain, swelling, effusion or effusion.

Muscle: - Show weakness with associated myotonic behaviour.

Diagnosis:

Mynopatia atrophia, chronic bronchitis and a degree of emphysema.

With regard to the chest condition it is necessary to exclude the following:

1. Chronic Pulmonary Tuberculosis. Repeated examination of the sputum and of the chest X-Ray have proved negative.

2. Left sided cardiac failure. This is no valvular lesion or hypertension and X-Ray shows a normal left ventricle. The patient is not weakened by a pericardium of dyspnoea as is the cardiac case, but rather cannot get to sleep because of its cough which is paroxysmal and exhausting.

3. Bronchitis. The "dry" type usually is characterized by little cough at rest although this may be considerable basal bronchitis and the only symptom may be recurrent haemoptysis.

Typical bronchitis is characterized by a paroxysmal cough and in mild cases the clinical picture is similar to that of chronic bronchitis. The incidence of the disease is between 30 and 40 and is common in males than in females. The history of pneumonia in childhood is always a point in favour of this diagnosis. Coughing paroxysmal spoken with offensive odour is not a feature in this case and we would have expected a degree of clubbing of fingers and toes if bronchitis was present for the sick patient in this case is of long standing.

X-Ray revealed no isolated bronchi or cavities. Lastly, physical signs in bronchitis are usually basal and may be unilateral or bilateral. In this patient the signs were demonstrated all over the chest with no particular emphasis on the bases.

4. Thoracic tumours. Absence of cold features of a space-occupying intrathoracic lesion and the X-Ray plate excluded this diagnosis.
All the features in this case fit in with a diagnosis of chronic Bronchitis. The repeated attacks of cough which increased in severity and duration with successive years, the paraaeroidal exhausting cough, the nearly continuous mucoid sputum, occasionally streaked with blood, and becoming more frequent and frankly purulent during acute exacerbations. The dyspnoeans which is present on exertion is due to emphysema and consequent congestive cardiac failure. Many cases show features of severe dyspnoea due to bronchooedema.

The physical signs in the chest in this patient are characteristic of bronchitis with emphysema.

The pain in the chest the patient complained of was the result of muscle strain due to the repeated coughing (the myalgia of acute bronchitis).

The attacks of pain experienced during while out walking with made him stop until the pain subsided. He no indefinite and vague and occurred at such long intervals that I would hesitate to attribute them to an organic cause.

The transient rash he described is probably evidence of a state of sensitiveness or allergy and is all the more interesting when one reviews the attack of dyspnoea experienced in Waterloo Station and considers the possibility of bronchooedema (either) as an additional factor in the illness. In my clinical examination, however, I could detect no evidence of bronchooedema. The rhonchi heard were more probably due to plugs of tenacious mucus on the bronchial walls causing partial occlusion than to actual oedema.

Treatment:

1. Attempts must be made to improve the patient's general health. Adequate sleep and adequate diet with addition of extra fat, oil, butter, and cream, to increase his weight are essential. Regular exercise, as far as his vital condition allows, is of the greatest value.

2. Deep breathing exercises, by increasing pulmonary ventilation, blood flow, and gaseous exchange, diminish dyspnoea.

3. Dusty and smoke laden atmospheres should be avoided. The
patient feels that the fumes he inhales are bad for his chest.
Had there been no other complication we would have done well
To advise a change of occupation. In this case it seems very
probable that he will have to give up work altogether unless
some job can be found for him, which requires the minimum of
muscular exertion and is compatible with the condition of his
chest. Smoking should be forbidden. Even cutting down smoking
is not enough. When we consider how the eye and if cigarette
smoke happens to get into them and then reflect on the probable
effect on the highly specialized, delicate, sensitive cells of the
respiratory mucosa, it is no exaggeration to say that cigarette
in such a condition as chronic bronchitis are "coffin nails".
4. Underlying causes should be treated such as chronic infection
of the nose, throat and air passages; nasal obstruction.
5. I am afraid the possibility of removing the patient to a
warmer, dry, equable climate for the winter is highly remote.
6. The excessive cough, especially at night should be controlled
by the use of codeine phosphate 1-2 fl. drs. This may be repeated
4 hourly if necessary. When the cough is scanty, cough
remedies and inhaled attempts may be made to liquefy it by the use of potassium
iodide 3 ggr., ammonium carbonate 5 ggr., solution of ipecacuanha
5-15 ml. It appears that is little scientific evidence to support the
recommended effects of such a mixture. A morning dose of an alkaline
mixture in a glass of hot water before breakfast is useful for
the expulsion of the phlegm which has accumulated during the
night.
7. When bronchofum is suspected anti-tussive drugs, e.g.
ephedrine 1 ggr. are of great value.
8. Periodical coughing exercises and regularly should always be
done if the phlegm is copious.
9. A course of injections of toxic or autogenous vaccine may
be given during the winter and the autumn preceding. By this
means the susceptibility to acute exacerbations may be diminished.
10. Should congestive cardiac failure become prominent its
4
treatment should be instituted at once.
The Differential Diagnosis of Myotonia Atrophica:—

From a diagnostic point of view fibrillar contractions are important because, for practical purposes, they do not occur in the myopathies or primary muscular dystrophies that are due to lesions in the muscles themselves and not in the spinal cord. In only a few recorded cases have these fibrillations been seen in cases of myopathy where lesion of the central nervous system could be excluded. Neurologists and myologists have devoted much attention to primiparous myopathy, with the result that it has become blurred with a highly elaborate classification and nomenclature. Thus the condition generally has been described as—

Primary progressive myopathy; progressive muscular atrophy (Crb); idiopathic muscular atrophy and hypertrophy; familial progressive myopathy; muscular atrophy; myopathy.

Special forms of it have been raised to the dignity of “types.” The chief of which are—Single atrophic (Crb); pseudo-hypertrophic; spinal cord (Crb); fascio-scapulo-humeral (Landouzy & Dujon); distal (Gowers); myotonia atrophica; mixed and transitional (Fisher & Macleod; Zimmerman).

This importance of the present purpose consists in this—that fibrillary contractions may occur as a rare exception in most of them.

Contrariwise fibrillar contractions are definitely observed in the course of the progressive muscular atrophies of neuropathic origin, variously known under such names as—Chronic anterior Poliomyelitis; amyotrophic lateral sclerosis (Charcot); progressive bulbospinal; progressive muscular atrophy; toxic degeneration of the lower motoneurons; Hereditary-Neuhoff progressive muscular atrophy of infants.

In the case under discussion no fibrillar contraction is to be seen in the affected muscles, a point in favor of the myopathy. The onset of the disease in the myopathies is usually in childhood or adolescence. The history in this case suggests an onset in the early years (was always exhausted at play before the other children) and we must remember that Alexander Ritchie’s house of health was built on sand. His weakly form, evidence ofrickety et
that witness to this fact; so we cannot lay too much stress on the years of childhood. We certainly know, however, that at the age of 22 he noticed weakness in his hands and it is very probable that the condition had been slowly progressing for years before that the muscle atrophy began in the second half of life.

The loss of flesh which occurs in the myopathies leads to a loss of tone and so the reflexes are depressed at first; but if there is no added spasticity (as in amyotrophic lateral sclerosis) this is also seen in the muscle atrophies of neuropathic origin.

One thing is common to the true myopathies and the muscle atrophies—in nerves is that any sensory loss. Only rarely in the true myopathies are the intrinsic muscles of the hand involved but in this patient there was bilateral evidence of wasting in the thenar muscles.

Progressive muscular atrophy is a form of muscle atrophy of neuropathic origin where the degeneration mainly involves the anterior horn cells of the cervical part of the cord but the pyramidal tracts are not slightly affected. The lower limbs are not affected and in the arms the reflexes are often normal, probably coming to the slightest hint usual involvement of the lateral columns (pyramidal tracts). In our patient the lower limbs share in the atrophy.

Anterior poliomyelitis in the stage of permanent deformity must also be differentiated from myotonia dystrophica. The distribution of the paralysis is asymmetrical. The lower limbs, especially below the knee are more often involved than the upper; the paralysis is of the lower motor type. Since operating muscle groups are uniquely affected contractions tend to develop. There is no definite history of an acute illness (often called a "flu" by the layman) but this is not essential in poliomyelitis, we would expect muscle pain and tenderness, slowing and atrophy of a flaccid paralysis with recovery, partial or more rarely complete, after the first week of the illness.

Peripheral neuritis is a condition also showing muscle wasting but there is also sensory involvement involving all forms of sensation in greater or less degree.
The diagnosis of myopathy really rests on the absence of involvement of the nervous system, the bilateral distribution and the family history for the fact that this weakness is not accompanied by weakness (although males are affected far more commonly than females in myotonic dystrophy) seems to me to have a definite significance.

The condition, then, is a myopathy. There is no difficulty at all in determining the type for no other condition gives such a clinical picture. It would have been interesting to know the electrical reactions of the muscles in this case. Reaction of degeneration is never seen in myopathies (i.e., after about 3 weeks). The reaction to Faradic stimulation is lost and that to galvanic is sluggish and shown as a wormlike wave of contraction passing over the muscle, the state of affairs seen in a chronic motor neuron lesion). In the myopathic Faradic and galvanic reaction is defused but no wormlike contractions are seen. So we see that in the myopathic a quantitative change occurs in the electrical reactions whereas in the muscle atrophy of neuropathic origin the change is qualitative.

Myotonic atrophy is a rare hereditary familial disease of unknown etiology, developing during early adult life and occurring usually in males. It is characterized by atrophy of the facial muscles (The weak orbicularis oculi leads to ptosis of the lid) of the mouth, of the forearm, hand and leg muscles, and also by myotonia, which is usually best seen in the facial and tongue muscles, in the flexors of the forearm and in the calf muscles. Percussion (or electrical stimulation) of the myotonic muscle elicits a slow localized contraction and delayed relaxation of the muscle fibers. Voluntary contraction is also followed by the same delayed relaxation. The patient has myopathic features with considerable weakness of the facial muscles. Associated with this myotonia are usually mental deterioration, premature baldness, calvaria and atrophy of the testicles. This is usually a history of precocious calvaria in the generation immediately preceding the myotonic generation and of mild calvaria in the second generation. The myotonic
Discussion:

That a good history is essential in all clinical investigations is without a doubt a great and undisputed truth. When dealing with an clinical problem, therefore, the patient is almost an all-important factor in establishing a diagnosis. In that, by lucid explanation of his symptoms, the clinician is enabled to formulate a clear-cut picture which more or less conforms to an accepted standard which is recognized as a clinical entity. Yet even the possibility of overlooking an insidious, and usually insidious condition because of the more obvious manifestations of a comitant and perhaps less serious disease, must always be kept in mind. When Oliver Wendell Holmes wrote —

"If you must listen to his doubtful chest, catch the essentials and ignore the rest", I hope he meant this to include no more than accentuation. To "ignore the rest" was what our trusted doctor had done for years, and so would most doctors, in the course of a busy morning round, leave the patient reporting with a bad cough and a pain in his chest as his most prominent symptoms.

The rarity of the condition is really the stumbling block in the diagnosis of this disease for the diagnosis is easy to make once you consider it as a possibility. If you suspect it, the diagnosis is as good as made for the varied manifestations in this condition under taken together constitute a clinical entity simulated by no other condition.

Mental deterioration was not a feature in this case not was
The prognosis in this case is grave. Not only is the patient faced with the prospect of chronic invalidism, and confined to bed where bronchopneumonia often ends the story, but there is every indication that the heart is beginning to fail, secondary to the lung condition. It may be that an acute exacerbation will go on to broncho-pneumonia, and in such a debilitated subject the chance of recovery are extremely small.

In the meanwhilequinine in 5 gr. doses twice or three times daily should be given and this is effective in reducing the myalgia. Ecliptone has been said to be of value in improving the state of the muscles but this therapy must be continued or else relapse occurs.

It was rather a surprise to me that myalgia was not a feature in this ease for, with such a degree of lung involvement, one would have expected that oxygenation of the blood would be impaired. Furthermore symptoms suggest and radiographic investigation proves that the right heart is beginning to feel the strain of the diseased lungs; yet the coarse basal rales which are characteristic of incipient failure with congestion were singularly absent but it must be remembered that the patient has been confined to bed, while heart action is reduced to a minimum and conditions are conducive to improvement.

The case is interesting in that it shows us a rare clinical condition which in its early phases was completely overlooked by a more obvious complaint. It teaches us a great lesson as well and, with apologies to Oliver Wendell Holmes, I would suggest —

When symptoms indicate an unhealthy chest,

Give it attention — but above the rest.
Interrogation:

William Brown, age 47 years, married; labourer in gas works.
Address - 27 Royton Main Street, Granton, Leith.
Admitted to Municipal General Hospital on 16th November 1945.
Recommended by R. Macfadyen, Granton.
Examined on 17th November 1945.

Complaint: - “Pain in the left ‘side’, made worse on deep breathing and coughing; and headache, mainly over the left frontal region.

History:

Present Illness:

The patient, who has been troubled with bronchitis for many years, states he was in reasonably good health till 7 weeks ago when one evening, on coming home from his work, he suddenly felt a shivery feeling all over his body. He felt “off colour” all evening but next morning he felt well enough to go to his work. Though not his usual self he continued to attend his work. His cough, which had been latent for many years became worse so the week went on and was accompanied by a rough, scratchy feeling behind the upper end of the trachea, his spit, usually white and frothy, became greenish and tenacious but was not purulent. Then one morning, a week after his shivery feeling, when awakened to go out to work he felt himself faint and very weak and almost fell as he tried to get out of bed. He also had a severe stabbing, frontal headache which was worse on the left side. His doctor was called in and he prescribed powders which relieved the headache temporarily, and put the patient on a course of sulphur, thiazide for 4 days. During this period the patient sweated a lot and the feverish feeling gradually subsided. After a fortnight in bed he was allowed up but did not feel his old self at all. He remained off work for a further month during which time his feeling of weakness and “off colour” persisted, and, about a week before admission to hospital his headaches and feverish feeling, with sweating, returned. The headaches were always...
worse in the morning, always left sided, and his head seemed as if to burst —"as if I had been drinking all night," he said. The headaches could only be relieved, and that temporarily, by taking the powders his doctor had advised.

On the Tuesday morning before admission (it 3 days before) he went out for a short walk. On returning, he felt very tired and suddenly developed a sharp stabbing pain in the lower half of the left side of his chest which prostrated him. The pain was like a "jag," he declares, which was made worse if he breathed deeply or coughed. His cough did not worsen any but became short and painful, pain being the limiting factor. He could not touch his chest over the affected area because of the pain this induced and if he moved the pain seemed to shoot through his whole body. He felt flushed and fevered and on the following day, after a restless night, decided to send for his doctor who again prescribed "M and B." On the Wednesday and Thursday the patient fell sick and vomited once or twice and the doctor realizing all was not well had the patient admitted to hospital on the Friday for further investigation.

At no time in the illness did the patient notice blood of a rusty colour in his sputum, which at this time was white, mucoid and rather scanty. On the first 3 days of the week in question the patient states that he noticed frank red blood in his stools and that the sitting posture was painful — due, he believes, to ulcers which have troubled him for many years now.

Previous health, social conditions, food and habits:

The patient as a child and adolescent enjoyed very good health, suffering only from the usual complaints of childhood (chickenpox, measles, mumps), none of which was severe in his case. In his late twenties he began to be troubled with bronchitis, first starting as a "winter cough" which showed a steady increase in severity and duration with successive years until baryta, cough has come to be present all the year round, worse at night and occurring in spasm which often leave him weak and exhausted.
In 1920 he took up gardening as an occupation and continued at this work until 1940 when he was offered a job in a brewery which he accepted. While employed in the brewery he confesses he was a heavy drinker but since leaving this work 1½ years ago, when he was directed by the Ministry of Labour to a gas-works, 2 or 3 pints of beer a week has been his usual consumption. He felt that the work in the gas-works, although it often gave him severe frontal headache (nearly always left-sided), “cleaned his chest” and on the whole he felt better in this work than when he was a gardener which necessitated him being out in all weathers. Of recent years the patient finds he tends to become easily fatigued on exertion but he has never noticed his ankles swollen at night or any other time.

The patient states he has been losing a considerable amount of weight recently. Usually 8 st. 8 lbs., about 1½ months ago he was surprised to discover, on weighing himself, that the scales only recorded 8 st. 14 lbs. Two weeks later, on the same scales, his weight was recorded as 7 st. 11 lbs, and he feels that he has been losing weight much faster.

For the last 3 months or so the patient has been having trouble with micturition. He has been having difficulty in starting the stream, often having to wait 2 or 3 minutes, and when the stream did begin he experienced pain at the point of the penis and his urine has on frequent occasions been dark in colour, sometimes almost brownish he declares. He has noticed no unusual discharge and that has been no alteration in the stream.

The patient has never been abroad. He smokes 20 cigarettes a day.

Family:

The patient’s mother is alive and well. His father died a few years ago with what the patient calls “an abscess in the spine.” An interesting point, which may be of some value, was brought to my attention when making inquiries into the health of his brothers and sisters. It appears that his sister about a month ago complained of “pains in the head” and that on the day of the patient’s admission to hospital
She developed a pain in her chest — "just like my own." The patient states. One of his brothers has been having penicillin treatment for infection of the gums.

The members of his own family, five in number, are all sick and well.

**State on Examination:**

The patient was lying in bed, slightly propped up. He was of average build but was rather thin and his sunken cheeks and temporal regions corroborated his statements of loss of weight. His eyes were heavy as though he had not been getting his sleep recently. Occasionally a short, loose cough would cause him to twist his face a little in pain. His spit was rusty, white and mucus. The patient lay on his back and avoided any movement which might bring the left side of his chest in contact with the bed. His respiratory rate was 24 per minute and his temperature was 100°F. There was definite cyanosis of the lips and ears, and the capillaries over his malent regions were dilated which contracted strongly with the gauzy, toxic appearance of the rest of his face.

There was no clubbing of fingers or toes and the conjunctiva was of good colour.

**Systematic Examination:**

**Alimentary System.**

**Symptoms:** — Appetite has been poor for the past two months and at the present. The patient has no appetite at all. The patient’s complaint of blood in his stool is very probably explained by haemorrhoids.

He has noticed no blood since the painful attack of chills a week ago. At present the patient is constipated but in health his bowels were always regular.

**Signs:** — The lips show definite and marked cyanosis. Both upper and lower dentures were well fitting but the gums looked red and inflamed. The tongue was moist but was heavily
coated with a yellow deposit over the posterior half. The papillae of the tongue stood out prominently.

The fauces appeared quite healthy.

**Examination of the abdomen:**

The only abnormality detected was slight tenderness in the left hypochondrium. This was not accompanied by rigidity of the abdominal wall.

Examination of the stools revealed no abnormality.

**Circulatory system.**

**Symptoms:** Breathlessness on exertion of moderate degree.

**Signs:**

**Arteries:** Pulse rate 92, regular in rhythm and force with a good pulse wave. The pulses are equal in force and rhythm and are synchronous on both sides. Arterial tension 120 mm. Hg.

**Veins:** No distension, varicosity or pulsation.

**Capillaries:** Leg veins but no edema or abnormal pulsations.

**Heart:**

Precordium normal in shape but poorly sounded. I could not detect the area beat either on inspection or palpation, even when the patient inclined forwards. There is no vibration in the extent of cardiac dullness. No thrills felt over precordium. The heart sounds are but faintly heard but the are no murmurs present.

**Respiratory System.**

**Symptoms:** Pain over the lower half of the left side of the chest, ventrally. The pain, once stabbing in character, is now a dull ache, aggravated by deep breathing and coughing.

Also a short, productive cough which is worse in the evenings and often long-continued and exhausting; and shortness of breath which has been becoming progressively worse and which is induced by exercise of moderate degree.

**Signs:** There is obvious cyanosis of the mucous membranes.

The chest is poorly sounded but of normal shape. The respiratory rate rises slightly increased. The movements of the
chest on quiet inspiration were equal on both sides but on taking a deep breath after a spell of coughing the left basal region was seen to move less than the corresponding area on the right.

Vocal fremitus normal on the right side. On the left side, anteriorly, vocal fremitus was slightly diminished at the base and above this area no detectable variation of vocal fremitus was appreciated.

Posteriorly, however, as well as a definite decrease in vocal fremitus over the base, one could appreciate, over an area covered by about three ribs with the intervening spaces in the long axis of the lung and about the same extent in the transverse, situated close to mediastinal border and at the junction of the middle and lower thirds of the lung, a definite increase in vocal fremitus, when compared with the other side. Over a very limited area above this, vocal fremitus was again slightly impaired but not so greatly as at the base.

Percussion over the right lung revealed normal resonant lung. There was not even a suspicion of hyperresonance, but, in spite of the long history of bronchitis, the normal form of the chest indicates that emphysema, if present, is not gross, so such a finding was to be expected.

Anteriorly on the left side percussion yielded a dull, even flat note over the base and the upper limit of dullness which was like the are of a circle sloped towards the axilla as one proceeded toward the lateral border of the chest. While not very dull, this was a definite feeling of resistance to the applied finger when percussion was performed. I think "board-like" would best describe this feeling. Elsewhere on the front of the chest nothing definite was elicited by percussion.

Posteriorly percussion at the base revealed a dullness at the base and here, under the fingers, a sense of strong resistance and even discomfort was experienced. This could be truly called "spongy" dullness.

Over the area mentioned above where N.F. was found to be increased, the percussion note was again dull but none of the resistance or discomfort such as was felt over the base was
experienced. Above this area normal lung resonance was elicited on percussion.

An auscultation over the right lung coarse crepitations were heard over the base, elsewhere in the lung, especially at the apex, high-pitched rhonchi were present. The breath sounds were vesicular
with prolongation of the respiratory murmur (hoarse vesicular). Vocal resonance was unchanged.

Anteriorly over the base of the left lung the breath sounds were faint but vesicular in type and coarse crepitations could be made out especially after a cough. At the apex anteriorly and posteriorly the auscultatory findings were identical with those on the right side.
Posteriorly at the base The breath sounds were greatly diminished being appreciated only on maximal inspiration. At the upper level of dullness at the base posteriorly the inspiratory phase was rather blowing in character but the breathing was not bronchial.
This alteration of the inspiratory murmur was not appreciated anteriorly.

Here was no true egophony at the upper level of dullness, anteriorly or posteriorly.

Over the area where dullness was appreciated, at the junction of the
middle and lower thirds of the lung, joint bronchial breathing was heard.

The voice resonance was increased but there was no whispering.

Radiographic Examinations of Lung:

The right lung showed a clear field. On the left side a definite opacity could be seen at the base in the a.p. film, its central aspect being slightly closer to the left border of the chest. Peripherally, by the heart a circular dense opacity about 3 inches in diameter was seen. There was no reaction in the lung tissue surrounding it and the appearance resembled a billiard ball in its uniform density and its chest cut edge. A lateral film showed it to be in the lower lobe and not in the interlobar space. It was not right in the hilum but was deeper in the lung substance. The rest of the lung field was clear. The abnormal density which one associates with emphysema, and the X-Ray appearance of collapse of fibrotic lung were completely absent around the azygous opacity. The chest shadow was normal.

Conclusions:

1. There were signs of slight effusion at the left base.
2. Signs of consolidation over a limited area in the upper part of the lower lobe of the left lung.
3. Slight collapse of left basal region. The position of the apex though not palpable is in the normal position on the X-Ray but the entry is markedly diminished in this area.
4. Apart from the absence of hyperresonance on percussion the signs in the chest suggest chronic bronchitis but the tempo in this case must have been very slow. I would have expected the signs of a fully developed emphysema after such a lengthening complaint.

We must remember that the patient has had a full course of tuberculosis before admission when we try to interpret the physical signs. Diminished voice entry at the base is probably the first sign of a pneumonia and there is every indication that infection is present here, associated with effusion and slight collapse of the
Urinary System.

Symptoms:— Difficultly in starting micturition. Pain at point of penis when the act begins. No dribbling, not alteration in stream.
Sometimes the urine has been discoloured, having a brownish tinge in it. No history of renal colic or urethral colic, acute retention or pain in the loin.

Signs:— Urine 14/4/45 is orange coloured, SG 1024, acid with a trace of albumen as the only abnormal constituent.
No tenderness over kidneys, kidneys not palpable. No tenderness in the loin. Per rectum: The prostate was found to be of normal size and consistency.

Haemopoietic System.

No symptoms.

Lymph glands in groin, axilla and elsewhere not enlarged. Spleen not enlarged.

Blood count 17/11/45. WBC 10,300. Hb. 85%.
The different varieties of white cell were present in their usual proportions.

Nervous System.

Left frontal headache was the only symptom.

Signs:—

Reflexes present and equal on both sides. Examination of cranial nerve function revealed no abnormality. The same affection of the peripheral motor nerves and no sensory disturbances. Examination of the fundi yielded negative results.
X-ray examination of the skull was also negative.
The patient was of average intelligence and not the type prone to introspection. The patient states that his headache was precipitated by fatigue and that before the onset of headache he always felt a feeling of malaise. There were never any sensory disturbances before the onset of a bout of headache, however, and at no time
The patient's headache was referred to the left side. He complained of nausea and vomiting a few days before admission to hospital but he could not give any information concerning the relation of the vomiting to the onset of a bout of headache. 

I am inclined to think that the toxic condition of the patient and the chemotherapy employed were the causes of the vomiting.

The endocrine, tegumentary, and locomotor systems presented no abnormality.

"This case demonstrates some of the difficulties encountered in chest conditions and also stresses the value of "side-room" investigation as an aid to diagnosis. Rather than be dogmatic with regard to diagnosis at this stage we would discuss the various possibilities and, by process of elimination, hope to arrive at a reasoned explanation. There are many "red herring" in our path for there are many seemingly unrelated facts to explain; but, as exemplified by another of the cases on review (case iv) different clinical conditions may find a home in one individual."

Differential Diagnosis --

The is, first of all, the subject of headache to be disposed of. The unilateral headache, the age incident (in adult life), the fact that fatigue was a predisposing factor, the feeling of "off color" before an attack of the "somewhat indefinite history of vomiting." All these would suggest a diagnosis of migraine. Yet the absence of the usual preceding sensory disturbances must weigh heavily against it. Even when I suggested some of the usual sensory symptoms -- scotoma, homonymous hemianopia, flashes of light, sc Trees, zig-zag of colored light (fortification spectra) fleeting in the arm or face on one side etc. -- the patient, an intelligent man, firmly denied these existence, or anything akin to them, in his case. The fact that his headache would persist for several days does not exclude migraine for certain cases of this disease show paroxysms lasting days..."
at a time. The exclusion of migraine rests upon the existence or non-
existence of a preceding sensory aura and the fact that attacks of
migraine are paroxysmal.

The patient's history of headache while at work may largely be
explained by the fact found in his environment, yet it may be
noticed that this headache then was always, or nearly always, confined to one
side. This, without evidence of intracranial lesion and excluding
migraine, leads one to think of some local pathology in the affected
area and the one that immediately springs to mind is sinus infection.

An infected sinus gives a frontal headache which may sometimes
be unilateral. I could elicit no definite tenderness over the sinuses
but I was interested to see that the patient frequently cleared
his nose with his handkerchief and this was obviously considerable
nasal discharge. The antero-posterior X-ray film showed a
suspicions increased density in the frontal and left ethmoidal
sinuses but since the film was not taken for sinuses and therefore
the density of the sinuses could not be compared with that of a
standard, the orbit, one could not be committed on this point.

A sinus infection which underwent acute exacerbation in the
presence of infection elsewhere and general lowering of resistance
has much in its favor for the response to chemotherapy on
The first occasion was very good and on The last occasion The
headache has abated considerably since the multiple decay has
been exhibited. When examined, the patient volunteered that The
headache was not nearly so severe as it was a week before,
being now only a dull ache which assumes a more acute
character as the evening wears on and it becomes tired. The
pain is also more acute in the morning hours than during
The mid-day hours. It makes one recall how an active
Tooth or a superficial spot seems to be more painful at morning
and evening, and in fact is some support for The infection theory.
It is the lung condition which demands most attention, however, and here we are dealing with somewhat of a rarity.

The various possibilities are:

2. Interlobar Emphysema. In such a condition there is a high leucocytosis (much higher than the white cell count of 10,200 in this case) with a relative increase in the polymorphonuclears; but chemotherapy has been employed here at an early stage of the illness and this may have modified the defence measures of the body. However, the lateral X-ray disposed of this possibility for the mass is not in fact in the interlobar space.

3. A pneumonia failing to resolve shows a temperature chart very like that of patients that this is usually a blood-stained or purulent discharge and the leucocytosis is usually less profound than that seen in the case under discussion. X-ray appearances are also helpful for in unresolved pneumonia the common feature are irregular opacities associated with dulling, ill-defined small shadows.

3. Lung abscess, before bronchial perforation has occurred.

The typical signs are in accord with such a diagnosis for, if the abscess is near the surface there will be signs of consolidation. More commonly the signs are a pleural rub associated with limited movement, impaired note, a postural cough and rales. That is no history of inhalation of a foreign body or infected material in this case but lung abscess may also be the result of suppuration of a pneumonic area. The story of a short, indolent and unproductive cough before the onset of pain in the chest would have been suggestive but such was not obtained. The frank pleurisy with breathlessness, sweating, mottling and cyanosis is very much in favour of an abscess and this is no doubt we are dealing with something very much akin to this condition, whilst the abscess corresponds to the typical chest X-ray picture in radiology is not so certain but it must be stated that both abscess of the lung can be accounted for, in only a half of cases, by aspiration
of unclean material from the mouth as in ulcerating cancers, 
general anaesthesia, operations on the mouth, nose and throat, 
dental extractions, coma, immersion and the like. Sometimes the 
sweat is insidious with bitterness and nausea as the main feature. 
In these patients the infected material is most probably inhaled 
during sleep. It is a known fact that a small amount of 
expectorated sputum left in the mouth at night can be seen by radiography 
to have entered the lung by the next morning. But suspicion of 
bronchial infection might lend a clue to the source of the infected 
material. Such abscesses are usually single and of fair size, 
involved a segmental zone of the lung; the organisms are carried 
into the bronchial tree in a small piece of particulate debris, 
the usual site of arrest being one of the smaller bronchi 
of the fourth or fifth order. It lodges in the right upper lung 
more often than the left, in a lower more often than an upper lobe. 
As might be expected in a recumbent person, arrest is often 
in branches of the posterior basal bronchi, of the basal 
bronchi of the lower lobe or of the posterior apical branch of 
the upper lobe. The record of these situations would fit in with 
this case.

But non-fibroid and fibroid abscess (to distinguish between 
single necrotic and necrosis with suppuration) are associated 
with very high subcutaneous cell counts, predominantly 
polyphomononuclears, the temperature has never reached the heights 
and associated with lung abscesses, and the X-ray shows no 
surrounding area of pneumonia such as is usually seen in 
lung abscesses.

The situation can be cleared up by bronchoscopy which is necessary 
in almost every case, even when the abscess is acute, for it is 
useless to make sure that this is not an underlying foreign body 
and must be excluded, a primary bronchial neoplasm. It may also 
help in accurate identification of the abscess by 
demonstrating the particular bronchus from which pus is exuding. 
The examination of sputum in this case did not give much help. Certainly the pus one associates with lung abscess was
not found and growth on culture revealed normal throat flora.
The sputum in lung abscesses may also show a mixed infection,
the predominant infectors being obvious in only a small
percentage of cases. Clubbing of the fingers so as to rule takes six to
eight weeks to develop so the absence of this feature in this case is
not significant.

The basal lesion could also be explained as a secondary
manifestation of lung abscess. Swelling of the mucous membrane of
the bronchus and formation of granulation tissue obliterates the means
of exit of the localized pus. Since the non-contagious smaller
bronchi are dilated by inspiration and contracted by expiration, it
follows that when there is swelling of the mucous membrane
the lumen may become completely closed during expiration,
and also, therefore, during the expiratory phase of coughing.
Pus may therefore be absent from the sputum but a spill over
of pus into healthy zones of the lungs may occur and cause
suppurative bronchopneumonia.

Embolic lung abscesses are usually small, multiple and
subpleural in site. They are easily excluded from the diagnosis
for the condition in the lung is overshadowed by fulminating
systemic infection and the origin of the deposits is usually
obscured.

The above three (infected empyema, suppurative pneumonia
and lung abscess) are the conditions one considers when a
lung infection is not settling down under treatment. There are
objections to them all. A few other conditions are more probable
from the point of view of radiology and clinical features.
Primary bronchogenic carcinoma.

The history of long-standing cough, loss of weight and general decline of health is suggestive. The condition affects males much more often than females, particularly in the fifth decade (40 to 50 years). The tumour is commonly at the hilum but may occur anywhere so that its position is not a significant factor in the diagnosis. Even the apex is not exempt for sometimes "superior pulmonary sulcus tumours" is in reality an apical bronchial carcinoma producing symptoms by reason of involvement of the brachial plexus and the cervical sympathetic chain. An early neoplasm growing in the bronchial wall acts as a foreign body and attempts to expel it result in cough, short, hard, unproductive at first, maybe spasmodic. Perhaps a little mucoid sputum is soon brought up in response to the irritation. As the neoplasm increases in size it may ulcerate and bleed. This gives rise to haemoptysis in the form either of a few goblets of blood, or if there happens to be an associated inflammatory reaction as streaks of blood in mucousulent sputum. A chronic haemoptysis is uncommon. There has been no history of blood in the sputum in the case under discussion. With a mass as large as that shown in the X-ray we would have expected a history of blood in the sputum. We must remember that, to the layman, who reads his future in his doctor’s eyes, blood in the sputum conjures up pictures of deadly maladies and calls for thought. The truth is that often old back important facts, perhaps because they wish to persuade themselves that if the doctor fails to bring them to light they cannot be disturbingly significant.

It is possible that the growth can grow in size until it produce an appreciable but not significant blocking of the bronchus without haemoptysis preceding. Since the lumen of the normal main bronchus is about as wide as a narrow finger, and the lobal divisions smaller still, the intrabronchial portion of the growth need not become very large before it embarrasses the proper ventilation of the corresponding lobes or lobes of the lung leading to imperfect oxygenation of
The blood flowing through the affected part will result in dyspnea and cyanosis. The dyspnea results from the partial bronchial block which interferes with the ventilation of the affected lobe. This in turn causes an imperfectly oxygenated blood supply to the heart, myocardial non-functioning, and consequent pulmonary congestion. We have seen that breathlessness on exertion has been assuming a prominent place in our patient's list of symptoms.

The partial obstruction of the bronchus impedes free drainage of secretion, this, together with the interruption of the normal defensive ciliary movement over the area of the growth, renders the imperfectly sealed part of the lung particularly susceptible to infection. As a result there are pyogenic attacks, often found to be inflammatory, or giving the picture of a pneumonic, an abscess or pleurisy. We have a history of one such pyogenic attack two months before the onset of the present illness in the case under discussion.

The physical signs in our patient fit in well with a diagnosis of partial bronchial occlusion with infection in the related lung. The cause of such occlusion is what is in doubt. There is no evidence, radiologically or clinically, of secondary involvement of mediastinal glands. There is no enlargement of the superficial glands of the body.

The sputum may be examined (Knyegy's method) for cancer cells but the diagnosis and perhaps prognosis rest on the results of bronchoscopy.

The X-ray appearances cannot exclude the condition. It is not unusual for the shadow to be "billet-shaped" in appearance but it is a possibility that necrosis of the mass has occurred to give an appearance not very like a lung abscess. The necrotic semi-fluid material bulging the rather irregular confines of the growth and smoothing out such irregularities of the wall.
Metastasis from malignant tumors elsewhere in the body.

Metastatic tumors of the lung are common enough, arising either by transmission along the lymphatics, or in breast cancer, or via the blood stream, as in primary sarcoma of bone, melanoma, lymphosarcoma and the like. The deposits may be large or small, so that the x-ray picture may show the lung invaded by fairly large, well-defined nodular shadows or that may sometimes be a diffuse infiltration in which the tiny nodules give an appearance which may be mistaken for merely tuberculosis.

As to the question of a primary growth, the history of dissolved urine and difficulty of mitrocardial trouble suspicions on the urinary tract but no enlargement of prostate or kidney was detected. One cannot be left to accept a story of dark-colored urine as being evidence of blood in the urine for it is not known what conditions predisposing to hyperconcentration of the urine were present at the time. What is known is that microscopic and chemical tests for blood in the urine proved negative. Medical smears and perhaps cytology at a later date may help to clear up the doubt. There is no history of vaginal discharge but the history warrants the lactic acid examination of smears.

The fact that there is only one mass and that a fairly large one, is not in favor of metastasis. Also, one would have expected definite signs and symptoms of the primary growth.

Primary sarcoma and primary innocent tumors of the lung (fibroma, adenoma, lipoma, and chondroma) are rare. Bronchoscopy is necessary for this exclusion from the diagnosis.

Desmoid cysts are usually in the anterior mediastinum but may be in the lungs. X-ray may reveal typical dense patches of calcification. Here again bronchoscopy gives the clue to diagnosis.

A gumma was a distinct possibility. The Wassermann reaction is negative, however.

Primary amniotic abcess is not unknown in the lung, and, had
The patient been a soldier returned from the East, this possibility would have to be considered.

4. The "Union cavity" of Tuberculosis, produced by partial obstruction of a bronchus allowing air to enter but preventing its exit, may produce an appearance similar to that seen in this case when the cavity contains retained secretion. It shows as a perfect sphere on the X-ray, but this is always surrounded by a reaction and often the signs of Tuberculosis in the lungs. The history of the patient is also strongly suggestive of a Tuberculosis case - typical cough, loss of weight, blood-stained spit, night sweats etc.

The sputum in the case of William Brown was T.B. negative.


Hydatid cyst in the human lung remain latent until they produce symptoms which depend on their site and size: irritation of the pleura, causing pain, or of the diaphragm, causing cough; presence on a bronchus, causing cough, sputum mucous and hemoptysis; rupture into a bronchus, which may cause death by drowning of the lungs, or by suffocation from infection of the esophagus wall in the pharynx.

If the patient survives these hazards the cyst cavity soon becomes infected, with suppuration of its contents; a rupture may occur into the pleural cavity, with an anaphylactic reaction and the development of secondary effusion.

The physical signs are in accord with the diagnosis and X-ray appearances are highly favourable. There is no history of exposure to the Taenia echinococcus, however, the patient never living near in these areas where the disease is rife and never being in close contact with dogs.

The Casoni intradermal test with an extract of echinococcus negative as did also complement fixation test for hydatid. Might it have been that infection of the cyst destroyed the cyst and with it the sensitivity of the tissues to the extract used in the diagnosis? I thought at first that the condition was very like an infected hydatid and looked for evidence of involvement of
The search in an attempt to discover the cause of the headache but the X-ray showed no such lesion in the brain.

Again, eosinophilia - a condition one usually associates with a state of allergy, sensitivity of the tissues (e.g., allergy) was not a feature in this case.

It is of the utmost importance to exclude hydatid so far as is possible before attempting intervention by bronchoscopy for rupture of the cyst may prove fatal. The absence of eosinophilia and the negative findings of the specific tests should exclude hydatid. I have, however, knowledge of a case in which the eosinosis and complement fixation tests gave a roasting positive and yet, on the operating table, the condition was found to be a simple cystic lesion. Whether the converse is true, a negative eosinosis in the presence of a cyst, is possible, is not so likely.

(10) Congenital Cystic Disease of the Bronchi.

Large, infected, single cysts had the signs of and behaved as would a lung abscess. Attacks of bronchitis, frequently accompanied by bronchial asthma, in this condition, precede a fulminating septal pneumonia by months or years. Cases have been recorded in the age period which includes our patient, which gave no pulmonary symptoms at all and which were diagnosed post-mortem. Indeed it is probable that this abnormality is commoner than is usually thought for it is only when infection is superadded that the condition is recognized. We do not know what is the proportion of cases of cystic disease of the lungs which remain uninfected throughout life and since it is the advent of infection within the cyst or cysts which is as a rule brings these cases to notice, it is not improbable that at present see the probability of infection is overestimated.

Infection in such a cyst, with subsequent aspiration of its contents following the failure to discharge through a narrowed bronchus, has much in its favor as a diagnosis in the patient. If a congenital cyst, newly infected, in the condition present, the absence of lung reaction around the mass would be explained easily for a bronchus, however dilated by congenital cysts, is a normal constituent
of the lung and not to be regarded by the mechanism of lung defense as an intruder.

The ultimate diagnosis, however, rests on the results of bronchoscopy.

The case was interesting to follow up. Penicillin was administered in massive dosage and within two days the temperature had fallen to 99°F and the patient looked much better. The white cell count fell to 9,200 at this stage. The left basal lesion showed evidence of enlarging but the pain in the chest became much easier on the fourth day. When the infective process had, for certain been overcome, bronchoscopy was carried out. The operator discovered that the affected bronchus was contracted and could find no apparent reason for this constriction; and when the bronchus had been dilated a considerable quantity of thick, yellowish material was evacuated. It was indeed a great pity that the material was not examined microscopically or cultured. The only investigation carried out was to determine the bacteriology. The result, for what it is worth, was that a non-haemolytic streptococcus had been cultured.

Bronchoscopy should really be repeated and swabs from the wall of the cavity examined histologically. A repeat X-ray of the chest might have yielded a clue to diagnosis but no such investigation was carried out during the period I had opportunity to study this case.

"Treatment:"

No matter what the result of microscopic examination of the wall of the cyst, I feel, is ultimately unfruitful. Once the infection in the left base is, without any shadow of doubt, eradicated the possibility of lobectomy will have to be considered. It is fortunate that the pathology is confined to one lobe for the whole area of disease can be removed by operation. Even should adhesions occur at the base so the condition subsides, this can be easily dealt with. This would be an excellent case for such an operation and there is a chance that the
old-standing complaint of bronchitis will be alleviated if the condition is, indeed, a congenital cyst, for bronchitis is a usual accompaniment of congenital cystic disease of the bronchi. It is reasonable to suppose that the condition will improve once the cyst, a perfect breeding place for bacteria, is removed.

The patient is well suited for operation and it is a comforting thought that his future, in all probability, will be bright — so vastly different from that of the majority of other who are found to have a mass in the chest.

Medical treatment can fit the patient for operation but will not cure the condition so it is the duty of the physician to give the patient a possible chance of recovery, even if it may be a slender one for the surgery of the thorax is not yet as firmly established as that of many other regions of the body. Thoracic surgeons are still pioneers, blazing trails through difficult country, making roads on which those who come after may ride safely. The following extract from John Riving's preface to his "Clinical Lectures on Abdominal Surgery" (1914) is to the point:— "All practitioners properly feel the responsibility of advising patients to undergo operation, and they all feel this because the fears and many doubts of the patient react on the minds. On the other hand, the practitioner is far less sensible of responsibility if he refrains from advising surgical assistance in cases of certainty or doubt, simply because no one would saddle him in such case with the responsibility. No one, that is to say, save his own conscience."

Discussion I-

There are many interesting features in this case and although the correct diagnosis is largely a matter of opinion there are many lessons to be learned from it in study. There are two aspects in this case to be considered — one, the not chronic, long standing affection of the lungs, and two, the superadded acute condition.

With regard to the former it may be stated that chronic catarrhal inflammation of the bronchi is not often the result of
rants attacks alone; usually there are other factors, so that the important problem is to discover the primary condition which underlies it. This may be, for example, some infectious focus in the upper respiratory tract which determines recurrent inflammations of greater or less severity, and I feel sure that unhealthy sinuses have been of major importance in overcoming the primary defences of the lungs in the case under consideration, and that the patient's doctor would do well in satisfying himself on this point. Correlation is often difficult in medical problems, but it is reasonable to believe that the patient's complaints of headaches and chronic bronchitis are due to the pathological state of his sinuses.

The ability of the medical attendant to take a clear and relevant history of a case is indeed a valuable asset, but so profound in their manifestations are some diseases — and especially may this be said of chest conditions — that without the secondary aids to diagnosis now available, the best of histories and the fullest of clinical examinations often leave an element of doubt in the physician's mind. This case amply demonstrates this fact.

We have seen how bronchoscopy, radiology and the specific tests for tuberculous infection have each played an important part, and how the results of radiology determine the next step in investigation. The importance of the lateral film in X-ray investigations of the chest has also been shown, for what might have been a dilatation was in this case shown to be in the lung substance, and in the least lobe by the lateral film. Actually radiology can achieve more in this patient. A film taken after bronchoscopy would have been of immense importance for if the abscess cavity proved ragged or not central in the zone of shadowing the suspicion of a necrotic carcinoma would have to be entertained. It is often said that "diagnoses are difficult" so indeed they often are; but it is the odd case that acts as the test book would have it. I can hear Rushin murmuring as he has watched the laboured attempts to explain the facts "All the knowledge that a man has must be held cheap the moment he comes face to face with Nature."
Interrogation:


Complaint:

Lassitude and weakness of left arm and pain over left breast, numbness over left side of face extending to mid-line posteriorly.

History:

Present Illness:

The patient stated he was in good health (he entered the Army as an A1 man) until the spring of the year 1943 when, in mid-April, while stationed at Shawbury, he developed several carbuncles on the posterior aspect of his left fore-arm which necessitated his admission to hospital for treatment. A week or so later, when the carbuncles were clearing up, the patient began to experience a pain over the lateral part of the left breast region. He complained to his M.O. and was assured the condition would disappear in time when he had fully recovered from the rota condition of his arm. This prophecy, as we shall see, was not to be fulfilled.

The pain, which was hot and burning and very present, by day and night, was not exaggerated nor was it relieved by any measure known to the patient. It did not at this latter incapacitate him. However, and he was deemed fit enough to be sent overseas, to India, and on the first of January, 1945, set sail for the East.

January passed and with it passing the severity of the pain increased and a new feature of the condition developed. The left arm also became painful, the pain being of a similar character to that first experienced in the chest and a peculiar numbness was felt, coincident with the development of marked muscular weakness in the arm. This numbness and soreness, he observed, stopped at the wrist and did not involve his fingers.
He also discovered that whereas little hot paws were to be treated with respect by the bare hands and arms he could now handle very hot baking utensils with impunity. This left arm seemed stub to painful stimuli and cuts and severe knocks at his work did not seem to trouble him now. Skirts would now slip out of his hand and his grip on a loaf of bread while cutting it was intense.

A numbness on the left side of the face and back of neck now gradually made its appearance. The neck and face fell stiff even when the head was at rest. He could see a blunt razor on the left side of his face and not feel it. Seating himself, was about over, the left side of his face and his left eye now tended to close, a condition often remarked upon by his workmates. Friends would joke about the drooping of his shoulders, telling him he was becoming like an old man and a look in the mirror told him that their remarks were founded on fact. His gait was at this time unaffected, there was no stumbling, no unsteadiness. He never saw double and his vision was at no time blurred or hazy. His left ear felt a little "full of hearing." He remarks, and this has gradually become worse. There has been no memory disturbance, no headache, not any difficulty in swallowing or chewing his food.

Towards the end of March the patient, by this time greatly concerned about his physical state, reported sick and his M.D. sent him to a medical specialist who could find nothing to indicate organic disease. He was thereupon referred to a psychiatrist who for six weeks treated him for a psychoneurosis but at the end of that time the patient "came out by the same boot as he went." Convinced that his symptoms were real and not some figment of his imagination the patient once again complained and finally went to the office of his M.D. to arrange for an interview with a specialist in neurology who at once shot out his condition.

Sick leave was unusually arranged and the 25th of September saw him again on British soil. He went to the "Transit Hospital at Wakefield for two days and from there was sent home on
14 days leave. While on leave he noticed that if he walked slowly he was inclined to stagger. Ordinary or brisk walking was not affected. A communication arrived on the 10th of October requiring him to report to his nearest hospital and on the following day the patient was admitted to The Western General Hospital.

Previous health, social conditions, food and habits:-

Apart from measles as a child and an accident at his work which removed the distal two phalanges of the middle finger of his left hand, the patient has never had an illness requiring him to stay off his work or keep in bed. Even the common cold went past his door and if he occasionally happened to cough, it very never upset him more than requiring an extra handkerchief in his pocket. He has been therefore, robust, a very fit subject.

The patient is married and has two young children rely cared for by an understanding wife, and his manner of speech concerning home and family was such as to indicate his private life was happy and that his home was that of a good working man.

Many nations had certainly agreed with our patient for his plump, robust face was not that of one accustomed to a bread and water diet. Twenty cigarettes a day and an occasional pint of beer, he never, are his worst habits. Neither of these has, as yet, been detrimental to his health.

State on Examination:-

The patient presented a contented picture as he lay there, propped up but in no wise breathless, yet even a cursory glance is enough to detect in his countenance an expression of suffocated anxiety. It was striking to notice how everything was done with his right arm—lighting a cigarette etc.—the almost complete exclusion of left arm activity. He seemed content to keep his left arm under the sheets even when first I saw him. He felt rather keenly about the asymmetry of his face (see later) — at least that was the impression I formed.

Sft. 4½ ins. in height and 121. 14 in weight. The patient
was well-developed, his nutrition was very good but his mentality was not marked. His complexion was of a healthy hue, and his attitude was one of complete confidence that all would eventually be well.

The patient's temperature was 97°F.

Systematic Examination.

Gastrointestinal System.

Symptoms: Appetite very good. No thirst, dysphagia, abdominal pain, distension, flatulence, heartburn, or waterbrash. There is no constipation or diarrhoea.

Signs:

The lips were of a healthy, reddish colour. Upper and lower teeth were healthy and clean. The tongue was moist with a slight yellow deposit over the posterior half. The usual roughness of the papillae were observed. Lymph and fauces were normal.

Abdomen:

Inspection: Slight fullness over lower abdomen - correlated with the rather rounded shoulders of the patient. No striae, scars, distended veins or abnormal movement.

Palpation: No tenderness, rigidity, or resistance. There was no fluidity and the rectus muscles on each side were in equal tone. No masses palpable. The umbilicus was not inverted and was freely movable. There were no nodules at the umbilicus.

Examination of Individual Organs:

The stomach contained an air bubble of average size. Heart, spleen and kidneys were not enlarged.

Faeces: Nothing abnormal in faeces.

Circulatory System.

Symptoms: No dyspnoea, pain or faintness. Has occasionally experienced palpitation on going to bed at night but attributes this (I think quite rightly) to preceding cold or suffocation.
Cutaneous: — Pulse rate 96/min, regular in force and rhythm. Pulse wave of average excursion and well sustained, normal wall palpable. The pulse is equal in force and rhythm on both sides.
Arterial Pressure 120/80 mm. mercury.
Venen: — No distension, variocities or pulsations.
Capillaries: — No capillaries, droopy or pulsation.
Heart: —
Precordium normal in shape and well rounded. Apex beat in 5th left interspace 3½” from mid-sternal line. The area of cardiac dullness is not enlarged. There are no thrills.
Heart sounds are closed in all areas.

Respiratory System.

No symptoms.

Signs: — Normal breathing at normal rate (20/min). Chest well covered and symmetrical, viewed from the front. Viewed posteriorly there is a suspicion of drooping of the left shoulder and there is a slight right-sided scoliosis involving the whole of the thoracic and upper lumbar segments of the spinal column. Movements of chest on normal and deep respiration equal on both sides. Vocal fremitus and resonance normal and equal on both sides. Breath sounds vesicular all over chest. There are no accompaniments.

X-Ray shows clear lung fields and a definite right scoliosis.

Digestory System.

Symptoms: — Patient has noticed absence of sweating over left side of face. This I verified. As the sun was shining on his face through the window I could see the dryness of the left as compared with the glairing, moist appearance of the right side. There are no skin eruptions and no abnormal pigmentation.
The nails show no change. There is no clubbing of fingers or toes.
On the posterior aspect of the left forearm four circular scars heat witness of his first complaint. The palmar aspect of the pad of the left thumb is almost black with nicotine as if cigarettes had been retained in the hand till they were very small stubs.
Urinary System.

No symptoms.

Signs: Kidneys not palpable. Urine 21/10/35 is lemon colored, acid 5.01, and no abnormal constituents.

The hematopoetic and endocrine systems revealed no abnormality.

Nervous System.

Mental Functions:
Intelligent, well balanced emotionally, memory very good. The patient sleeps well. There is no aphasia.

Cranial Nerves:
1. No anemia or psychosis.

2. Visual acuity unimpaired on both sides. No disturbance of vision. Ophthalmoscopic examination revealed no abnormality of the discs. There are no retinal hemorrhages, "silver wiring", macular stars, woolly patches or papillae.

3. No nystagmus or diplopia. No impairment of ocular movements. There was marked lateral nystagmus with a rotary movement of the eyeball. There was no vertical nystagmus.

The left palpebral fissure is markedly seduced and there is a slight degree of exophthalmos. There is equality of size and shape of the pupil on both sides.

Good light reflex and good reaction to convergence in both eyes. Consensual reflex present.

4. Motility: No detectable difference in the performance of the muscles, plughids, and temporal muscles on each side.

Sensory: Ordinary sensation present on right side over sensory area of trigeminal. On the left side, pain and temperature sensations were lost and also that of light touch. Nasal, buccal and conjunctival mucous membranes have this sensation impaired on the left side. Taste is not impaired.

13. The face muscles are equal on both sides so far as active movement is concerned as is shown by the patient puffing out his cheeks, showing his teeth and keeping his eyes closed against
resistance. The patient can wrinkle the forehead on both sides although, at rest, the left side is flat and unwrinkled whereas the right side is corrugated with several wrinkles.

There is no hyperacusis.

VIII. No limbic, tremors, or vertigo. Hearing is slightly impaired on the left side, average on the right.

IX. Taste not impaired. No anaesthesia of pharynx and no dysphagia.

X. Muscles of soft palate move the palate equally on both sides.

XI. When the shoulders are raised the right trapezius appears to be more powerful than the left. No detectable difference in motor power is to be observed in the sternomastoid.

XII. The tongue when put out shows no lateral deviation. There is no evidence of atrophy of the tongue.

4 Function in the Motor Neurons:

As one observes our patient as he lies at rest the attention is drawn to irregular intervals, to the fine fibrillations which are to be seen over the flexor aspects of the arm and over the first interosseous space. That the tremors in the latter form situation is not due to the pulse (for the minute pulse may occasionally be felt and is not related to the tremulous pulse.

The patient is right handed. There is slight flexion at the distal interphalangeal joint of the little finger of the right hand, which the patient declares, has been present since birth. There is a suspicion of flattening over the first interosseous space on the right side. There is no muscle wasting in the right forearm or upper arm. The right grip is tight when his hand is shaken and that movements for individual movements muscles reveals no appreciable loss of power.

The left arm looks definitely abnormal, however. Muscle wasting above the wrist is present but slight. There is marked wasting of the muscles of the first and some wasting of those of the second interosseous space. The adductor digiti minimi of the right side is practically non-existent as is shown by the flat almost barren of the right hand. On the right side the wrist tendon is plumbeous and bulging. Individual muscles were thin
Tested as follows in order to try and delimit the affected segments on the left side.

Rhomboids (C6 C7): - Patient tried to brace back shoulder against resistance. Action was imperfect.

Pectoralis Major (Clavicular part C5 C6 C7 C8): - Patient raised arm forward above horizontal and tried to adduct it against resistance. Result very poor.

Pectoralis Major (Sterno-costal part C6 C7 C8 C9): - Patient raised arm to below horizontal and tried to adduct against resistance. Movement significantly impaired on left side.

Flexion of the supinated forearm against resistance (Biceps C5 C6) was weak and jerky.

Abductor Pollicis Longus (C7 C8): - Abduction of thumb at right angles to palm against resistance, weak.

Abductor Digitii Minimi (C8 T1): - With the back of the hand and fingers flat on the bed the patient tried to abduct little finger against resistance. The action was greatly impaired and almost absent.

In the above the nerve supplying most of the muscle is undamaged. Hence I concluded that the paralytic in the hand involved all the nerves of supply to that limb (C4 - T1). Weakness of movements on the left side (Accessory + C3 and 4) indicates the possibility of involvement of C3 as well.

That is no weakness of loss of power in the lower limbs.

Reflexes:

Superficial: - Abdominal reflex absent on both sides. Plantar response extensor in type on left side, inconclusive on right. Biceps, brachioradialis, ulna-epicondylar and corneal reflexes diminished on both sides but especially so on the left.

Deep: - Knee and ankle jerks very brisk but equal on both sides. Right and Triceps jerks diminished on left side average on right. On the left side the supinator jerk was inverted. The jerk was replaced by finger flexion, indicating a lesion involving the grey matter of the 5th cervical segment. I could not induce the jaw jerk. There was no clonus of knee or ankle.
Right side of body to show affected segments (lined).

Left side of body to show affected segments.

Loss of pain, temperature and light touch in segments C4-C8 and T5-T9.

Post- & Ant. affected segments - C2-C6 and C7-T5.
Sensory Functions:

Testing by means of test tubes with hot and cold water, the blunt and sharp ends of a pin and a piece of cotton wool, I was able to elicit what is commonly known as "dissociated sensory loss" in the areas shown on the accompanying diagrams. In the areas marked red there is a loss of the sensations of pain and temperature, and tactile sensibility is impaired. Light touch being unappreciated in all the marked areas. In some areas, especially on the left side, the patient would ask "Are you touching me?", when using the pin with some force in the test for "blunt or sharp."

The affected segments are:

Left side 5th Cranial, C2-T5
Right side C4-C8 and T5-T9.

The other forms of sensation are not affected.

Vasomotor disturbances - sweating is absent over the left half of the face.
Summary of Observations on Nervous System:

1. Sensory changes due to affection of fibres subserving thermal and painful sensation, and impairment of tactile sensibility, over limited areas. (See diagram above for limits involved.)

2. Disturbance of the efferent fibres from the superior cervical ganglion to the four other cervical nerves giving narrowed palmar tissue on left side owing to drooping of upper lids, and absence of sweating over left side of face. The pupils are equal however (although this is not Horner's Syndrome).

3. Atrophic paralytic of lower motor neurone style involving left arm to a marked degree, with evidence of it commencing in the right arm.

4. Inconsistent spastic weakness of lower limbs — difficult with slow walking and positive Babinski.

5. Marked degree of nystagmus in a horizontal plane indicating a degree of involvement in the bulbi. This is also indicated by the sensory loss over the trigeminal area.

Locomotor System

Bones: - No evidence of deformity (apart from rotation), chiefly or slightly of bone.

Joints: - No pain, swelling, effusion or crepitation.
Touch (fine discrimination) 
Pressure, vibration, postural.

Touch & Pressure

Pain & Temperature

Proprioception

represents fasciculus gracilis & cuneatus.

" anterior thoro-cerebellar tract
" anterior thoro-thalamic tract.
" lateral thoro-thalamic tract.

Touch, pressure & proprioception have crossed and uncrossed paths.
Pain & temperature have a crossed pathway only.

Square box shows site of lesion in Syringomyelia i.e., grey commissure.
Muscles: The state of the muscles has already been discussed.

Diagnosis: Syringomyelia with a degree of Syringobulbia.

Discussion of Diagnosis:

The words "dissociated anesthesia" always suggest to one the diagnosis of a lesion in the region of the central canal of the spinal cord. The concomitant neurological features depend on the extent of the lesion and the degree to which it has involved adjacent tracts.

In respect of the motor symptoms, the combination of wasting of the forearm and hand muscles with signs of spastic weakness in the legs, is common both to Syringomyelia and Amyotrophic Lateral Sclerosis. In the latter, if no sensory loss, the tendon jerks in the arms are exaggerated, there are no skeletal deformities, and the patient is commonly a middle-aged man.

Intradural or extradural tumours of the cervical region of the cord may also produce a comparable motor picture. In these conditions, skeletal abnormality is absent, and there is sensory change, not associated in time and involving all the body below the level of the lesion.

Progressive paraplegia with spastic disturbance and root pains of constant distribution, and the absence of trophic and vasomotor symptoms, all serve to distinguish compression by meningeal or nerve root tumour or by myelodysplasia, from syringomyelia.

Hematomyelia, in which the topography of the lesion is the same as that seen in syringomyelia, may present a comparable picture with the exceptions that trophic, vasomotor, and skeletal signs are absent, and that the onset is sudden in the former.

Cervical site, when it is manifest by the development of wasting of the muscles of one hand and by pain in the arm, may be mistaken for an early manifestation of syringomyelia. In the former, the signs remain unilateral and confined to the arm.
There is little or no sensory loss of any kind and the wasting is selective in incidence, in many cases being confined to the opponens and abductor pollicis.

The symptoms and signs in this case present such a clear-cut picture that there is no doubt whatever about the condition present.

Prognosis:—

The disease is slowly progressive over many years leading to great disability, especially in the arms. The degree of syringomyelia in this case makes the prognosis even more grave since broncho pneumonitis is a frequent termination in such patients.

Treatment:—

The drugs usually employed are potassium iodide and mercury; the latter being given by injection. Their value has not been established by clinical observations but may help in cases with an obvious psychological overlay which is not uncommon because of the nature of the disease.

Deep X-Ray therapy often benefits cases of syringomyelia. It should be applied to the site of disease as indicated by the clinical findings. The treatment may be repeated once a year. When syphilitic dilatation of the spinal cord causes obstruction to the subarachnoid circulation, laminectomy with incision of the posterior aspect of the cord may be advisable.

Discussion:—

Syringomyelia, or better spinal glial, for the condition is at first a proliferation of glial tissue with later cavitation, is an uncommon condition, affecting both sexes equally. There are said to be no hereditary or familial factors and in this case none could be demonstrated.

It is a chronic progressive disease characterized by the presence of a cavity of varying length within the cord. The cavity arises in a part of embryonic tissue in the region of the central canal. This undergoes proliferation during early life and breaks down at its centre with the formation of a cavity. The symptoms appear
during early adult life and are the result of compression of normal structures in the cord by the enlarging lesion. Occasionally, however, symptoms may affect in childhood, and in some cases hydrocele developing at this period has been the first sign of the malady. It may be accompanied by the presence of musculoskeletal abnormalities of congenital origin, such as spina bifida, or deformities of the skull and bones. Hence the name "static dysraphisms" which has been applied to these conditions.

We have noted the presence of a scoliosis in this case.

The gliotic proliferation, or gliomatosus of syringomyelia, affects to originate in the neighborhood of the grey commissure of the cord. On inspection the cervical, and less commonly the thoracic regions of the cord, may be irregularly enlarged, owing to the dimensions of the enclosed cavity at these levels. Serial sections through the cord reveal the presence of a central gelatinous mass of glial tissue enclosing a cavity, which varies in size from segment to segment and contains a fluid which may be clear and watery or glairy in consistence. In some regions the cavity is large and its glial wall thin; in others a dense glial mass contains a narrow cavity. The process may extend from end to end of the cord, and sometimes passes upwards into the medulla. Here it has the appearance of one or more fissures radiating ventrally and laterally from the floor of the fourth ventricle and contained by walls of glial tissue. Degenerative changes in both grey and white matter are present, due in part to compression and in part to actual invasion and destruction of the nervous elements by the proliferating glial tissue. The lower cervical and upper thoracic segments are almost always the region in which the nervous tissue is most severely damaged, and are therefore the regions to involvement of which most of the clinical manifestations of the disease are due.

The case of Joseph Black is, in most points, a typical one. A young man of 28 first complains of unexplained pains in the chest and arm, notice he is gradually losing power in an arm and discovers that his cigarette burning his flesh no longer hurts.
him (that he disregards this is shown by the thickened, shaven skin over the pad of the left thumb), that his face is insensitive to pain on one side and that there is no sweating there, and so on. It is on physical examination that one discovers these.

From what has been said above it is clear that there is commonly a "dissociated sensory loss" in syringomyelia. The forms of sensation which travel by crossed paths, namely, temperature and pain sensitivity and part of touch, are lost; those which travel by an uncrossed path in the posterior column, namely, the sense of active and passive movement and certain aspects of tactile sensitivity, remain intact. This feature has been demonstrated in the case under discussion but the various interruption of the sensory loss on the right side was not expected. To explain it we must postulate that the gliosis is either interrupted or extremely small in amount in the cord at that level. That this interruption was indeed present was confirmed beyond doubt by the fact that daily testing, over a period of 5 days, always gave the same result. But this belt of normal feeling is not to be found in the corresponding segments on the left side which we would expect seeing that fibres for both sides are crossing at that level. Could it be that at this level the gliosic or cavitation is interrupting the fibres at, say, the point X in the diagram showing the tracts (see before), leaving the fibres from the opposite side to pass through the grey commissure untouched? The extent of gliosic as determined by clinical findings is indicated below. The interruption from C8-75 on the right side of the body would imply the existence of two almost separate patches of gliosic or cavitation joining at A.

\[\text{Diagram of anterior horn cells.}\]
The definite upper and lower level of loss, a characteristic feature of
the disease, is evident however.

The equality of the pupils is unexpected in the case. I should
have thought a full blown thrombocclusive syndrome would have been
more likely. The sympathetic is obviously untouched as far as
the dilator of the pupil goes.

The history in this case would indicate that the patient himself
observed that temperature sense was altered before that of pain. This
is a frequent observation in this disease. Since, in many cases,
temperature suffers earlier than pain, the true test for syringomyelia
is the "warm-or-cold" test.

Subjective sensory symptoms are relatively infrequent, and when
present generally consist of pain referred to one or more of the
segments in which there is sensory loss. As we have seen, pain was
the outstanding feature in this case and was indeed the first
symptom. The state of the tissues and the particular liability
do injury dependent upon the anesthesia, in syringomyelia, lead
to the presence of infected wounds and ulcers, of whitlows, and
sometimes of necrosis of the terminal segments of the digits. But
the conditions mentioned in this patient were present before
analgnesia had developed, and since the trophic theory is not
universally accepted, analgesia being stated as the factor
responsible for the skin affections in areas affected by
syringomyelia, we must take it that the first manifestation
of the disease in this case was pain.

The progress of this disease is usually very gradual, and may
be completely or partially arrested for a long period of years at any
stage. The effect of deep X-Ray Therapy has yet to be seen in this
case but at best we can only hope for a slowing down of
the proliferative process. Rarely, hemorrhage into the cavity or its
sudden distension may lead to an acute increase in symptoms, and
sometimes to severe paraplegia of the legs. Intense pain is apt to
accompany these events. Death may ultimately ensue after many
years from respiratory paralytic or from intercurrent affections.

Addison, in his Vision of Minja, depicts The Bridge of Life
spanning the River of Death. In the Bridge we may imagine many 
Trapdoors. There are a few early on which we can name the 
infectious diseases and other ailments of childhood. At the far 
end of the Bridge there is a wide opening almost the whole 
width of the Bridge — the Trapdoor we may call Malignancy, 
through which, if we avoid the Thorns in our walk through 
life, we will almost certainly fall. But between these extremes 
there are many other pitfalls. That labelled syringomyelia is 
away at the edge of the Bridge where few travellers walk 
and we can imagine it as only a foot's breadth and length 
in dimensions. So if perchance the unwary traveller puts his 
foot through he finds it difficult and usually impossible to 
retract it. And so, with his struggles becoming feebler and feebler, 
he sinks down and down till the black waters ultimately 
swell over his wasted flesh.

Joseph Black has been one such Traveller on the Road of Life.