REPORTS AND COMMENTARIES ON

SIX CASES

ILLUSTRATIVE OF THE DIAGNOSIS, TREATMENT

AND MANAGEMENT OF

TUBERCULOSIS OF BONE AND JOINT.

Sir Robert Jones Prize for Orthopaedic Surgery.

1962.

KENNETH C. RANKIN.

5th YEAR.

6th JUNE 1962.

CASE NO. 1

FRANCIS GLASGOW

FRANCIS GLASGOW | Age 37 | SEX Male

OCCUPATION Lift operator. Married.

On 23rd January, 1962 this patient attended the Orthopaedic Out-Patient Department of the Royal Infirmary, where he gave a long history as follows.

HISTORY

He first developed trouble in his right shoulder in 1943 while in the army and subsequently developed "arthritis" of his left knee. In 1950 his left knee was arthrodesed and in 1952 his right shoulder. At that time it was proved that both joints were tuberculous. No other focus of tuberculous infection was discovered at that time.

In 1953, he complained of pain in his left shoulder but no abnormality was found on examination. Radiological examination at the time was normal and after adequate physiotherapy full movements were recovered and he was discharged but asked to attend at intervals.

Since 1953 he has continued to be troubled with his left shoulder from time to time complaining mainly of stiffness/

stiffness. Pain was never a feature but the stiffness has gradually increased over the years and during the past month he has noticed a swelling in the region of his left scapula.

PERSONAL HISTORY

His general health is good. He has not complained of a cough or sputum and has not had haemoptysis. He has not complained of chest pain. His weight has been steady and his appetite good and there is no complaint of constipation or diarrhoea. There is no history of urinary symptoms and he has not passed blood at all. He has not complained of symptoms pertaining to the Central Nervous System.

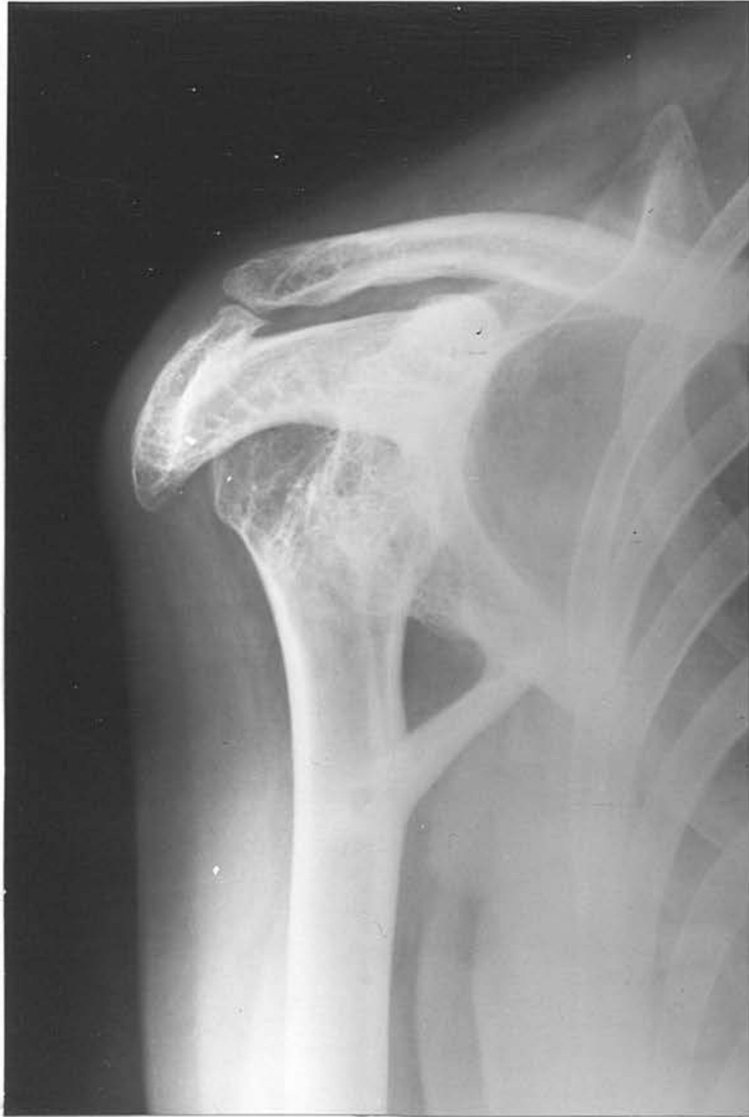
PAST MEDICAL HISTORY

Apart from the features noted in the history, as above, there are no features of note.

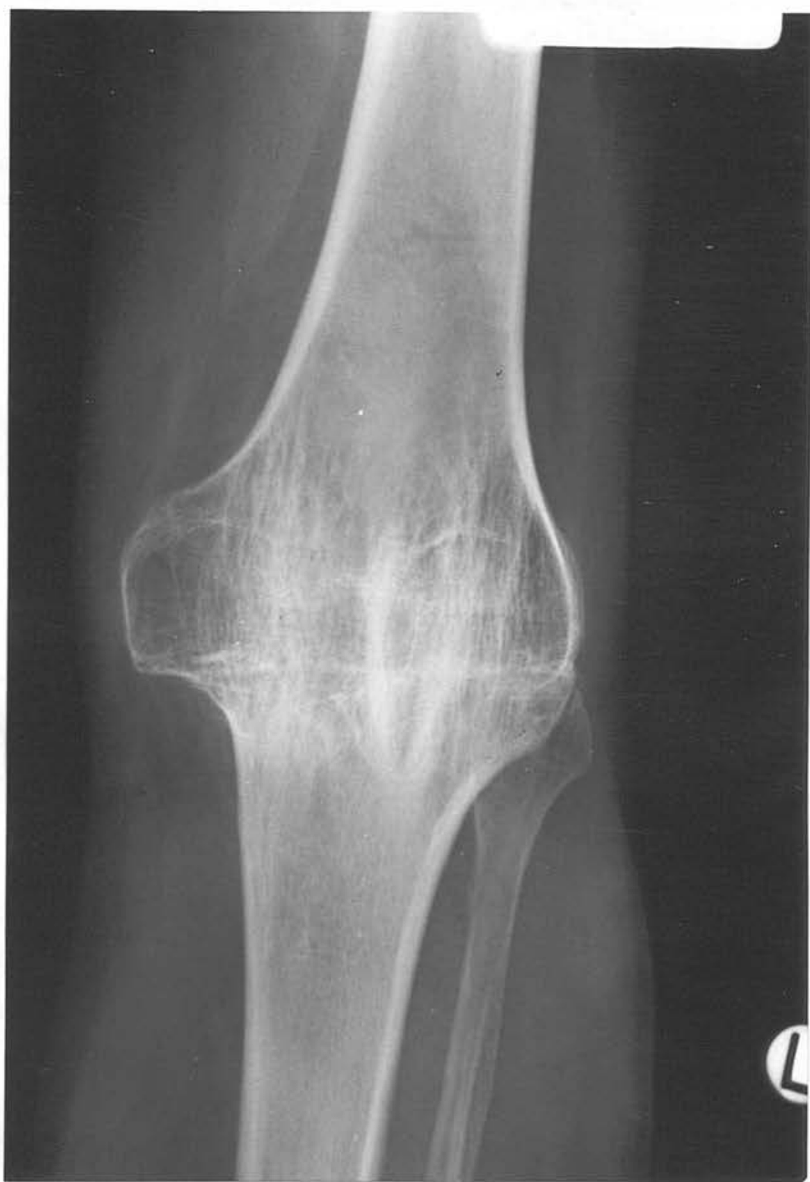
In 1955 he passed a small stone.

FAMILY HISTORY

Married. Two children alive and well. Wife - alive and well.



X-RAY I



X-RAY 2

ON EXAMINATION

A thin slight man but looking generally healthy and not underweight. The right shoulder has been arthrodesed in a position of 30° abduction and 10° external rotation and appears to be solidly united (X-Ray 1) There is no evidence of infection round the joint and the functional position of the shoulder is excellent for him.

The left shoulder is diffusely swollen and there is a large fluctuant swelling over the left scapula which can be felt to fluctuate across to the shoulder joint. The capsule of the joint is thickened but there is no local increase in heat.

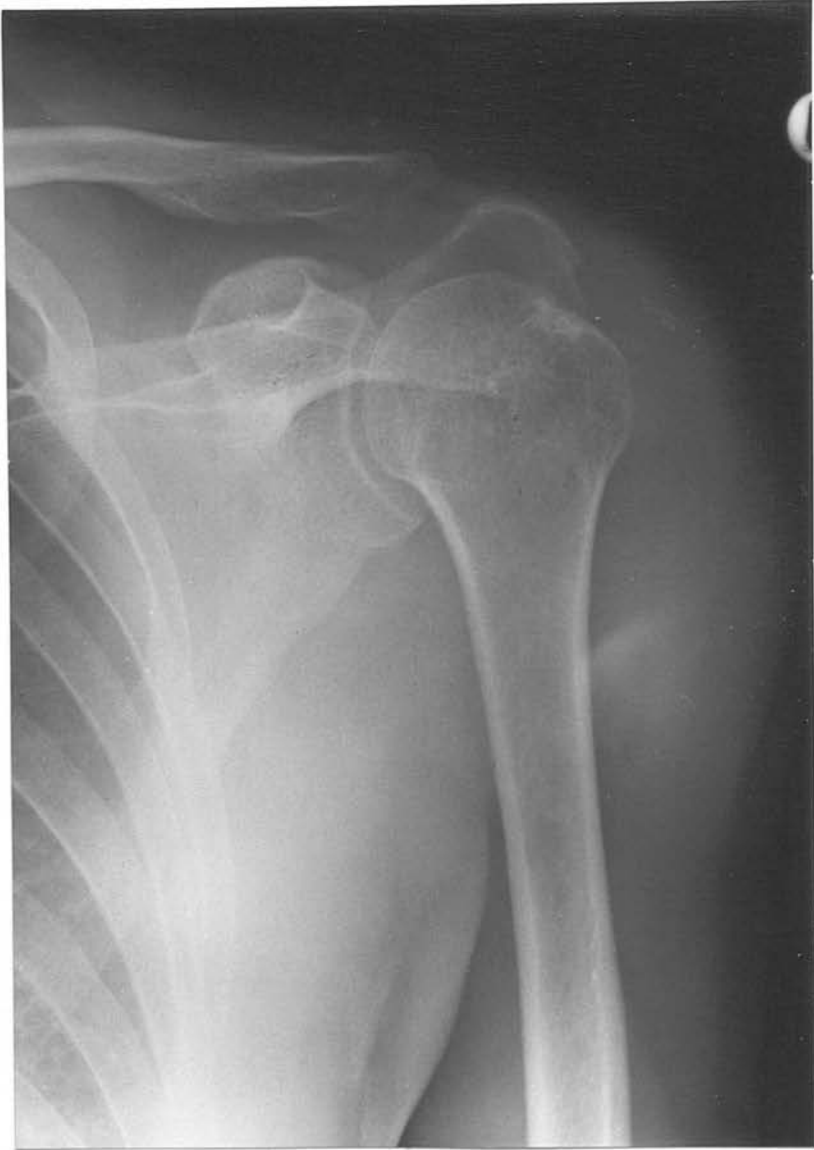
MOVEMENTS AT THE LEFT SHOULDER:

True abduction	- 20°
Combined abduction	- 70°
External rotation	- Nil
Internal rotation	- 45°

The left knee is soundly arthrodesed and no evidence of infection is present around this joint (X-Ray 2).

No other joints present any abnormality. The spine moves well.

The/



X-RAY 3

There is no abdominal swelling or any generalised or localised lymplodenopathy.

RADIOLOGICAL EXAMINATION.

Left Shoulder (X-ray 3).

As can be seen from the relevant X-ray the joint space is preserved. There is also an appearance of osteoporosis in the bones around the joint but it is difficult to be sure that this is in fact pathological. There is an unusually large gap in the acromioclaricular joint suggestive of bone destruction. The gleno-humeral joint is well preserved and the soft tissue swelling of the subdeltoid abcess is easily seen.

Right Shoulder and Left Knee, are both soundly arthrodesed and there is no evidence of active tuberculous (X-Rays 1 and 2)

Chest. There is evidence of disease in the lungs where there are fibrotic and calcified shadows in the right upper zone and hilum.

Investigations E.S.R. - 7 mm per hour.

Diagnosis Because of the above history and findings a provisional diagnosis of tuberculosis/

tuberculosis of the left shoulder joint was made and the patient was admitted to hospital for confirmation of diagnosis and treatment.

After admission to hospital it was imperative to incise the abcess, drain it and attempt to culture the organisims. This was carried out on 8th February,1962.

Incision and Drainage of Left Shoulder.
An incision was made over the scapula swelling and on incising the infra-spinatus,the abcess cavity was opened. Approximately half a pint of thick yellow "pea soup" pus was evacuated and the margins of the abcess cavity explored digitally as far as possible. The cavity occupied the infra-spinous fossa of the scapula and extended into the sub-acromial bursa, and the sub-deltoid area.

The wound was then closed and a compression bandage was applied. A quantity of pus was sent for bacteriological examination.

FURTHER INVESTIGATIONS

Bacteriology of Pus

No alcohol or acid fast bacilli seen on direct smear.

Concentration method for M. tuberculosis - negative.

Culture		
	1st Report	- No Mycobacteruim tuberculosis isolated
	2nd Report	- Do. Do.
	3rd Report	- "Guinea Pig" innoculation - Negative.
	4th Report	- "Guinea Pig" innoculation - Negative.

Haemoglobin	- 94 mgs. per 100 mls.
E.S.R.	- 6 mm. per hour
White Cell Count	- 14,200 cells per cu. mm.
Urine specimen	- no pus cells, red blood cells, casts, or crystals seen.
3 morning specimens	- negative for tuberculosis.

Intra-venous Pyelogram

This shows reasonable function on both sides with a relatively normal pyelogram on the right. There are 2 small calcific opacities in the right kidney. On the left side the pyelogram is deformed and is low and medial. However there does not appear to be a horse-shoe kidney since the medial border/

border of the right kidney is visible.
Ureters and bladder, seen and normal.

TREATMENT

Although tubercle bacilli were not seen in the pus and could not be cultured and guinea pig innoculation was negative the diagnosis was so certain that anti-tuberculous chemotherapy was instituted as follows:

Isoniazid 200 mg. per day

Para-amino salicylic acid 15 g/day

Streptomycin 0·75 g per day.

On 14th February the patient's left shoulder was immoblised in a shoulder spica.

On 15th February the abcess cavity was aspirated and 50 ml. of old bloody serous fluid were evacuated.

A sample of this was sent for bacteriological examination and later reported as follows:-

(i) No bacteria seen

(ii) No growth on culture.

At this time progress was entirely satisfactory.

On/

On 21st February, 1962 the patient complained of buzzing in both ears and dimination of hearing on the left side.

On 26th February, the patient was seen by an Oto-Rhinolaryngologist because of the hearing difficulties but by this time his hearing had improved. His hearing loss was then diagnosed as being due to catarrhal otitis media and was thought to be unrelated to his dose of streptomycin. At this time also his wound was again drained and a specimen of the serous fluid sent for bacteriological examination.

On 6th March his hearing problem had gone and he was discharged from the Ear, Nose and Throat Clinic. The wound swab was reported as giving no growth on culture.

E.S.R. at this time was 1 mm. per hour. White Cell Count was 10,100 cells per cu. mm.

One week later on 11th March this patient was discharged from hospital, after a period of seven weeks. His left shoulder was in a spica and he was on anti-/

anti-tuberculous chemotherapy (as noted above) with which he was instructed to continue.

A letter was sent to his own doctor explaining the treatment and asking his co-operation in ensuring that Mr. Glasgow took his drugs and that his wound was given attention as there was still some serous discharge.

Four weeks later on 14th April the patient was seen at the Out-Patient Department when he reported feeling well and managing to continue with his chemotherapy. He also looked well and radiological examination showed that there had been little change in the joint and that the joint space was well preserved. There was at that time occasional slight wound discharge in the left scapular region.

On his next visit on 12th May the patient was very well. The shoulder spica was removed and X-Ray showed that the situation had changed little. There was however calcification in the abcess cavity and the evidences of destruction/

destruction still showed in the region of the acromio-clavicular joint.

At this time he was to begin mobilising gently on his own with his arm out of plaster.

Future Treatment It is envisaged that the patient should continue to mobilise his shoulder on his own until a full range of movement is restored.

Anti-tuberculosis chemotherapy will require to be continued for two years.

COMMENTARY

This patient presents with the classical signs of bone and joint tuberculosis - Both on clinical examination and by radiography there is really only one possible diagnosis in a man with a previous history of widespread tuberculosis treated in the days before chemotherapy was available. The patient was complaining of slowly increasing stiffness of one month's duration, limitation of movement, slight pain, and the most classical of all the signs of tuberculosis, a fluctuant cold abcess. X-Ray of the joint although significant does not give as positive signs as the clinical examination would have suggested. There is surprisingly /

surprisingly little destruction in and around the joint. The most marked area of bone destruction is at the outer end of the clavicle, but there is no diminution of gleno-humeral joint space and no sclerosis surrounding it. The presence of osteoporosis (one of the most significant of X-Ray findings in tuberculosis) is not markedly present although I would maintain that there is definite loss of bone density. There is difficulty in this situation because of the absence of a normal joint on the other side with which to compare. ~~this~~.

However, having established the diagnosis it is necessary to find the primary site of tuberculosis in the body. This is not an easy task. The chest X-Ray shows signs of tuberculosis but suggests inactivity. There are two renal calculi but early morning specimens of urine do not reveal any tubercle bacilli. The other joints previously diseased are also completely free from disease (as can be seen from the X-Ray). I think that the answer lies in the fact that this joint has been the site of disease for many years - since 1953 in fact when he was first troubled with stiffness in his /

his left shoulder. It will be recalled from the history that this joint has given him trouble intermittently since 1953 and it is most likely that this has been due to tuberculosis. Why the condition should have flared up at this time is not known but it may have been a slight deterioration in his general health which led to an exacerbation in this joint.

Although involving incision of the abcess, treatment in this case comes under the heading of conservative. This is so because there is no direct operation on any of the joints of the shoulder region and the incision is merely to remove the accumulated pus. It is very important in this man's case to preserve joint function. He already has one arthrodesed shoulder and a second would be a considerable handicap, therefore every effort should be made to preserve good function.

After initial incision and drainage of the pus, the joint is rested by means of a shoulder spica and the patient also rested as a hospital in-patient. Specimens of the pus were sent to the laboratory in an effort to grow the organisms and discover their antibiotic sensitivities./

sensitivities. This is important because until this is known the patient must be maintained on all three antitiberculous drugs. If sensiti-:vities are found then one drug can be dropped with consequent increase in comfort to the patient. However, it is most surprising that there was complete failure to grow any of the organisms by any method. One would have expected in material form so active a site that the growth of organ-:isms would have been inevitable but this was not in fact so.

One explanation of this finding may be that this abcess has formed away from the main active focus of the disease and that having tracked to the abcess site the organisms were by that time killed off. General understanding of the tubercle bacillus, however, does not seem to indicate behaviour in this manner. Laboratory error cannot be ruled out but it is most unlikely that this would occur with all methods and with all the specimens. What this finding may indicate is that the disease is of long standing and has even now reached an inactive phase. In this case all the active organisms would have been killed off by the normal tissue resistance.

It /

It is not clear in this case where the actual site of the disease is. Although there is general osteoporosis round the gleno-humeral joint, there is no diminution of joint space or destruction of bone. There is, however, destruction of bone at the lateral end of the clavicle and there is an unusually large space between clavicle and acromion, which would seem to favour disease of this joint as the primary cause or in addition to disease in the gleno-humeral joint. It is most likely that both joints are involved and that the disease in the gleno-humeral joint is in a very early stage.

The prognosis for this patient and the possibility of his eventually having a painless joint with a good range of controlled movement are very good at the present time. There is no bone destruction, sequestration or loss of joint space and the most recent X-Ray shows that the lesion has not become worse. After being three months in plaster the patient's shoulder is pain free and he is beginning to mobilise by gentle exercises. It is important for this patient to maintain a good level of general health for the rest of his life. In my opinion he /

he is potentially infected with tubercle bacilli because of the calcification at present proceeding in the abcess cavity. If he allows himself to become very overworked and in poor general health then he may have a recrudescence of his tuberculosis. In this respect fairly close watch by surgeon and general practitioner will be most essential as they are at the present time in ensuring that drugs are taken, and general health maintained.

SUMMARY

This patient is a classical case of tuberculosis of the left shoulder joint presenting with, swelling, limitation of movement and a cold abcess. X-Ray reveals disease in both gleno-humeral and acromio clavicular joints. Treatment is conservative but involved the incision and drainage of a cold abcess. The prognosis is good with the continuation of drug therapy and general measures.

CASE NO. 2

ISABELLE SANDHAM.

CASE NO. 2. AGE 51 years

MRS. ISABELLE SANDHAM.

9th August 1961.

COMPLAINT

This lady has one main complaint and that is of a chronically discharging sinus over the right sacro-iliac region which has been present for seven years. Although this causes her almost no difficulty it is a very great nuisance and she would be very pleased to be completely free from it.

HISTORY

In 1938 the patient was admitted to hospital with presumed tuberculosis of the right sacro-iliac joint. She was not sure whether there was ever positive proof and there was no report of cultivation of tubercle bacilli. However the X-Rays did show caseation and the presence of a Psoas abcess so that the diagnosis would seem to be fairly certain.

She was in hospital for 2 years before being discharged. She also had a pregnancy terminated on this account.

In /

In 1955 and subsequently she has had a sinus discharging posteriorly which has caused her several periods of hospital admission with attempts to cure it by chemotherapy. She has also had the abcesses both asperated and incised, each time being in hospital for a number of months.

She also has a rash which is said to be neurodermatitis but her own doctor has suggested that the sinus might be the basic cause.

PERSONAL HISTORY

She has had bouts of asthma on several occasions in the last ten years precipitated in the first instance by an emotional shock but always subsequently associated with a cold and mild bronchitis. The last episode was in Spring 1961 when she was treated for several days in bed.

Feels generally well.

Weight - steady. Appetite - good.

No cough, sputum or haemoptysis.

No urinary symptoms.

No. central nervous system symptoms.

PAST MEDICAL HISTORY /

PAST MEDICAL HISTORY

Principally as above.

Vein legation for varicose veins.

At present receiving 8 m.g. Ledercort daily for the skin condition.

FAMILY AND SOCIAL HISTORY

Married.

Husband 75 years.

Looks after her mother aged 82 years and her husband. Any period in hospital and away from the family would cause difficulty.

EXAMINATION

General Intelligent, co-operative but somewhat apprehensive woman.

Good colour and well nourished.

No cervical lymphademopathy.

Thyroid - not enlarged.

Cardio-vascular System Pulse 84/min.

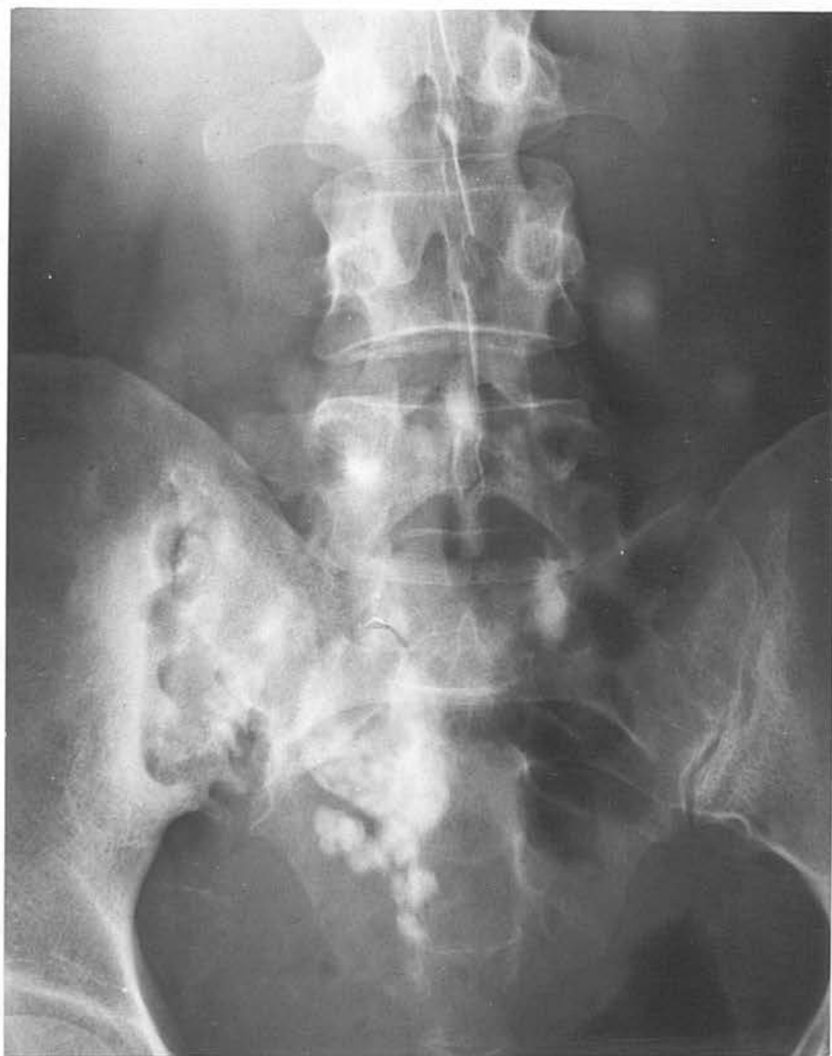
B.P. 124/78

Respiratory System Chest - symmetrical moves well on respiration.

Breath Sounds - Broncho vesicular in all areas.

Alimentary System Abdomen - show abdominal vertical scars attributed to termination of preg-:nancy and appendicetory liver and spleen - not parable.

No /



X-Ray 1

No deep tenderness.

Rectal Examination - negative

LOCAL EXAMINATION

On the back there is a sinus with marked in-pulling of the skin, so much that attachment of the skin to bone may be present. The sinus is draining and the discharge had soaked a dressing more than the size of a half-crown within 8 hours. Above this there is a healed scar.

RADIOLOGICAL EXAMINATION

Pelvis As can be seen from X-Ray 1 there are obvious signs of involvement of the right sacro-iliac joint and sclerosis of the ~~evangius~~ margins of the remaining bone.

There is considerable calcification of mesenteric glands and also of a psoas abcess.

Chest N.A.D.

Stereo X-Rays of the right sacro-iliac joint show that there is a large cavity and no evidence of sequestra except perhaps one very small one near the upper end.

In view of the above history and findings a diagnosis of tuberculosis of the sacro-iliac joint was made.

The /

The patient was advised that operative clearance would give a very good chance of permanent cure but that the length of stay in hospital would depend on whether bone grafting was necessary or not.

The patient was agreeable to operation and was admitted to hospital on 9th August, 1961.

After admission the following investigations were carried out:-

a). Three early morning specimens of urine for examination for tubercle bacilli.
This was later reported as negative.

b). Swab from the sinus for routine bacteriology and tubercle bacilli.
The report from this showed:-
(1) No tubercle bacilli on culture.
(2) Animal innoculation - negative.

On 17th August there was a flare up of the pruritic rash on the flexor surfaces. This was considered at the time to be asthma-eczema of the Beniers' prurigo type and steroids were thought to be contra-indicated.

The suggestion was made that steroids should be gradually tapered off.

TREATMENT/

TREATMENT

Treatment at this time was as follows:-

1). General Measures - Rest, good sleep, adequate diet.

2). Local measures - Treatment and care of sinus to prevent secondary infection. Plaster of Paris bed.

3). Drugs - Streptomycin 0.75 g. per day.
Para-amino-salicylate 5 g. thrice daily.
Isoniazid 100 mg. twice daily.

There was a problem at this time because of the co-existance of tuberculosis, steroid therapy and an imminent operation.

However, it was thought that the steroid would require to be continued until after the operation (having been given for such a long time) and that the dose should be doubled prior to and during the operation.

Accordingly, she was given:-

16 mg. Ledercort the day before operation.
16 mg. Ledercort the day of operation.
16 mg. Ledercort the day after operation before the previous dose of 8 mg. was resumed.

ON 25th AUGUST 1961

Exploration and Arthrodesis of the right sacro-iliac joint was carried out as follows:-

Through an elliptical incision the posterior aspect of the sacro-iliac joint was exposed. The first finding was of a sinus in the iliac blade with caseous material in it. Thereafter by a rather complicated series of bone removals two thirds of the joint was cleared but the remainder left,

as/

as it seemed to be reasonably healthy and stability was required.

Into the posterior two thirds of this joint iliac chips and a block of bone from the other and side were packed tightly after powdering with one gram of streptomycin.

During the operation one pint of blood was transfused.

Material obtained at operation was sent for examination and reported as follows:-

Microscopic Examination

Specimen consists of cancellous bone and portions of densely collagenised fibro-cellular tissue. The bone shows the features of sub-acute osteomyelitis and while an occasional area is without osteocytes, there is the appearance of viable trabeculae.

There is no evidence of tuberculosis in the sections examined.

Subsequent recovery from anaesthetic and operation was uneventful.

ON 25th AUGUST

Neurological examination was negative.

Haemoglobin - 67 mgs. per 100 cls.

There was also some oozing from the wound in the first 24 hours.

One week later, on 7th September, a small

/haematoma

haematoma had developed round the wound but the skin was in good condition.

Maintenance physiotherapy was being carried out.

On 14th September progress was satisfactory but about one week later a boil had developed about 2 inches from the wound and there was some persistent drainage from the wound.

Swabs were taken from both areas.

Boil:- Gram positive cocci - sensitive to penicillin.

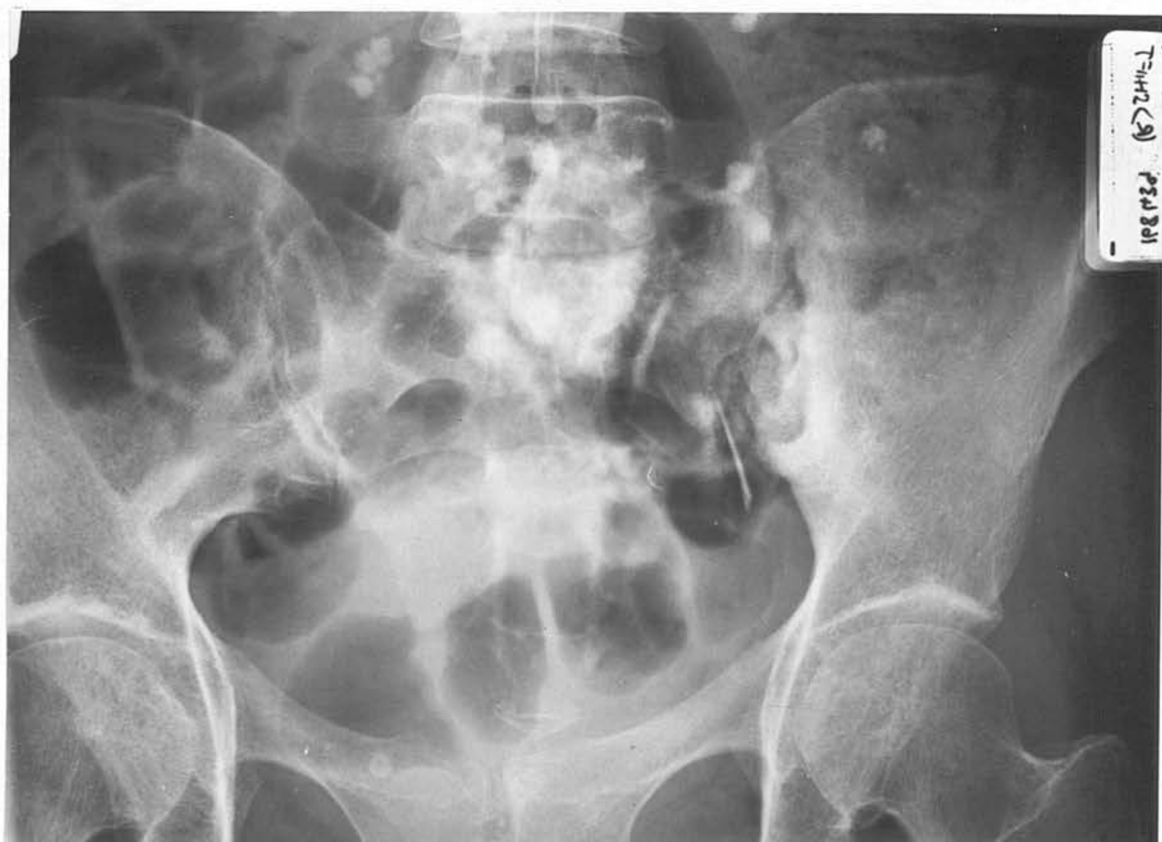
Wound:- Pus cells and gram positive cocci.

Culture - Moderate growth of staphyl-/occus aureus (coagulase positive).

Accordingly penicillin was given for two weeks and the boil subsided.

The ledercort was also gradually reduced with the intention of stopping it.

On 12th October there was still some drainage from the wound. The penecillin was stopped and on 19th October the drainage decreased a little. This drainage gradually stopped and 12 weeks after the operation, on 15th November, X-Rays were taken of the Sacro-Iliac/



X-RAY 2

Iliac Joint and Chest.

X-Rays of the former showed (as in X-Ray 2) that there had been considerable removal of caseous pus and debris. There are still a considerable number of calcified mensenteric glands. There is, however, no evidence of complete body union across the bone graft area.

The Chest X-Ray showed no abnormality. At this time the patient felt fit and was free from pane.

Haemoglobin and E.S.R. were satisfactory.

On 21st November, 1961, a plaster jacket was fitted leaving room for any drainage from the wound.

On 28th November the patient was walking comfortably on her own and she was discharged the following day.

The patient attended the out-patient department on 13th December when she xxx reported that her back was feeling comfortable, and that the wound was completely dry. At this time she had sinusitis and a recurrence of asthma and for these reasons was generally unwell.

When seen about one month later on 24th January she was very much better. She was very pleased with the result and had forgotten all about her sinus. E.S.R. was 2 per hour.

The sinus and wound were completely healed.

X-Rays showed that the situation was satisfactory.

Some four months later on 23rd May the patient reported again and was completely well, without pain or discharge. X-Ray showed that the situation was about the same as in January but there was still no evidence of complete body union across the graft.

COMMENTARY

This lady presents with one condition of importance - a chronically discharging sinus. Although the condition was not making her ill and causing her little difficulty - it was an obvious nuiscance besides being a constant source of infection. It was obvious that removal of this would give great relief andpossibly permanent cure, but it is first necessary to determine

its/

its cause.

A long history of tuberculosis was given by the patient, the significant factors being that she had evidence on X-Ray of a psoas abcess and of caseation. However, the diagnosis cannot be certain from this, as there was no positive proof of tuberculosis from aspirated material, and after several admissions for treatment with specific chemotherapy the sinus failed to heal. Therefore it is seen that diagnosis from the history is not easy or obvious. Tuberculosis affecting the sacro iliac joint is relatively rare but when it does so it is very prone to produce a chronically discharging sinus. In addition, the natural history of the disease is for it to grumble on for many years producing discomfort and ill-health but without any striking clinical or radiological features to indicate activity.

Thus although these are certain factors which make the diagnosis difficult in this case the history is certainly typical of tuberculosis of the sacro-iliac joint. The clinical examination this time only revealed a deep sinus with not inconsiderable discharge.

The X-Rays at this time however are quite helpful. There is evidence of an old psoas abcess

and/

and in addition there are calcified mesenteric glands, a feature of which is most suggestive of tuberculosis. A swab taken at the time is of immediate help because definite results would not be available for about six weeks.

On the above grounds there is sufficient evidence for a pre-operative diagnosis of tuberculosis in the joint to be made.

After admission to hospital swabs were taken and the immediate result showed that no tubercle bacilli could be seen and that there was growth of gram positive cocci of low virulence. From this the sinus was seen to be secondarily infected, and raised the question again of the exact diagnosis. It would be possible that this sinus had originated as a tuberculous one and that the disease was now quiescent but the sinus was being maintained by a low grade supperative arthritis or chronic osteo-myelitis. Sinuses or chronic osteomyclitis are notoriously difficult to heal and this may explain the failure of previous hospitalisation with anti-tuberculous chemotherapy. Stereo X-Rays also taken after admission showed that there was no real evidence of sequestrum formation.

However, one cannot exclude tuberculosis because/

because there are no tubercle bacilli found, especially as in disease of the sacro-iliac joint, for, as mentioned above there may be long continuance of the condition with a scarcity of signs. I think that in this instance diagnosis rests on the natural history of the disease, together with radiological apprearances. It is quite possible that the tuberculous disease is still active in addition to the secondary infection of the sinus and I think that this was the state of affairs in this lady's case. There is also nothing to suggest that tuberculosis cannot co-exist with chronic osteomyelitis.

Whatever the finer points of argument the sinus and underlying diseased bone should be excised and the condition treated as that of the fundamental pathology namely tuberculosis.

The treatment as in all cases of tuberculosis was general measures, including rest, sleep and good diet, and anti-tuberculous chemotherapy. A plaster ofparis shell is made in order to rest the joint and provide support post-operatively.

After the diagnosis was made there was only one form of treatment, to be considered, and that was clearance of the joint, of debris pus andsequestra with concomitant bone grafting should joint stability demand it. Following so many unsuccessful courses of conservative treatment, including aspiration andincision of abcesses, there is only one way in which to cure the condition - by radical operation. This is also indicated in order to remove the possible source of any of the live bacilli. Although the skin condition has an undecided association with sinus, its removsl may cause successful remission of the dermatosis which would be a not inconsiderable benefit to the patient. It should be mentioned in parenthesis that this is one of the operative methods of dealing with tuberculosis. As mentioned at some of the other cases the reasons and benefits ofoperative treatment are:-

a). Removal of avascular material in the form of pus, debris and sequestra allows access of anti biotics thereby promoting healing and curing the underlying infection.

b). The above procedure also removes material/

material responsible for toxity and result in a general unprovenient health and well-being.

c). Also to be added is this patient's case removal of the fundamental cause of chronically discharging sinus.

Because there is no requirement for range of movement in this joint, fusion by bone grafting can be undertaken without concern and should be carried out in the hope of producing bony union and obliterating the diseased cavity.

Pre-operative preparation was somewhat complicated in this patient's case. She was on a fairly high dosage of steroids (equivalent to 48 mg. cortisone daily) until immediately pre-operatively and it was apparent that this would require to be increased for the period of operation as there was no time to reduce and stop the drug. However, it was known that certain infections including tuberculosis exacerbate when steroids are given (could this have been a contributory cause of the discharging sinus?) and increase in dosage may have had adverse effect. Owing to the short duration of the increase I think that this danger was unlikely especially as the dose/

dose was about to be tapered off after the operation. Consequently, the dose was increased the day prior, the day of and the day after operation as in the case history above.

The operation is straightforward approach being made by an incision on the posterior aspect of the ilium by separating fibres of gluteus maximus. The sacro-iliac joint is defined by its relationship to the greater sciatic notch and i in this patient's case pus and dberis together with the sinus were removed. As there was lack of stability due to a large residual defect fusion was carried out by grafting of bone from the opposite iliac blade. (The final result can be seen in X Ray 3).

The subsequent course of the patient was satisfactory except for rather prolonged wound discharge and a boil in the region of the wound. It is only expected that there would be discharge in a wound in an area which had been the site of a sinus for so long. However, the discharge was due to secondary infection and not to tuberculosis as swabs later revealed. The wound did/

did eventually heal completely after rather a long period but the desired result was ultimately obtained.

Biopsy material gave what must be considered as a rather surprising result. There was no evidence of tuberculosis but only of sub-acute osteomyelitis. This would seem to support the suggestion made above that although the condition had originated as tuberculosis of the sacro-iliac joint it had become secondarily infected by low grade pathogens giving rise to sub-acute osteomyelitis with a sinus.

However, this was only one specimen from a very large area and it is possible that there may have been ample evidence from other regions. It may be that the microscopic structure of tuberculosis has been destroyed in the dense fibrous tissue found. These findings still do not preclude the presence of tubercle becilli but do suggest the inactivity of the disease. This does not mean that chemotherapy should be abandoned because there may be bacilli even though inactive and chemotherapy will require to be continued for the full two years.

The ultimate result as far as the

sinus /

sinus is concerned is excellent. There was eventual complete healing of the wound and the patient was very pleased to be rid of the sinus of such long standing. Although there is no definite report, there is no mention of further attacks of the skin condition and it may be that this has also been cured. The most recent X Rays do not show growth of bone tracebulae across the sacro-iliac joint but it is to be hoped that there will eventually be complete bony union. If this is not the case the stability of the joint will depend on the untouched parts of the joint.

The long term prognosis in this case is difficult to assess. One can never guarantee complete removal of diseased bone and living tubercle bacilli but I think that if chemo-/therapy is continued there should be no danger of recurrence of tuberculosis.

On the other hand there was a double aetiology with the prescence of evidence in in favour of sub-acute osteomyelitis. However the active focus of the disease has been removed and the patient is now weel therefore there is little danger of subsequent breakdown.

SUMMARY

This case illustrates well the features of sacro-iliac tuberculosis but with a chronic discharging sinus, secondarily infected and giving rise to evidence of sub-acute osteomyelitis. The condition was treated by general measures, chemotherapy and operative removal of the sinus and diseased bone, together with sacro-iliac fusion by bone grafting. Good recovery was made and in spite of wound discharge for some 12 weeks the wound has now completely healed and the patient ~~now~~ has a very good prognosis.

CASE NO. 3

LILLIAS NOBLE

CASE NO. 3.

LILLIAS NOBLE Age 10 years

14th September, 1960.

HISTORY

This girl was well until a few weeks ago when, at the end of her Summer Holidays, she complained of backache in the upper lumbar region and ~~the~~ limitation of spinal movements.

PERSONAL HISTORY

There is no complaint of any symptoms.

No cough or sputum.

Weight steady, bowels regular.

No urinary symptoms.

No central nervous system symptoms.

PAST MEDICAL HISTORY

Nil of note.

There is a family history of contact with tuberculosis in that the patient has an aunt with active disease.

ON EXAMINATION

General Thin girl about average height for her age.

Mouth /

Mouth and Phauces - healthy.

No palpable lymph lymphadenopathy.

<u>Cardiovascular System</u> N.A.D.

<u>Respiratory System</u> N.A.D.

<u>Alimentary System</u> N.A.D.

<u>Local</u> Walks well but rather guardedly.

The spine is held stiffly. There is no scoliosis but a slight dorsal kyphosis which is almost fully correctable.

There are no tender spines or abcesses palpable.

<u>Spinal Movements</u> Flexion, extention and lateral flexion are all limited to about a quarter of the normal.

<u>Straight leg Raising</u> Right 75°
Left 80°

Lower Limbs	Right	Left
Knee jerk	++	++
Ankle jerk	+	+

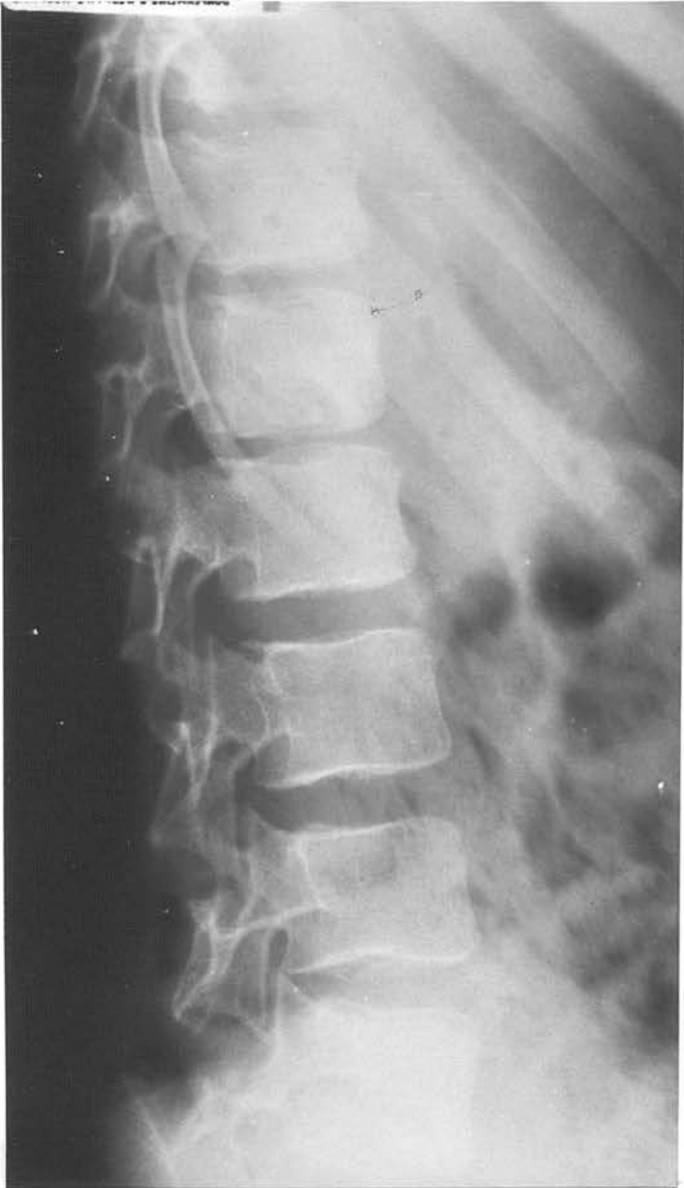
Babinski's sign - Not present on either side.

Sensation - Normal

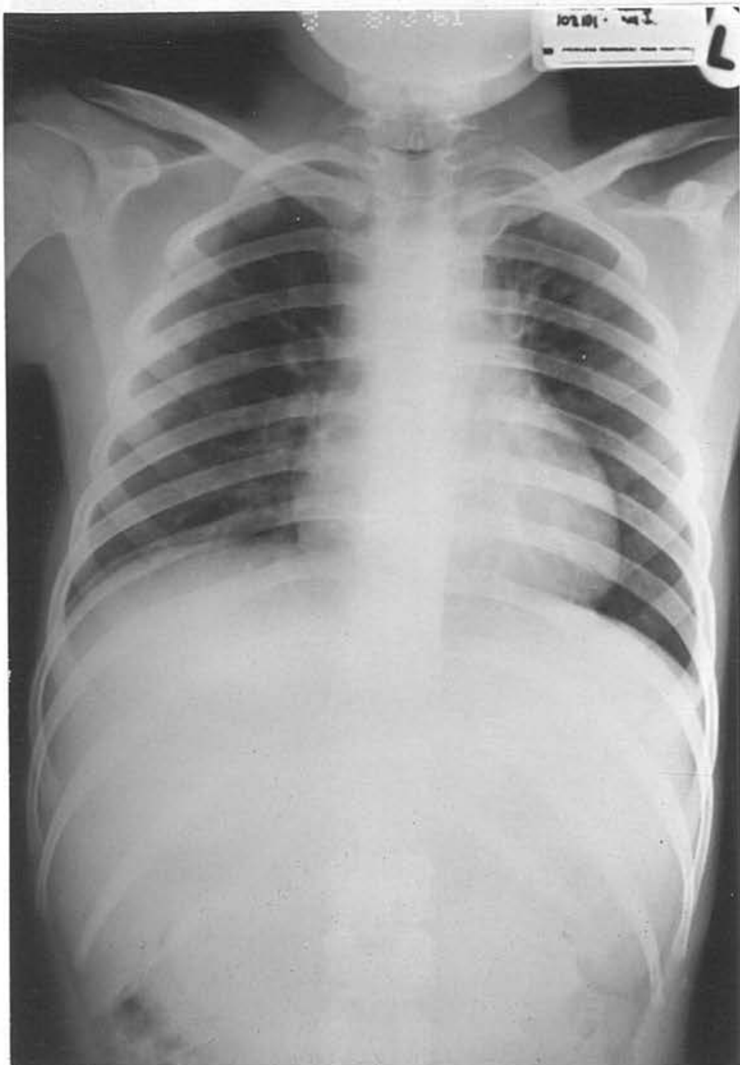
Circulation - Normal.

No evidence of disease in any other joint.

RADIOLOGICAL /



X-RAY 1



X-RAY 2

<u>RADIOLOGICAL EXAMINATION</u>

<u>Lumbar Spine</u> At this time (X-Ray 1) showed narrowing of the inter-vertebral disc between the 1st and 2nd lumbar vertebrae. There is also a disc-shaped lesion in the lower half of the 1st lumbar vertebra which shows as a translucency with slight increase in bone density surrounding this.

The upper anterior portion of the 2nd lumbar vertebra is slightly but definitely eroded.

<u>Chest X-Ray</u> As can be seen from the Chest X-Ray (X-Ray 2) there is evidence of tuberculosis.

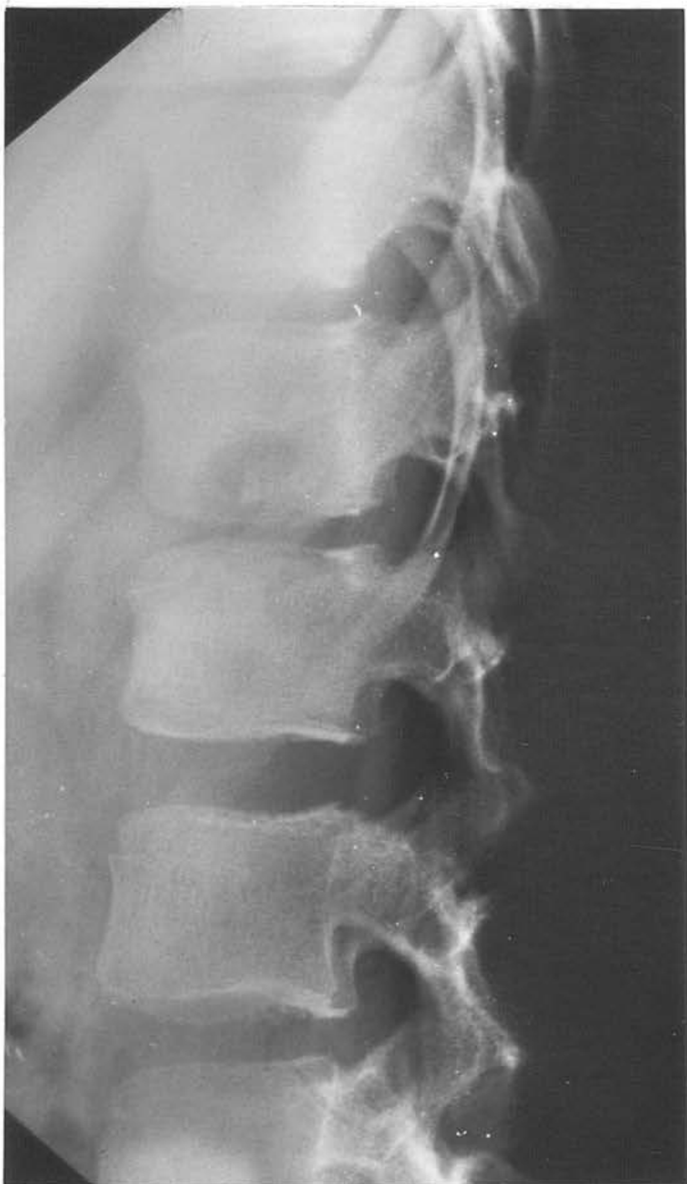
(i) There is increased markings in the region of the right lung hilum.

(ii) In the left upper zone there are calcified glands and increased lung markings.

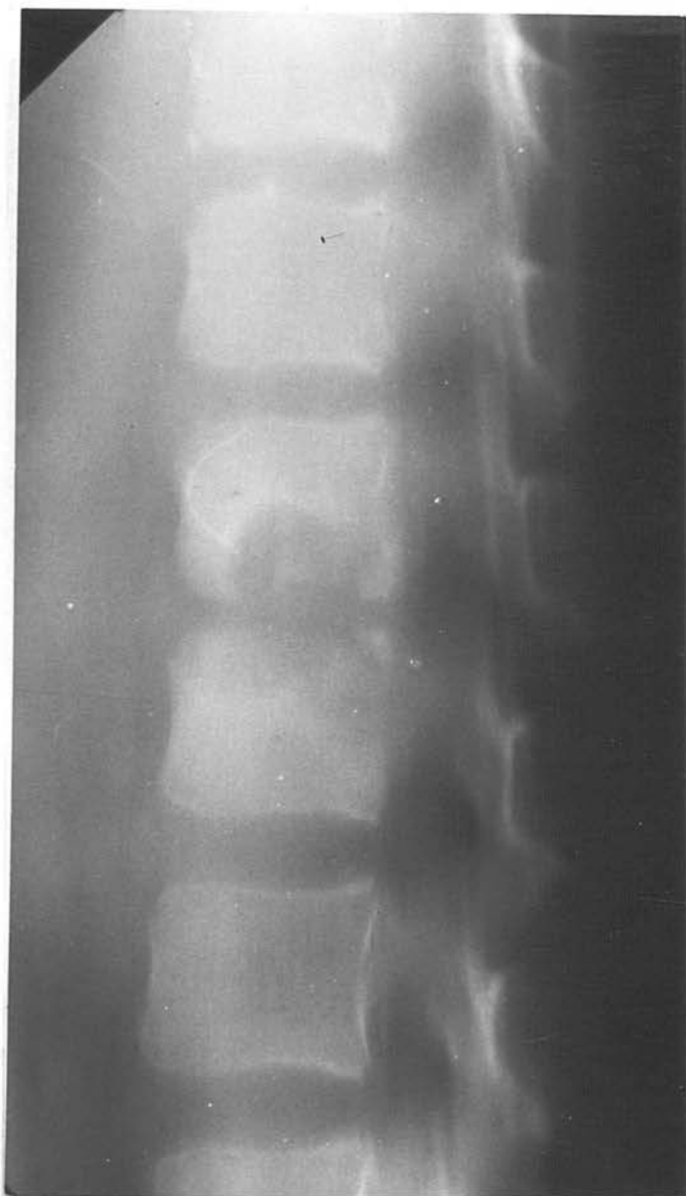
These findings are very much in keeping with primary pulmonary tuberculosis probably healed.

With these findings (clinically and radiologically) the diagnosis of <u>tuberculosis of the spine</u> was made and the patient admitted to hospital for treatment.

TREATMENT /



X-RAY 3



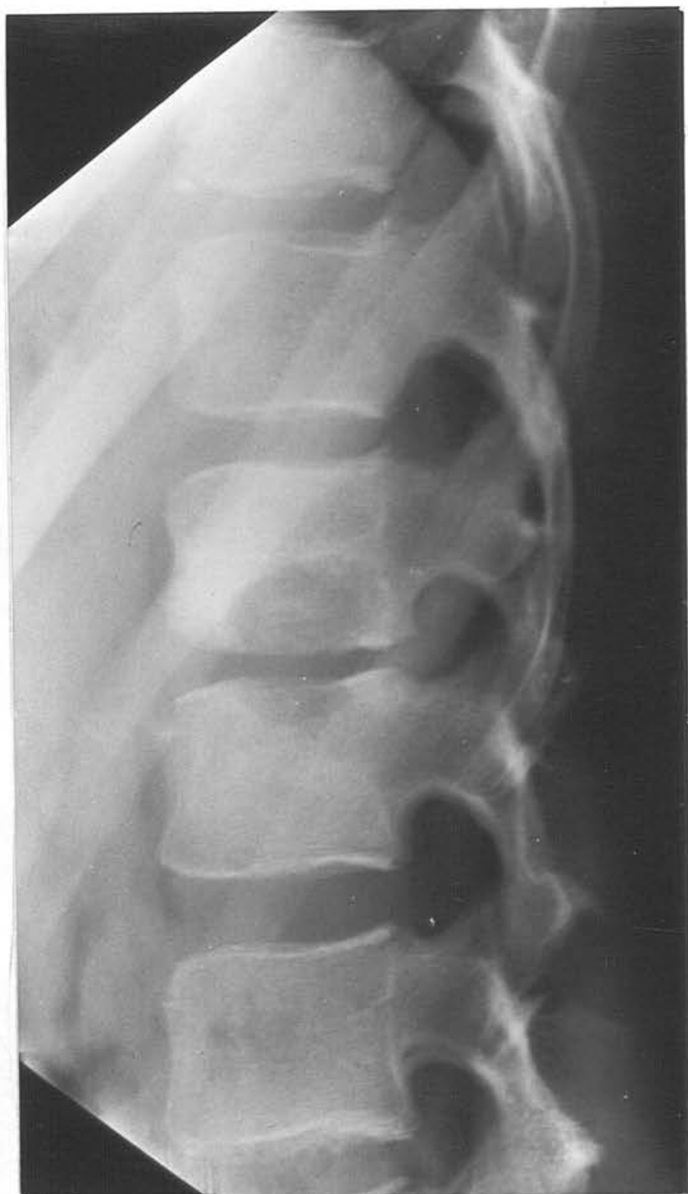
X-RAY 4 TOMOGRAM

TREATMENT

In the first instance this consisted of (a) bed rest and general measures to raise general health and (b) anti-tuberculosis chemotherapy. Initially treatment was with streptomycin, para-amino-salicylic acid and isoniazid but after the outset of double vision, the streptomycin was stopped and the patient given Pycamisan PHIO - 3 cachets twice daily.

During hospital treatment gastric washings were sent for bacteriological examination for tuberculosis but the result was negative.

Two months after admission on 28th November 1960, the patient was clinically much improved and free from pain. X-Ray at that time showed (as in X-Ray 3) that the lesion was no bigger in size and that there was no increase in the destructive process. Tomography (X-Ray 4) at this time showed that the true extent of the lesion was greater than was expected from the plain film and that the decalcification extended into the region of the pedicle in the 2nd lumbar vertebra. There is also to be seen on plain film and tomogram a small circumscribed dense opacity in the middle of the lesion in the 1st lumbar vertebra which may be a small sequestrum.



X-RAY 5

A further two months later on <u>2nd February 1961</u>, her general health was reported as being perfect. Chemotherapy was continued. At that time also the E.S.R. was reported as being 20 m.m. per hour and the haemoglobin level satisfactory.

On <u>22nd February</u> (3 months later) the findings were as follows:-

E.S.R. 10 m.m. per hour

<u>Radiography</u> Shows increased destruction of bone especially at the upper limit of L.V.2. (as seen in X-Ray 5)

On <u>18th March</u> X-Ray showed no further evidence of destruction.

Other investigations at that time:-

E.S.R. 8 m.m. per hour

White Cell Count 5,800 cells cu. m.m.

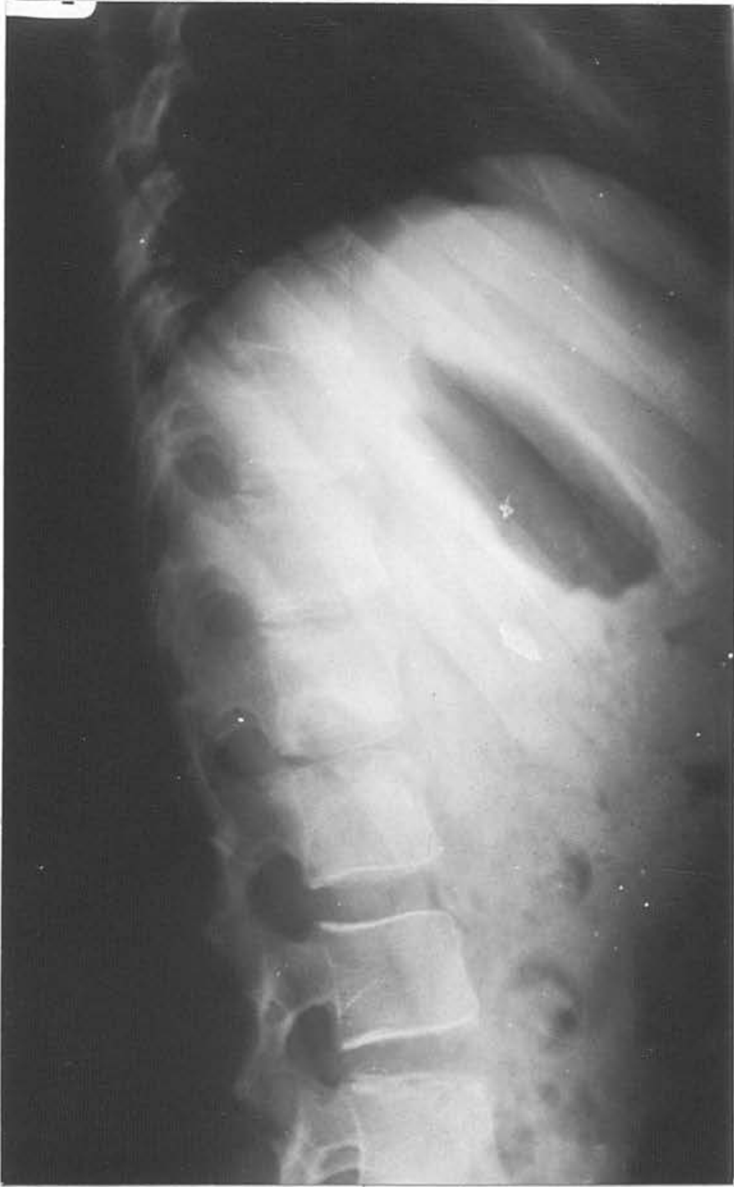
Haemoglobin level 83%

Three months thereafter on <u>27th July 1961</u> the following was the situation:-

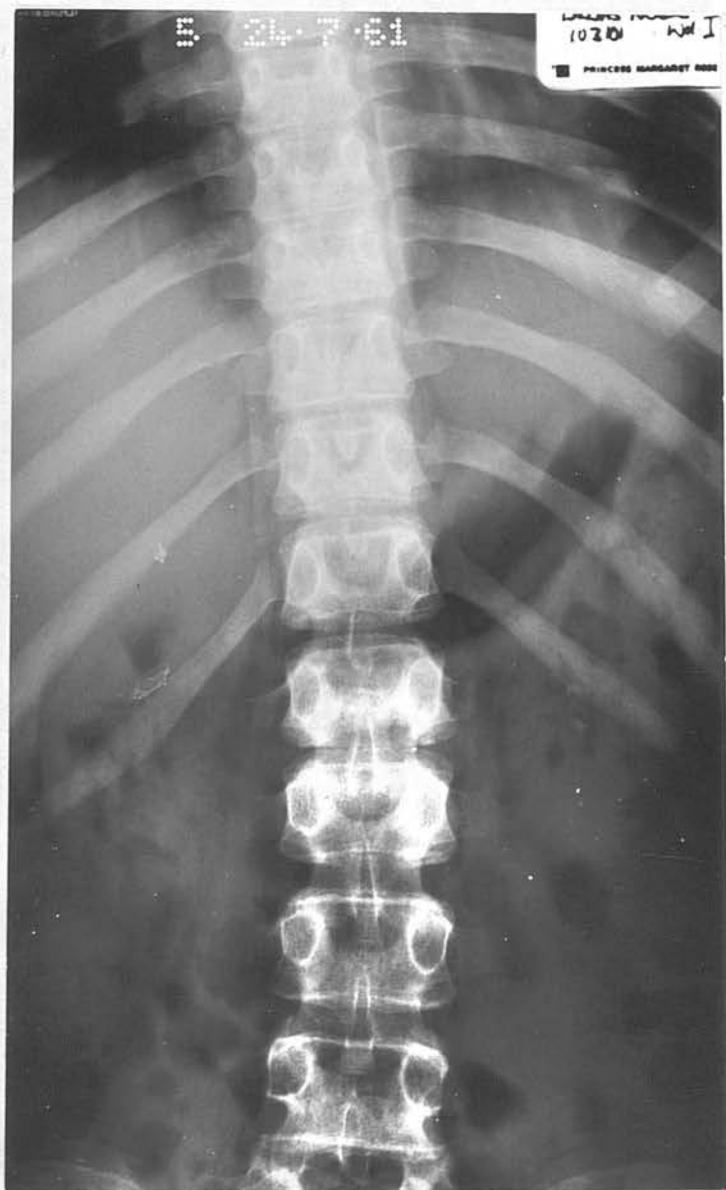
E.S.R. 7 m.m. per hour.

White Cell Count 6,900 cells cu. m.m.

<u>Radiography</u> /



X-RAY 6



X-RAY 7

Radiography at this time shows (X-Rays 6 and 7) sclerosis of the edges of lesion and the appearance of one small sequestrum in each of the diseased areas in each vertebrae.

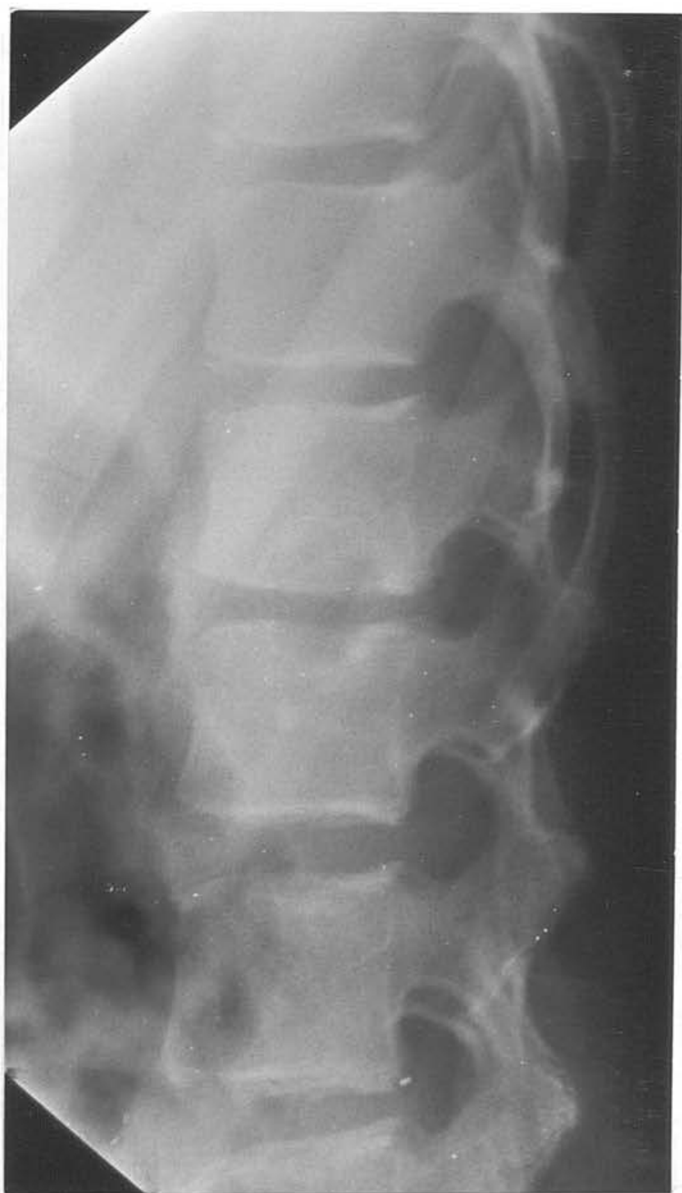
Some two months later on 26th September, 1961, there is further healing of the lesion, as seen in X-Ray 8. The lesion was smaller in size and appeared to be healing.

At this time also the patient's general health was good.

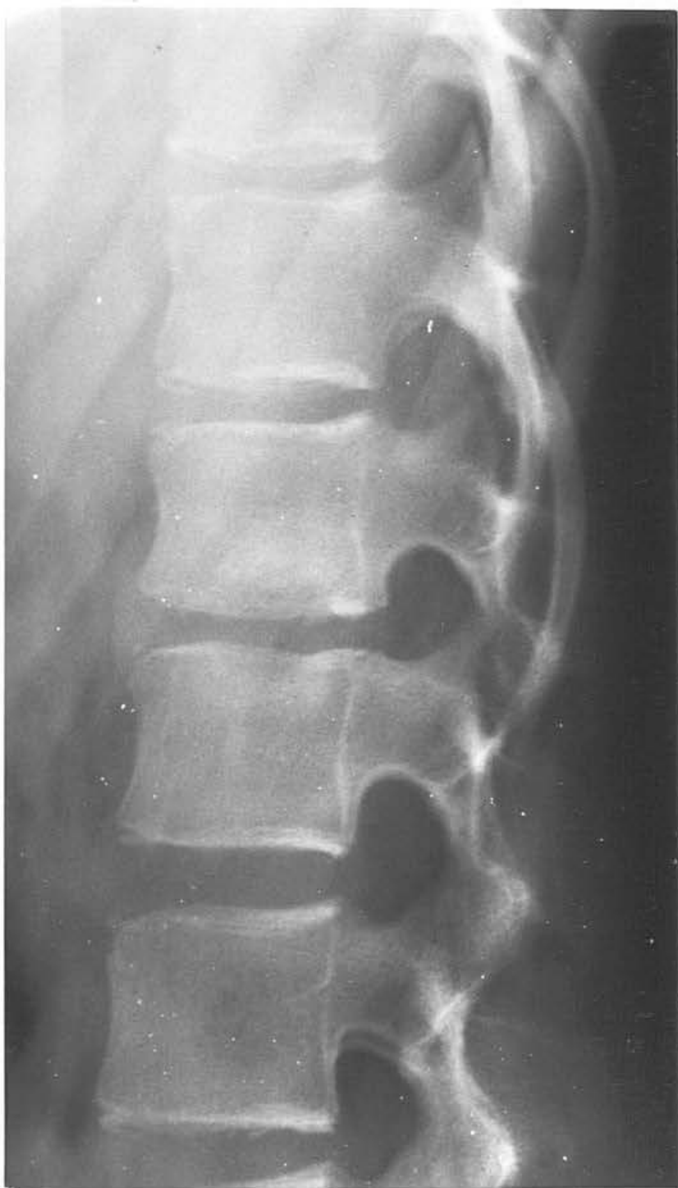
Since that time a slow but steady progress has been maintained. On 9th January, 1962, the lesion was still regressing and X-Ray (No. 9) showed a clearly defined lesion with sclerosis at the periphery. On 24th January the haemoglobin was satisfactory and there were no problems. At this time, however, there was the possibility of these being an abcess lying antereorily and the X-Ray about that time (X-Ray 9) does suggest a soft tissue shadow at the level of the 1st and 2nd lumbar vertebrae and slightly anterior.

By this time it was necessary to decide upon a scheme of treatment and this lay in one of two directions:-

a) /



X-RAY 8



X-RAY 9

(a) Remobilisation and rehabilitation in a plaster jacket.

(b) Operative debridement of the area and fusion of the spine.

The choice was the first of these alterna-:tives and on 23rd February, 1962 the patient was put into a plaster jacket with the aim getting her ambulant and active again this way.

On 7th March the patient was walking with the aid of a machine.

On 29th March the E.S.R. had risen to 24 m.m. per hour and a reactivation of the disease or possibly an intercurrent infection was suspected.

On examination of the throat the left tonsil was seen to be enlarged and there was infection round the opening of the parotid duct. There was also the report of an enlarged lymph made at the angle of the jaw.

Two weeks later the infection had cleared and there was no evidence of cervical adenitis or tonsilitis. The E.S.R. had fallen to 24 m.m. per hour and specimens were sent for Staphylococcal Acute haemolysin titre

and /

and catheter urine for examination.

On 2nd May, 1962, the patient was well and the E.S.R. had further fallen to 10 m.m. per hour. The catheter specimen of urine was negative and anti-staphylococcal haemolysim titre normal.

An X-Ray through plaster was satisfactory. However, this X-Ray also showed the presence of two renal calculi on the left side.

On 18th May the plaster was changed and tomograms done. These showed that defects of L.1 and 2 are now fairly clearly defined with a return to normal density of the adjacent bone. The appearances suggested that the lesion was quiescent.

FUTURE TREATMENT

Continuation of mobilisation and rehabili:tation in plaster jacket.

Maintenance of anti-tuberculous chemo:therapy and general measures.

COMMENTARY

This patient presents a case of considerable interest from the point of view of diagnosis, and management. She presents with symptoms which /

which are compatible with several conditions which affect the spine. However, the age of the patient immediately limits the number of conditions which would be initially considered. Presenting with approximately a three week history of pain, stifness and limitation of all spinal movements brings tuberculosis immediately to mind, and in a girl with good general health otherwise, a chronic infection is certainly highly likely. The X-Ray changes also suggest tuberculosis showing as they do, diminution of disc space and a decalcifying lesion. However, the situation is not typical of tuberculosis, not being in the anterior edges of the affected vertebrae.

The condition could also be low-grade pyogenic arthritis or sub-acute osteomyelitis. In the latter condition there is generally no narrowing of the disc space but evidence of new bone formation is usually seen together with marked sclerosis. The differentation between low-grade pyogenic arthritis and tuberculosis is not easy and the most helpful evidence in deciding /

deciding comes from other factors. There is a history of contact with an open case of tuberculosis and more significant still there are X-Ray signs of primary pulmonary tuberculosis. Tuberculosis of the spine is the commonest skeletal site for bone and joint tuberculosis and such sighs and history make the diagnosis in this case almost completely certain.

It has been stated that if there is no para-vertebral abcess in suspected tuberculosis of the spine there is no sign at all of para-vertebral abcess but I think that the history of contact and chest X-Ray serve adequately to distinguish this condition from low-grade pyogenic arthritis.

The condition is also that of very early tuberculosis of the spine and although one cannot always judge the state of the lesion by X-Ray a para-vertebral abcess would not be expected at this stage. This is so because of the situation of the lesion in the vertebrae and the fact that it looks very circumscribed and not yet extending beyond the bone.

There /

There is no radiological evidence of sequestrum formation or of collapse of vertebrae and these provide very good evidence that this may be a relatively 'benign' lesion. No neurological signs of cord movement are present giving confirmatory evidence about the size and extent of the lesion (i.e. there is no pus, or sequestra beyond the limits of the vertebrae).

Thus on first seeing this child one could give a firm diagnosis of early tuberculosis of the spine with a very good prognosis.

Treatment at this stage was conservative with bed rest, good diet, fresh air and anti-tuberculous chemotherapy. However I think that operative treatment could also have been considered at this time. If debridement and fusion had been carried out then the diseased tissue could have been completely removed and the patient given a very good chance of fairly rapid recovery. It has been found from experience that radiological examination does not give a complete picture of the extent of the lesion /

lesion and open operation at this time would have given just this information. In addition material could have been obtained for bacteriological examination so that the diagnosis could have been proved beyond any possible doubt and organism sensitivity determined. Also fusion at this stage would have been a safeguard against sudden collapse at a later date.

There is naturally, very great reluctance to do an open operation for a lesion so apparently small on a girl so well. I think that the subsequent course of events served to indicate that this would in practice have been a very worth-while procedure. At ~~the~~ least a needle biopsy should have been attempted so that the sensitivity of any organisms could have been determined.

During 5 months of conservative treatment the patient remained well and became free from pain. The X-Rays during that time showed the lesion to be rather static and it did not increase in size. Tomograms on 30th November (X-Ray 4) showed that in fact the lesion was much larger than was at first thought and that it /

it extended into the pedicle of the 2nd lumbar vertebra. About 3 months after this there was further increase in the size of the lesion but there was no abcess seen or palpable in any region. In spite of this the patient remained well and the E.S.R. continued to fall.

Again, at the time of increase in size of the lesion the question of operation arises. The increase in size indicates activity in the area and such activity could continue and lead to collapse with possible disastrous results. However there is still no sign of abcess formation or of cord mobilement and operation may still be considered to be unnecessary. From the experience of other workers in regions where tuberculosis is widespread it has been found that the conservative management of spinal tuberculosis has been shown to produce not particularly good results and I think that experience of this kind could help in deciding future management.

In this case conservative treatment was continued and later on 18th March there was no further increase in size of the lesion or evidence of further bone destruction. Some months later /

later the X-Ray showed definite evidence of healing of the lesion with sclerosis at the edges indicating new bone formation. Also becoming quite obvious at this time was the appearance of two small sequestra one in each vertebra. These were very small and therefore were not of very much consequence but helped to indicate the progress of the disease. The fact that the patient was very well generally at this time is an indicator to the activity or rather inactivity of the disease.

Gradually the healing progress continued and the lesion began to regress in size as can be seen from the serial X-Rays. It was obvious that the lesion was becoming or had become inactive by this time and therefore although operative treatment was considered it was definitely contra -indicated. It has been found that operation should not be carried out on a lesion when it is in the healing phase and this tenet was adhered to in this instance and further treatment was by means of a plaster jacket in mobilising the spine. Mobilisation was /

was carried out in this jacket and the patient has remained very well since then.

There is one infective incident which remains unexplained. This occurred about four weeks after the application of the plaster jacket with the (very possible) explanation that this was a very slight recrudescence of tuberculosis. At the time the explanation of tonsillitis was given but this was later thought to be wrong and further investigations proved negative. In these instances (a similar episode occurred in case 5) it is very difficult to be sure of the aetiology. There is no definite test such as blood culture or antibody titre that can be used to distinguish tubercu-:losis from other causes of such episodes. All that can be said is that this is a sub-acute infective episode in a person who has had (or still has) tuberculosis. What such an incident does do is to remind the attendants that the patient may yet have active disease.

Another unexplained and very significant fact /

fact is the discovery of two renal calculi on the left. It is possible that they have been produced by the decalcifying lesion and then recalcification causing a rise in the serum, calcium but the possibility of tuberculosis of the kidney must also be entertained and appropriate measures taken to diagnose and treat the condition. It is possible that a renal infection together with an osteoporotic lesion in a patient recumbent for a long time was the cause of these stones. The importance of renal tuberculosis from an orthopaedic point of view is that it may serve as the primary site for further bone and joint involvement and as such is of considerable significance.

The ultimate prognosis for this patient is very good indeed provided that the general measures and anti-tuberculous chemotherapy are continued. The latest X-Rays show a very great decrease in size of the lesion and suggest that the lesion is quiescent. As in all cases very close watch must be kept on this patient in future years should there be a recrudescence of the disease in the spine. If, as is now to be fully expected there will be complete healing /

healing of this lesion, any form of spinal fusion would I think be unnecessary, as the spine will be stable enough and strong enough without any such procedure.

A few comments on the progress of this case would not be out of place. The reasons why this lesion should have healed eventually and not progressed are perhaps obvious but there are equally situations in which the lesion has continued with eventual collapse and paraplegia without obvious reasons.

Firstly, the lesion was detected at a very early stage, probably the earliest possible stage. This means that anti-tuberculous chemotherapy was begun early as were general measures.

Secondly the girl was in good general health - a most important factor. The activity of tuberculosis seems to be fairly closely linked up with general health.

Thirdly chemotherapy was begun at a time when the lesion was probably vascular so that the lesion would attacked directly before the formation /

formation of pus or other vascular debris.

SUMMARY

This case is one of early <u>tuberculosis of the lumbar spine</u> treated by conservative measures and anti-tuberculous chemotherapy, with subsequent healing without much bone destruction and carrying a very good prognosis.

CASE NO. 4

HUBERT DE BURGH

CASE NO.

HUBERT DE BURGH AGE 37 years MALE

OCCUPATION Architect.

HISTORY

This patient has a very long history of tuberculosis particularly of the spine. He has Pott's Disease and a well-marked kyphosis. On the 8th November, 1961 he was seen at an Out-Patient Department giving a two month history of inco-ordination of his legs. He had also noticed that his thighs were becoming thinner and that there were involuntary movements in his legs.

He complained of having a poor stream during micturition ~~to~~ and of terminal dribbling. In addition he has difficulty in containing flatus especially when climbing stairs.

Two weeks ago there was the appearance of muscle weakness in the lower limbs giving rise to difficulty in flexing his legs while dressing and dragging of his/

his feet on the lateral plantar surfaces on walking.

PERSONAL HISTORY

General health good.

No cough, sputum or haemoptysis.

Appetite unchanged.

Weight steady.

Bowels regular.

No night sweats, blackouts or visual disturbances.

PAST MEDICAL HISTORY

This patient has a very long history of tuberculosis spanning some 30 years and this is briefly outlined as follows.

At age 8 years he suffered from pleurisy and was admitted to hospital being nursed in a plaster shell for eighteen months. While in hospital he developed an abcess on his left arm.

In 1934 when 9 years of age he was diagnosed as having tuberculosis of the left humerous which was treated by curettage.

At the age of 11 years he developed tuberculosis of the spine in the T.12 to L1/

L1 region for which he received conservative treatment for nine months.

When he was 14 years of age his spine was bone grafted and he was in hospital for nine months.

At 17 years there was a recurrence of back pain which necessitated nursing in a plaster shell for 3 years. Also at this time he developed localised abcesses over his scar.

Between the ages of 21 and 25 years there was a recurrence of back pain and a lumbar abcess was aspirated. He also developed lupus vulgaris at this time. Between these ages he was in hospital for 4 years and treated in a plaster bed.

Five years ago, at the age of 32 years the patient was seen for the first time at the Royal Infirmary with a recurrence of back pain. This was treated by physiotherapy and the application of a brace.

He was seen again in December, 1960 with further back pain but in addition he complained of dropped foot on the right/

Right side and weakness in both knees. At that time he was admitted to hospital and nursed in a plaster bed for 3 months followed by two months in a plaster jacket. (May, 1961)

Since that time he has noticed numbness in both feet and has experienced a chilling sensation up to both knees.

Since June, 1961 he has been wearing a brace and walking with the aid of sticks.

Later in that year (September, 1961) he felt that his limbs were generally weaker and he lost the sense of balance finding also that his knees would easily give way.

ON EXAMINATION

GENERAL

Cardio Vascular System	N.A.D.
Respiratory System	N.A.D.
Alimentary System	N.A.D.
Central Nervous System	as below.

LOCAL/

LOCAL

Long scar over kyphus in the thoraco-lumbar region.

No local tenderness

No evidence of abcess locally

No evidence of abcess in distant sites.

No alteration to pin prick and light touch sensation in the lower limbs.

Both feet in the equino-varus position.

MUSCLE CHARTING

There is no weakness of the

Hip Flexors

Gluteus maximus, minimus or medius.

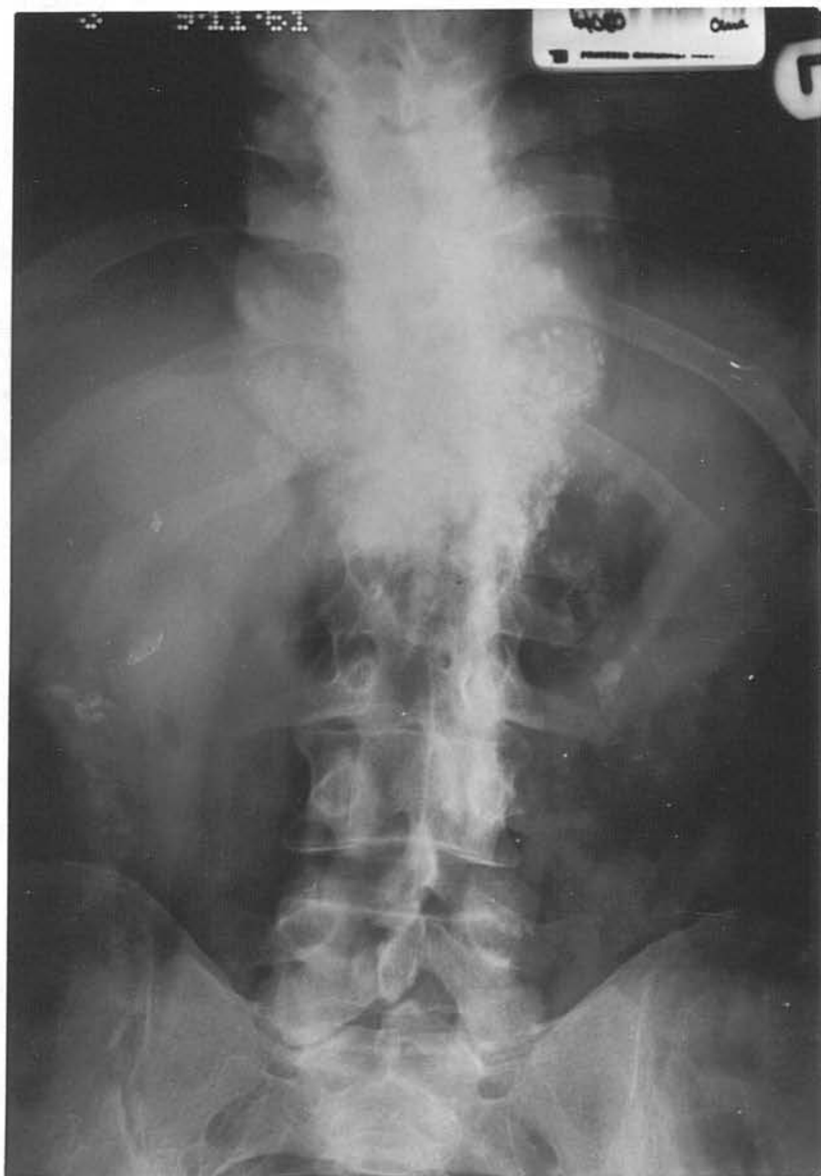
Hip abductors or adductors.

	Right	Left
Quadriceps	4	4
Entensor digitorum longus	3	3
Entensor hallucis longus	3	3
Tibialis Anterior	4	4
Peronei	3	3
Intrinsic Muscles	3	3
Calf Muscles	4	4

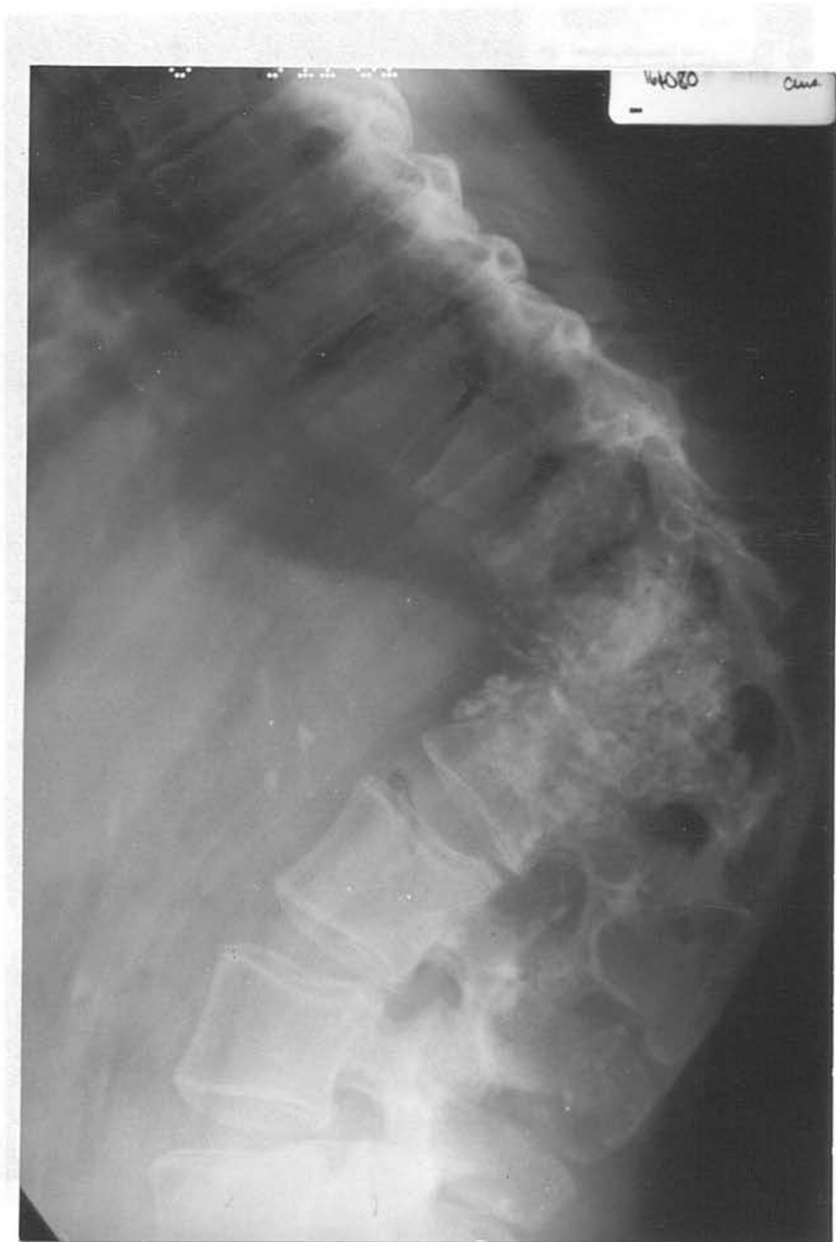
REFLEXES

Abdominal - Normal

Knee/



X-RAY 1



X-RAY 2

Knee and ankle jerks	-	Exaggerated right and left.
Knee and ankle clonus	-	present right and left.
Babbinskis' Sign	-	present

RADIOLOGICAL EXAMINATION at this time showed (as in X-Rays 1 and 2) the following:-

ANTERO - POSTERIOR There is complete obliteration of the normal spinal architecture and a very dense opacity from the region of 9th thoracic to the 2nd lumbar vertibrae. A large paravertebral abcess is clearly seen, it fusiform shape lying at the level given above. Immediately surrounding the vertebral bodies there are mottled opacities indicating small sequestra. There is a slight curve to the left. The lateral view shows a kyphosis of approximately 90° and confirms the vertebral body destruction and more clearly shows the presence of sequestra. (seen in X-Ray No. 2).

DIAGNOSIS/

DIAGNOSIS In view of the history and findings as above the diagnosis of Potts' Disease is obvious and the diagnosis of paraplegia of late onset was made. The cause of the paraplegia was thought to be an abcess and not gliosis due to ischaemia.

TREATMENT In the first instance was general measures including bed rest, with an attempt to raise the general level of nutrition. At the same time anti-tuberculous chemotherapy was instituted the general aim being to see if the paraplegia would thus recover.

The degree of paraplegia was such that operation was border line and was certainly not indicated until after conservative treatment.

At that time anterio-lateral compression was thought to be a procedure necessary in one or two months if there was no improvement.

PROGRESS Two weeks after this time there was no detectable sensory loss in the lower limbs and the motor loss was considerably improved. Ankle clonus was still present however,/

however, bilaterally.

On 2nd December the neurological situation was still improving.

On 14th December approximately four weeks after admission the clinical course was reported to be good and neurological examination showed that muscle power had increased to 4 and knee clonus had almost disappeared. Ankle clonus remained but was deminished.

Sensory testing gave variable results but there was no gross abnormality. The pin prick sensation was normal and proprioception was varied but good bilaterally.

All the reflexes were equal but still brisk.

Babinskia's sign - present bilaterally.

Intra-venous pyelogram - normal.

Although there had been considerable improvement it was obvious that signs of cord compression remained and therefore it was considered necessary to carry out Antero- Lateral Decompression at this stage. The operation was to be carried out in two stages the second being combined/

combined with anterior spinal fusion.

On 15th December, 1961 Antero-lateral decompression of the Right Side was carried out as follows:-

The 9th 10th and 11th ribs were removed and their inter-cotal nerves identified. During removal of these ribs pus was encountered and after the pleural reflection the paravertebral abcess was seen to extend the whole length of the diseased vertebrae. After opening into the abcess 2-3ozs. of caseating pus were removed. The space between T 9 and 10 was full of pus and sequestrated disc and this was exposed as it was apparently going back to the cord.

Antero-lateral decompression was therefore undertaken by removal of the pedicle between these two vertebrae the pedicle being that of the 10th vertebra.

After decompression it was just possible to see pulsation in the cord.

The side of the 8th-9th disc was explored and found to be normal but going down the paravertebral abcess

was/

was evacuated. After removal of pus from this space some bone chips were packed in.

There did not appear to be much evidence of pus between L 1 and 2 as far as could be seen from above the diaphragm and it was decided to open this space from the other side.

Immediate recovery from the operation was uneventful but there then followed a very complicated series of events which is recorded in some detail here as they are illustrative of the hazards of this operation.

<u>16th December</u> On the day after operation his neurological state was unchanged, but there were signs in the chest very suggestive of <u>pneumothorax.</u>

<u>On 17th December</u> an inter-costal tube was inserted and it was discovered that there was a <u>haemo-pneumothorax</u> - one pint of old blood being aspirated.

<u>On 18th December</u> the tube had blocked in the morning and there was concomitant respiratory distress, rise in temperature to $101^{O}F$ and cyanosis.

In/

In the afternoon the tube was removed. X-Ray at this time showed gastric distension and for this reason the stomach wasintubated and intravenous fluids commenced.

<u>On 19th December</u> the chest signs had diminished and the situation was satisfactory.

<u>Neurological Picture</u>. All muscles of the lower limb were power 4.

Slight diminution of light touch sensivity over the L4 distribution in the left leg.

Position sense in the toes - now normal.

Bilateral Ankle clonus still present

<u>On 29th December</u> the patient had a brisk haematemesis and developed a high temperature and a leucocytosis. It was discovered at this time that the patient had had melaena for about one week. Due to his condition it was considered that a Barium Meal was indicated and this was carried out.

This showed no evidence of gastric or duodenal ulcer but a large hiatus/

hiatus hernia and a filling defect difficult to interpret.

Treatment was conservative and he was put on an ulcer diet and the head of the bed was raised.

Blood was transfused due to a very low haemogoblin and eventually the haemogoblin level was raised to 100%

Stools now showed no frank melaena but were positive for occult blood.

Aspiration of the chest yielded no fluid.

However, owing to the probability of pleural fibrinous deposits in the right space and the probable incomplete re-expansion of that lung de-cortication was indicated and on 15th January a <u>right thoracotomy</u> was performed.

This showed little evidence of clot in the pleural cavity and the right lung was tethered in the region of the posterior ends of the lower ribs and also anteriorly at the level of the 4th rib. The posterior adhesions were left untouched but those in the front were divided and decortication was carried out. Considerable/

Considerable re-expansion of the lung was thus obtained.

The post-operative course was uneventful.

ON re-examination for the second stage clearance and grafting - the patient was comfortable in bed. There was a little trouble with the skin at the lower margin of the kyphus.

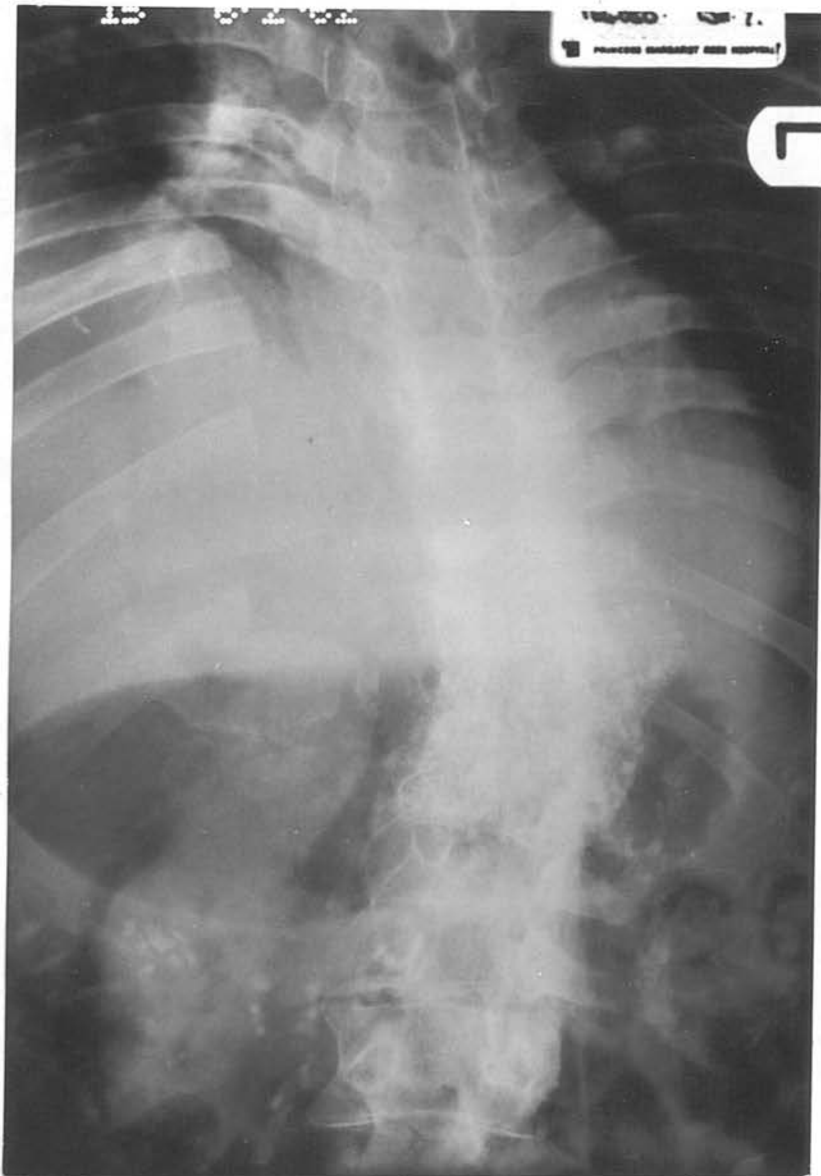
The thoracotomy and spinal wounds were soundly healed.

There was a trace of discharge from the thoracotomy drainage wound.

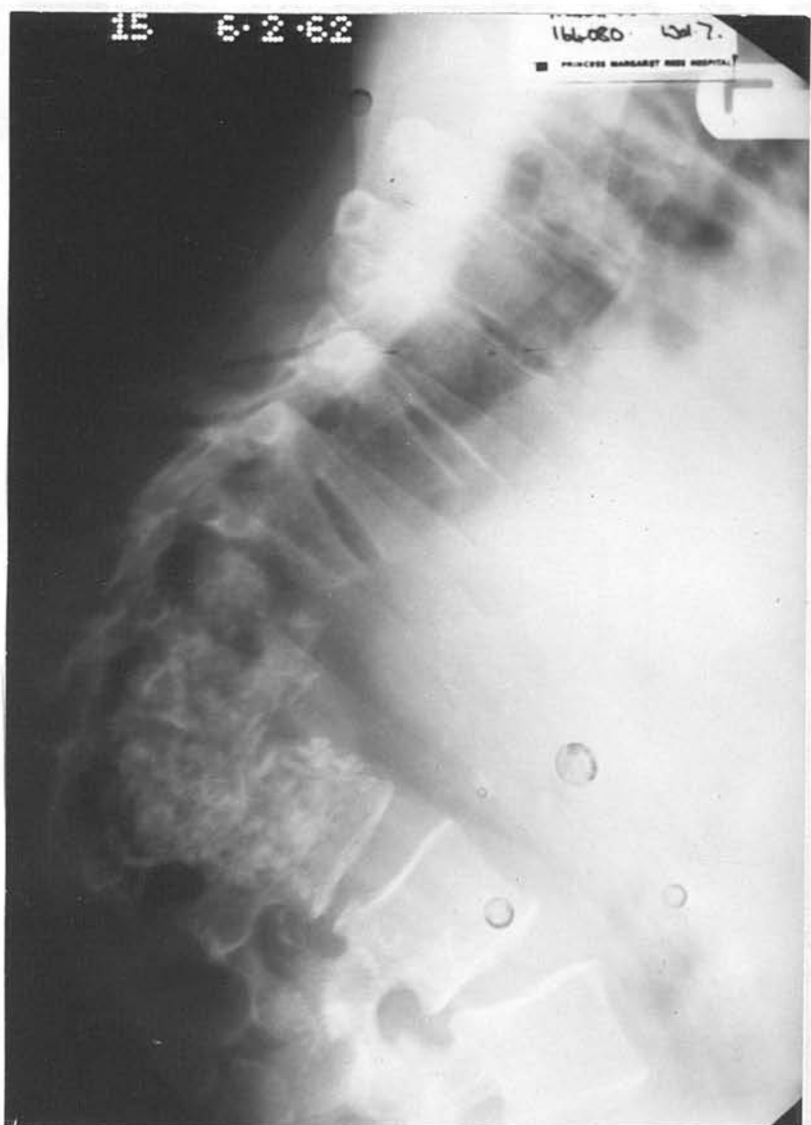
7th February
NEUROLOGICAL EVALUATION.

Lower limb Muscles	-	all at least power 3.
Sensory Testing	-	complete anaesthesia on rt. side from T5 -T10
Position Sense	-	Normal
Vibration "	-	Normal
Abdominal Reflexes	-	Present left but absent on the right.
Knee and Ankle jerks	-	present but exaggerated on both sides.

Knee/



X-Ray 3



X-RAY 4

Knee and ankle clonus - absent

Babinskis' sign - present on the left side - equivocal on the R side.

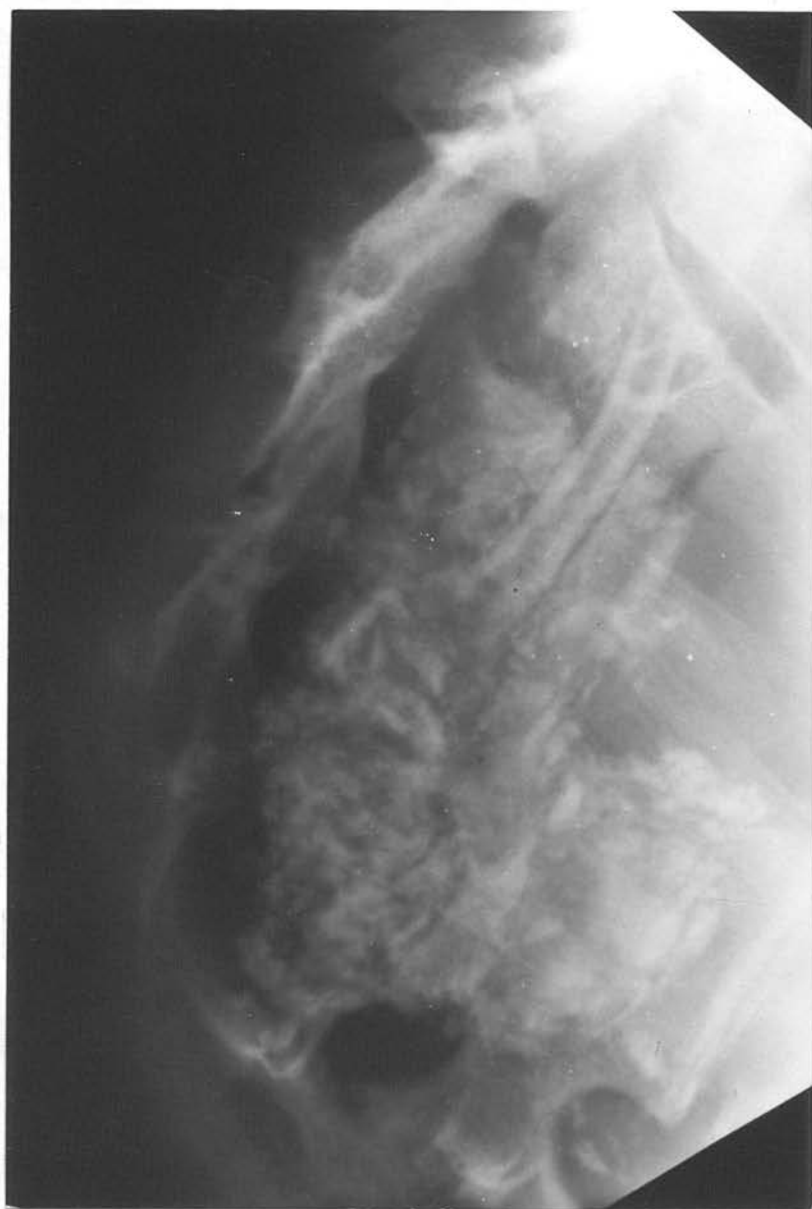
RADIOGRAPHY

At this time showed considerable clearance of pus and sequestra on the right side, but the situation fundamentally unchanged on the right. (see X-Rays 3 and 4)

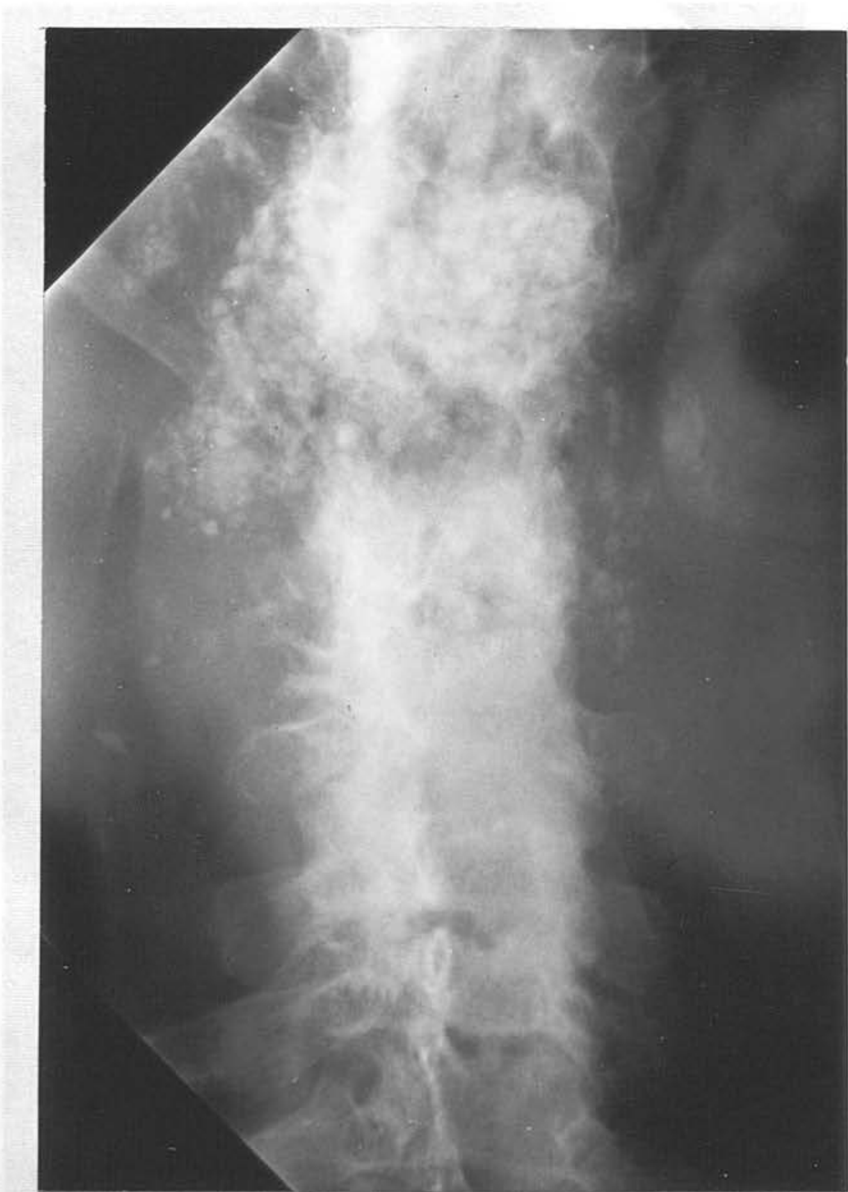
On 23rd January

Antero-Lateral Decompression of the left side was carried out together with anterior spinal fusion as follows:-

After removal of 3 ribs and tracing the intercostal nerves to the inter-vertebral foraminae it was easily possible to strip the pleura from the abcess wall. The abcess wall had already been opened twice on removing ribs. The upper part of the diseased area was approached by incising the abcess wall and a great deal of dried tuberculous pus was found. In the gap between the two upper most diseased vertebrae a further portion of sequestrated disc was found and removed. This revealed quite large cavities in this two vertebrae. All available diseased material/



X-RAY 5



X-RAY 6

material was removed.

A channel was then cut in the side of these two vertebrae and into the depth rib chips were packed.

Finally the groove was filled with a complete length of rib which was punched home and seemed quite secure.

The subsequent post-operative course was completely satisfactory on this occasion and there were no complications. X-Ray showed the situation as in X-Rays 5 and 6. The postero-anterior view shows that the abcess has been completely cleared and the area is dense with the bone grafting.

The lateral view shows also the removal of necrotic debris and the position of the rib and grafted material.

Since that time the patient has remained completly well and progressed satisfactorily. There was a complaint on 29th March of buzzing in the ears when the head was turned to one side but there is no final report on this.

Subsequent rehabilitation will involve/

involve from the time of operation -
4 to 5 months complete bed rest followed by mobilisation in a plaster jacket from neck to symphysis pubis. This will remain on for approximately six months when complete bony union in the spine is expected.

After this time the jacket should be probably dispensed with and the patient will be discharged and seen at regular intervals at the Out-Patient Department.

COMMENTARY

This patient presents on 8th November 1961 as a case of progressive paraplegia of significant degree. The wasting of the muscles, sensory and reflex signs and involvement of bladder and bowel, all signify the extent of paraplegia, and the fact that adequate treatment is urgent.

With such a long history of tuberculosis especially of the spine the diagnosis cannot really be in doubt and radiography confirms the condition as being one of Pott's Paraplegia. There is a highly characteristic paravertebral abcess/

abcess in the lower thoracic and upper spinal regious together with sequestra of varying size, and such collapse of the vertebral bodies that the architecture is obliterated resulting in a 90° kyphosis. The spinal disease having been present for more than two years the paraplegia can be said to be one of <u>late onset</u>. However having stated this one must yet determine

a) the cause of the paraplegia per se

and b) decide whether it is amenable to operative treatment or not.

The causes of paraplegia of late onset are similar to those of early onset paraplegia but those of late onset indicate a reactivation of the disease. From the X-Ray signs it is evident that the disease is again active and it would seem most likely from these pictures that the large paravertebral abcess surrounding the dura and pressing on it (and thus on the cord) is the cause of the symptoms.

On the other hand one cannot exclude the other causes of paraplegia in this/

this situation namely,

i) pressure of sequestra on the dura.
ii) pressure of living bone on the dura.
iii) pressure of pus on the vessels of the spinal cord causing a gradual venous congestion and ischaemia of the cord.

One cannot also exclude a combination of the above aetiological factors and the only way to find out is to institute treatment and to explore by operation.

The paraplegia is not of such a degree as would indicate that pressure of an internal gibbus was the cause of the condition.

Treatment is conservative in the first instance so that oedema and pressure on the cord is relieved and the paraplegia improved. This is important because if the paraplegia is in fact due to ischaemia of the cord with resultant fibrosis then the paraplegia would not resolve and operative treatment would be less likely to be successful, even though it may be required for clearance of the abcess.

As is seen from the notes the paraplegia did improve after about 5 weeks conservative treatment which included general measures and anti-tuberculous chemotherapy.

At this stage it is important to decide on future treatment. It is very likely that the paraplegia would further resolve by continued bed rest, but the disease is active, there is a large amount of caseous material and it is certain that this situation will not heal spontaneously. The presence of pus and necrotic material delays healing, favours continuing infection and its removal usually leads to healing.

The antibiotics cannot penetrate the dead bone and caseous pus and the only way to cure the patient permanently is to evacuate the pus and necrotic debris. This procedure removes the agents responsible for the paraplegia and also much of the active focus of the disease. The removal of sequestra and all dead bone allows revascularisation of the area and access of antibiotics. The removal of such material also has been observed to produce a clinical improvement in patients with an increase in appetite, general vitality and morale consequent on/

on the removal of general toxicity. Because it is anticipated that the spine will be rather unstable following this procedure (carried out in two stages) ~~then~~ the second stage includes spinal fusion.

The operation, antero-lateral decompression has now been very well standardised and is of proven value in this condition. It allows good access to the diseased area and the removal of pus, sequestra and debris. Generally it is well tolerated and also allows of spinal fusion if desired. In this case spinal fusion was carried out anteriorly to fill the defects and support the spine anteriorly. In this case it was preferable to posterior fusion at a later date.

The post operative course after the first stage is interesting as it illustrates well one of the renowned complications of this operation, namely that of haemothorax. In an operation performed in such close proximity to the pleural the danger of damage/

damage is great and if this goes un-
recognised then the treatment by
immediate intercostal intubation (at operation) for
two days is not carried out.

It is illustrative of the change
in attitude towards the surgical
treatment of tuberculosis that direct
bone grafting of the diseased area is
now confidently undertaken . Formerly
it was the practice to avoid direct
interference of the diseased area for
fear of spreading infection but the
observation that bone grafts take well
in these areas which after clearance
are reached by antibiotics indicates a
considerable change in ideas and advance
in treatment.

After the first operation these was
considerable improvement of the paraplegia
with the disappearance of knee and ankle
clonus and the absence of any serious
sensory deficit. However residual signs
did remain in the form of exaggerated knee
and ankle jerks on both sides and Babin-
skis' sign being present of the left.
Radiography shows that there had been
considerable/

considerable improvement and the removal of a great deal of pus and debris. A second operation is still required because of the persistent signs, to clear the remaining debris and to carry out fusion.

This was successfully done and now the patient is completely well and convalescing satisfactorily. Rehabilitation is now aimed at allowing the spine to fuse solid and mobilising the patient in a plaster jacket.

Thus the operative treatment of this Paraplegia of late onset in a Pott's Disease has removed the cause of the paraplegia together with a great deal of caseous pus, sequestra, and necrotic material. ~~and dead bone~~. The active focus of disease has been removed and the spine fused. As far as can be ascertained therefore the prognosis in this case is very good. However, I do not think that the patient could be considered to be beyond the possibility of relapse at any time in the future. It would only require/

require a minute focus of disease to
be left in the spine for the possibility
of relapse to occur. Reliance is
placed at the present time on the com-
plete eradication of the tubercle bacilli
from the spine by means of antibiotics.
It is known that tubercle bacilli can
live in calcified material for any years
and for this reason it is imperative
to eradicate any bacilli before they
can become incorporated in any tissue likely
to be calcified, or into new bone.

Careful watch must also be kept in
the future for any deterioration in
general health which may pre-dispose
to further activation of the disease.

There is no evidence of tuberculosis
in any other site at the present time but
it is possible that there may be some
occult focus. The long term treatment
will therefore involve careful follow-
up and the continuing of chemotherapy
for at least two years. Watch will also
have to be kept for any signs of recurrent
paraplegia.

In summary this patient presents a case of Paraplegia of late onset due to Pott's Disease treated by two stage antero-lateral decompression of the spine, evacuation of a large paravertebral abcess and other necrotic material and final anterior spinal fusion (during the second stage).

CASE NO. 5

ANN MAXWELL

CASE NO 5.

Ann MAXWELL AGE 15 years OCCUPATION - Schoolgirl

23rd June, 1961

HISTORY This young girl was admitted because of bilateral ankylosed hips following tuberculous infection.

PERSONAL HISTORY General health good
Not complaining of any symptoms
Bowels regular.
Weight steady.
No polyuria, dysuria, haematuria or nocturia.
No night sweats or visual disturbances.

PAST MEDICAL HISTORY In 1949 she was admitted to Bangour Hospital suffering from bilateral tuberculosis of the hip joints. In 1953 she was discharged walking but with no pain in the hips. Both hips were however stiff and there were deformities in the form of flexion and adduction in both hips.

In 1955 she underwent left ischio-femoral arthodesis and an abduction osteotomy was performed.

She walks well in spite of her completely fixed hips and can do most things including dancing. Climbing stairs she finds rather difficult and also boarding and alighting buses. She does not complain of pain in the hips but mentions the discomfort relating to having her legs together all the time and the difficulty with toilet facilities.

ON EXAMINATION

GENERAL Fit healthy looking young girl.

Cardio-Vascular system N.A.D.

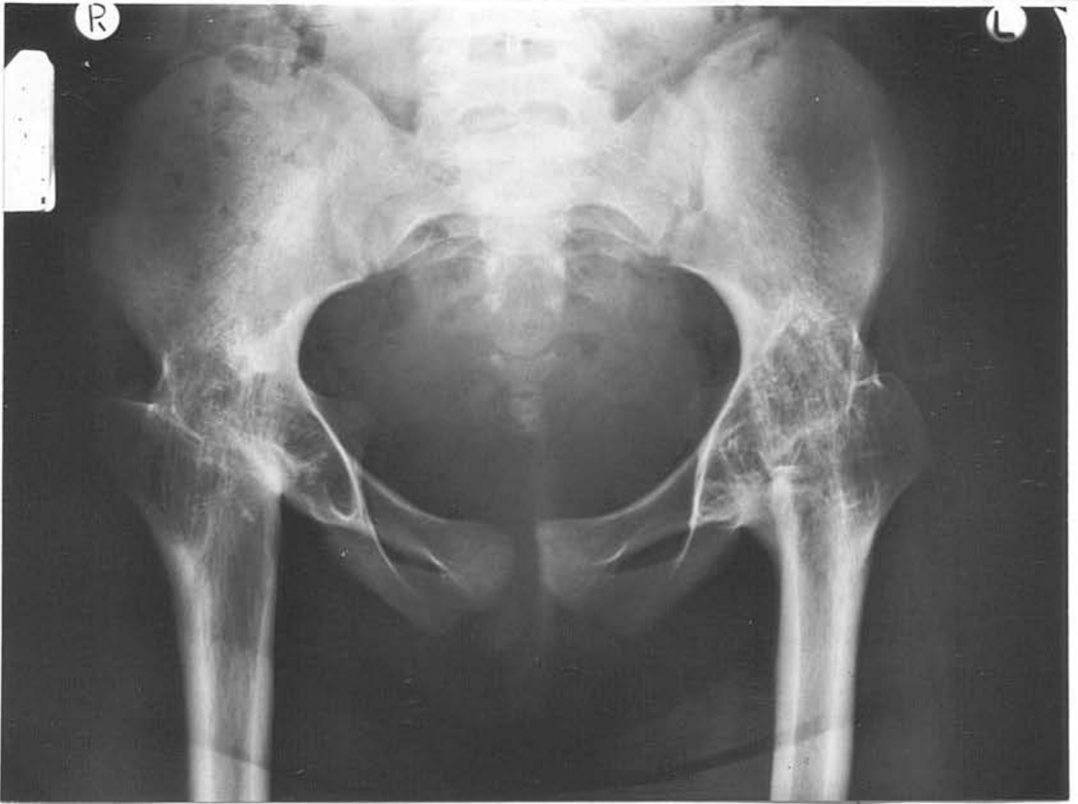
Respiratory system Enlarged cervical lymph nodes on the right side.

Alimentary system -N.A.D.

Central Nervous system -N.A.D.

No evidence of disease in any other joint

LOCAL Both hips soundly fused in a neutral position, but with 10° of internal rotation. Both patellae are facing forwards. Good range of painless movement in knees, ankles and/



X-RAY 1

and mid-tarsal joints.

RADIOLOGICAL EXAMINATION

Antero-Posterior view of Hips and Pelvis (X-Ray 1).

This shows that both hips are soundly fused by bony union.

There is no evidence of active disease and the bones of the pelvis appear well calcified. There is no sign of disease in the sacro-iliac joints and no calcified lymph nodes are to be seen.

The patient was admitted on the above date with the intention of mobilising the right hip by means of a cup anthroplasty. Operation was in fact post-poned because on the 27th June she had inflamed tonsils associated with cervical lymph adenopathy. The temperature was normal but on examination the tonsils were grossly enlarged and cryptic with injection and small areas of suppuration. The pharynx was also injected and small shotty glands were palpable bilaterally in the submandibular and superficial cervical regious.

Also/

Also palpable in the right deep cervical region were grossly enlarged and tender lymph nodes, freely mobile. There were also enlargement of the lingular group on this side.

However these glands had been observed to be enlarged over a period of five weeks.

Approximately four weeks later it was recorded that the patient had not been well since the initial attack of tonsillitis. She had lost a few pounds in weight was more easily tired and was not eating well. The neck glands on the right were mainly in the posterior triangle and were large and firm. Some were matted but two or three were discrete. There were also small hard tonsillar glands on both sides.

At this time the tonsils were large, soft and exuding pus. A chest X-Ray at this time suggested possible enlargement of the left paratracheal glands.

Because of the above history and findings it was highly likely that the enlarged/

enlarged glands were tuberculous as were the tonsils.

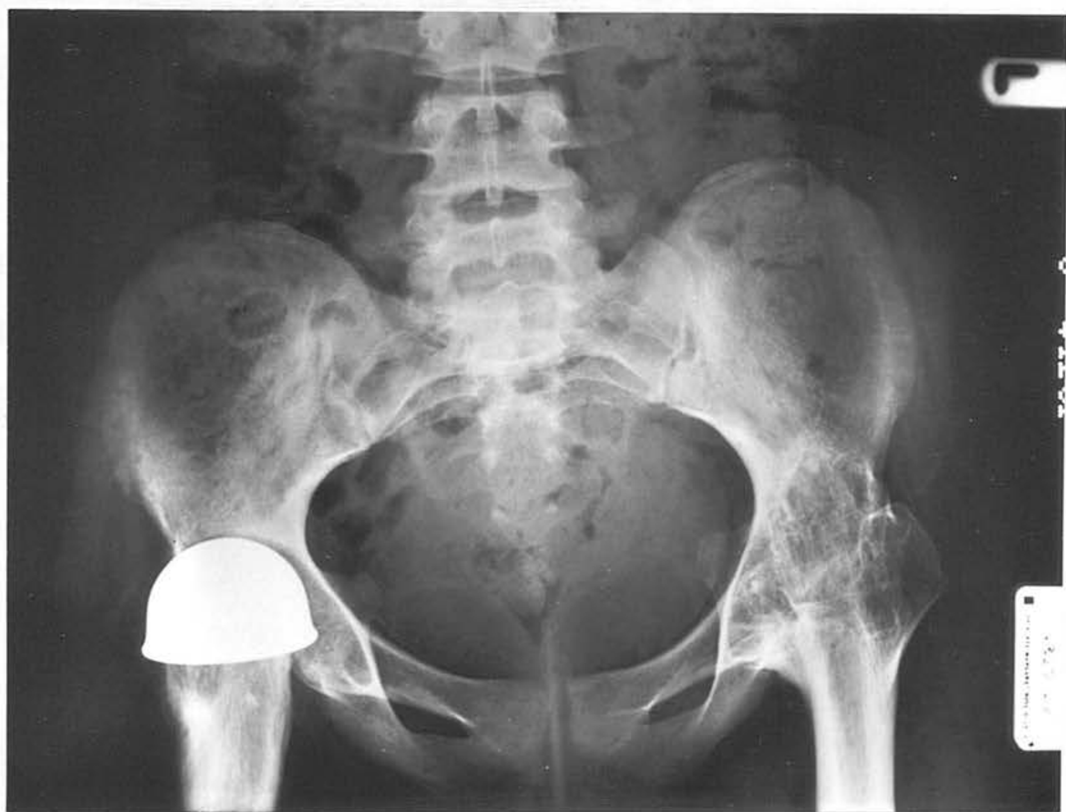
Accordingly anti-tuberculous chemotherapy was instituted and tonsillectomy advised. This was carried out and one of the enlarged glands was biopsied. The report received from this was that the gland was tuberculous.

Following these procedures the patient was allowed adequate convalescence and on 10th October some two months later a Cup Anthroplasty was carried out on the right hip as follows:-

OPERATION

With the patient on her left side a lateral incision just anterior to the old scar was made. Dissection was carried out until the attachments of the capsule of the hip joint to the previous acetabulum were defined. A little more bone was removed from the area of the greater trochanter to facilitate exposure of the posterior aspect of the femur.

A cut through the cortex was started at the estimated region of the previous joint, space and the separation completed by/



X-RAY 2

by fracturing cancellous bone with gouged osteotomes followed by Charnley tools. The new acetabulum was deepened. The head of the femur was shaped with a Charnley tool and trimmed to fill the metal cup. The lower rim of the acetabulum had to be trimmed away to prevent contact with the edge of the cup. A satisfactory range of hip movement was accomplished. The ilio-psoas tendon was identified and cut.

Adductor tenotomy was performed through separate incisions.

The wound was closed in layers and a bulky spica bandage applied with the leg in abduction.

X-Rays at this time showed the position of the graft.

Subsequent recovery from the anaesthetic and operation was uneventful.

RADIOLOGICAL EXAMINATION.

(X-Ray 2) showed a satisfactory position of the cup anthroplasty.

On the day after the operation maintenance exercises were begun in the form/

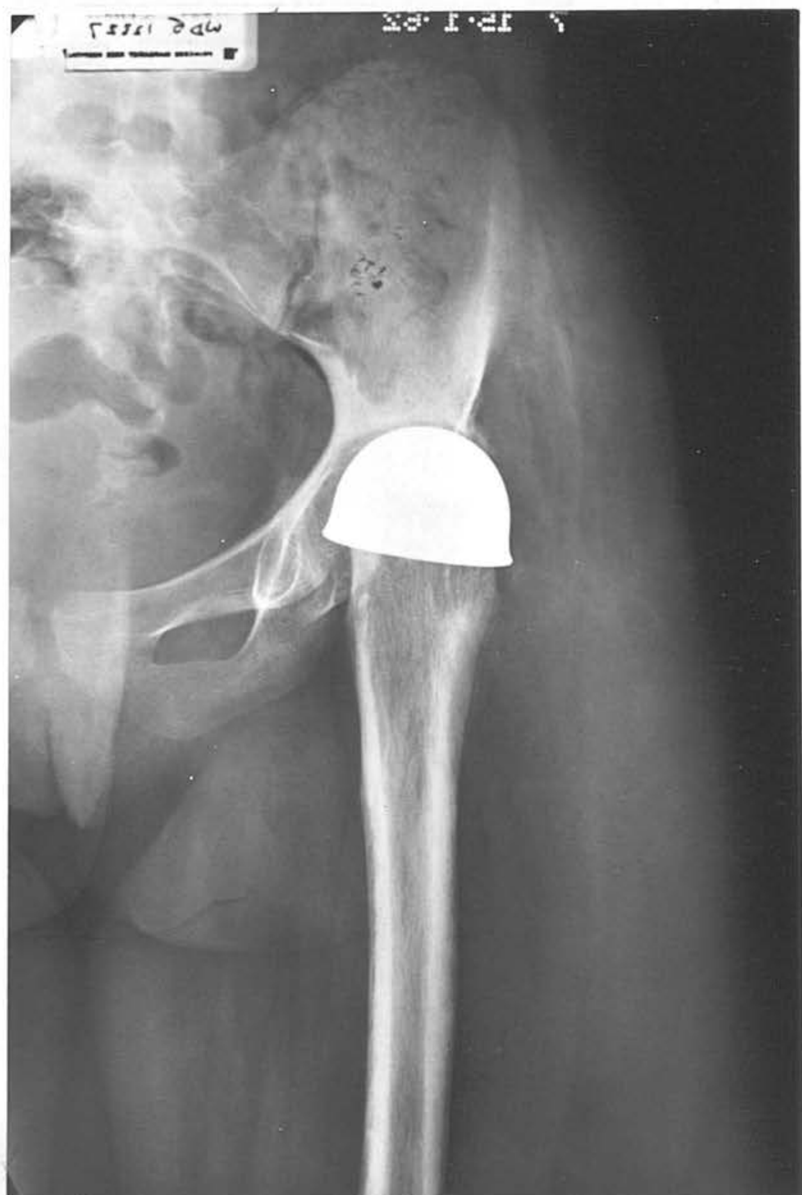
form of static quadriceps and ankle exercises. This was continued for some 4-5 weeks before mobilisation in bed was started on 6th November. This was carried out with the patient still on traction and involved flexion, abduction, adduction and rotation exercises. At this time there was a distance of 8 inches between her knees on abduction.

On 27th November, 3 weeks later partial weight bearing was begun. However this amounted to little more than the toe touching the ground. At this time there was still pain in the hip.

On December 18th the long crutches which had been used until the present were changed to elbow crutches and there was a gradual increase in weight bearing.

On January 9th, 1962 there were palpable glands in the right groin and one week later the patient was running a low grade temperature. The E.S.R. was 36 mm. in the first hour and there was the complaint of more pain in the right hip.

X-Ray/



X- RAY 3

X-Ray at that time (X-Ray 3 - printed in reverse) showed evidence of acetabular reabsorption.

For this reason active rehabilitation and walking were abandoned and the patient was returned to bed on 15th January with the right leg in traction.

Maintenance Physiotherapy was again instituted.

On 22nd January the patient began having periods off traction once every day.

E.S.R. at this time was 46 mm/hour By this time the range of movement as indicated by the distance between the knees was 4 inches.

On 12th February traction was removed completely and active assisted exercises were begun.

One week later the patient was given exercises in the swimming pool.

On 26th February she was allowed up but non-weight bearing . Two weeks later weight bearing was begun in the pool.

On 2nd April/

On 2nd April she was walking with two sticks and by 18th May (at time of writing) she is walking, with a pain free hip joint with only one stick.

At this time she has the following movements in the right hip:-

PASSIVE	Flexion	10°
	Abduction	8°
	Adduction	5°
	External Rotation	10°
	Internal Rotation	0°
ACTIVE	Flexion	20°

(not all true hip flexion) All other active movements approximately the same as the passive range.

There is 1 inch of apparent shortening on the right and ½ inch of true shortening.

She is very satisfied with the result and is well in herself.

The long term treatment is to continue with physiotherapy and do a cup arthroplasty on the left in about 1 years time.

COMMENTARY

This girl presents an obvious but sonsiderable/

considerable orthopaedic problem.

She had completely anklyosed hips which were bridged by solid bone and her knees were in contact at the time. Although restricting her activities remarkably little this did cause her considerable discomfort and distress. She could walk well but found difficulty in climbing up stairs and on and off buses. She could not sit at all, a handicap which will reveal after a seconds' reflection a great social handicap. Toilet purposes were to her a source of discomfort and difficulty and except in her own home and environment would be a source of some embarrasment. Thus there is the position of a young girl at the stage of puberty, in the above condition.

The ankylosed hips were caused primarily by tuberculosis and it is indicative of the change in attitude to treatment that at the time (1955) the main stay of operative treatment was arthrodesis. The fact that she had had the condition for some six years would seem to indicate, however,/

however, that the joints were very badly damaged by 1955.

It was obvious that if possible something should be done to remove this handicap. With the advent of arthroplasty for the hip joint in the treatment of osteo-arthritis and the extention of the procedure for other conditions there is a way of making this patient's hips mobile onee more.

However, there are considerable problems in the comtemplation of this procedure. There is not as in osteo-arthritis, a joint space (even a diseased one) as the femur is joined to the pelvis by solid bone. The femoral neck is almost non-existent and any arthroplasty which is performed would have to be of the end-bearing type. The normal range of movement at the hip joint is dependant to a great extent on the length of the femoral neck and the two-thirds space of the femoral head both of which would be absent in this case. A new joint cavity would have to be fashioned from the acetabular region and this reveals/

reveals problems of reconstructive surgery. For these reasons one would expect a much poorer range of movement than in those treated for osteo-arthritis. Even in this condition there is a very high failure rate (33% in some series) which indicates that the procedure is not always helpful. There is the additional factor that this type of operation is very uncommon in people of this age group and the prothesis will have to with stand the wear and tear of virtually a whole life span.

There is the further question of reativation of the disease. All the evidence points to the quiescence of the disease in the ankylosed joints and the X-Ray appears satisfactory but the presense of living tubercle bacilli in the bone cannot be completely ruled out and there is the risk of reactivation and spread to other regious. (There is one way of safe-guarding against reactivation and spread and that is by the administration of antituberculous chemotherapy before operation.)

In addition to the problems of creating a new and physiological joint with ultimately a good range of movement there is the problem of muscle and tendon contracture. The muscles, which move the hip have in the patient's case not moved the joint per se for a period of at least seven years and the patient has grown considerably since then. It is well seen from other situations (head injuries etc) that after a few months of disuse,, tendons become hard and fixed and muscles become atrophied and fibrosed. These factors will tend to make for a very difficult period of convalescence in over-coming resistant tendons and building up muscles fit for walking.

These factors suffice to show that arthroplasty could not be undertaken lightly in such a case, but in this instance any very slight improvement in function would mean such a very great deal to the patient's life that the operation is fully justified,

Immediately prior to operation there/

there is ample evidence that the patient is suffering from systemic tuberculosis by the generalised condition and tuberculous lymphadenopathy. There was a delay of two months in order to allow full recovery.

The subsequent course of the patient brings into full focus the problems of this method of rehabilitation. Progress was slow and to begin with, painful and after several months there was no real improvement in walking over her pre-operative state (in terms of pure mobility). I think that this was almost certainly due to the contracted tendons and fibrotic muscles. The position of the cup arthroplasty (as seen in X-Ray 2) shows that it alters considerably the pelvic dynamics in that the main bearing point of the femur is now directly upwards to the ilium and not as in the normal hip to the ilio pubic emience. There is also evidence from the X-ray that there is increased bone density in this new line of stress

(c.f/

(c.f. X-Rays 1, 2 and 3). This does not seem to be having any adverse affect (indeed I don't think that any is expected).

Progress was satisfactory until 15th January when she had a small but useful range of movement and there was a distance of 8 inches between her knees. She was learning to walk from the hip and was pleased with the result from the hygienic and cosmetic point of view.

However, around January 15th she had a recurrence of pain in her right hip associated with a low grade pyrexia and a raised E.S.R. This episode, which interupted her rehabilitation and set her back somewhat is very difficult to account for. There are, I think, two main possibilities.

The first is that this is a recrudescence of tuberculosis from the previously infected lymph nodes in the neck. As a similar type of incident occured only 7 months previously this does seem highly likely.

However/

However, as the condition was pre-
ceeded by palpable lynph nodes in the
right groin it does seem possible that
a second reason could be a reactivation
of tuberculosis in the right hip joint
producing a generalised condition (which
does resemble tuberculosis clinically).
The X-Ray (no. 3) is not particularly
helpful but does show reabsorption of
bone of the acetabular roof. There
are no signs of active tuberculosis but
there may be disease with no radiological signs.

It is also possible that there
there is another cause if for this
in the form of a low grade infection
somewhere but the paucity of other
signs in my opinion points to a different
actiology.

After this episode there was a
gradual decrease in pain and although
the E.S.R. remained high for some weeks
it gradually returned to normal and
active exercises were gradually recommended
after a period of 4-5 weeks.

This episode did cause a loss in
movement/

movement gained up until the time of its occurence. Physiotherapy was continued until at the present time of writing she has a range of movement as noted.

What is the result in the patient's opinion? Although there is, in terms of pure function, an extremely limited range of movement and her walking is not really much better, the patient is very pleased with the result. The effects from a hygienic and cosmetic point of view are very pleasing for her and she is able to sit. Although walking is rather clumsy for her at the present time it is very probable that this will improve with practice. The original aim was to have both hips mobilised and despite the (considerable) pain which she has endured she is very enthusiasitc about having a second operation on the left hip in one year's time.

The long term prognosis, is however, uncertain. Some of the problems of putting on an artificial head and recreating the/

the joint have been surmounted as shown by the fact that the cup has fitted well and appears in good position. An important factor is the one of reaction of the bone to the cup (in a prothesis to be in place for many years) and one cannot be too certain yet on this point, especially after the episode with reabsorption of bone. However this was most likely due to pressure on bone that was not accustomed to it and was not due to reaction.

The main concern is however, about the position in 10 or 15 years time and the condition of the joint at that time cannot be predicted.

In <u>summary</u> this patient presents with bilateral anklyosed hips fused by bone and has been treated by the insertion of an end-bearing cup arthroplasty in the right hip. The result is satisfactory with a small but very useful range of movement and a very pleased patient.

CASE NO. 6

RICHARD SAUNDERS

CASE NO. 6.

RICHARD SAUNDERS AGE 5 YEARS 4 MONTHS

HISTORY This boy first attended the Out-Patient Department of Sick Childrens' Hospital on 27th June, 1961 complaining of left-sided limp which had been troubling him intermittently for ten weeks. No further history was obtained and there was no complaint of pain.

EXAMINATION of the child revealed that he walked with his left hip flexed at 15°. Further examination showed an obviously swollen joint. There was a fixed flexion deformity of the left hip (of unspecified extent) and only 90° of hip flexion was present. There was also limitation of extension as of abduction, and adduction; and rotation (medial and lateral) amounted to but 5°.

FURTHER INVESTIGATIONS showed the following situation:

E.S.R. 45 mm/hour

W.C.C. 7,150 cells per cu. mm.

Differential white cell count:-

Neutrophils 79%

Lymphocytes/

X- RAY 1

X -RAY 2

Lymphocytes 20%

Eosinophils 1%

Heaf Test Weak Positive

RADIOLOGICAL EXAMINATION:

Hips and Pelvis:- As can be seen from X-Rays 1 and 2 there are the following features to be seen.

Diffuse rarefaction of the femoral head greater trochanter and acetabular region on the left side. No evidence of sclerosis or sequestrum formation.

CHEST:- The chest radiograph was reported by the radiologist as possibly showing a primary tuberculous complex. On examination of the film (not shown here) there does seem to be evidence of a primary lesion in the right upper zone in the form of increased density of lung markings. However no glands are to be seen in the mediastinum.

PAST MEDICAL HISTORY. Richard had had no serious illnesses or operations in the past but had suffered from mumps, measles and chickenpox.

There was no history of him ever having had enlarged glands and he had not been in contact with a known case of tuberculosis (except as noted below).

FAMILY HISTORY/

<u>FAMILY HISTORY</u>

Richard is the youngest of a family of four children the remainder of whom are all well. All the children were examined by Mass Radiography in 1958 with a negative result. There is no history of B.C.G. vaccination in any of the family. His mother and father are both well and when examined in 1956 by mass minature radiography were also given a negative result.

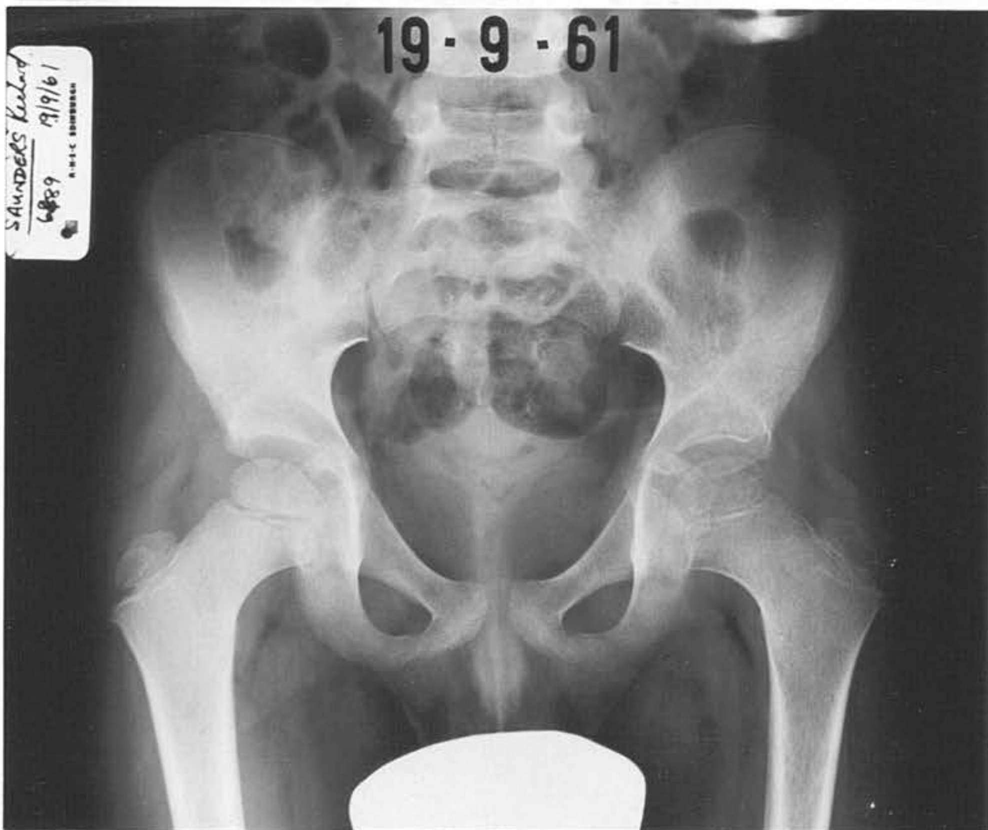
A brother of the father, however, had had an amputation in East Fortune because of "diseased bone in the left leg" and there was a possibility of this being tuberculosis.

<u>SOCIAL HISTORY</u>

The father and daughter are both employed and together earn sufficient to maintain the family in a four roomed house in Musselburgh. They can also afford a holiday.

At this time the diagnosis which was made was <u>sub-acute arthritis</u>; accordingly treatment was in the form of bed-rest and traction on the left leg.

Between/

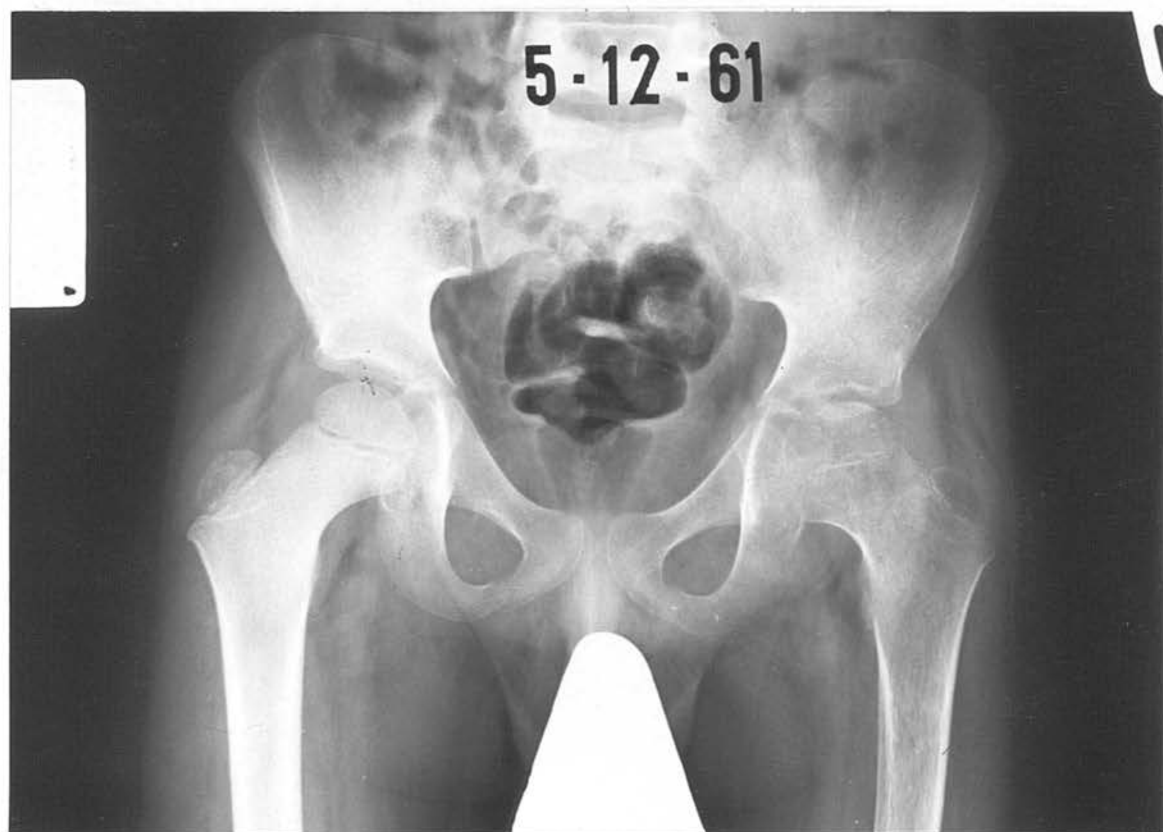


X- RAY 3

Between 27th June and 28th July satisfactory progress was reported and the E.S.R. fell to 24 mm in the first hour. X-Ray showing greatly improved appearance. On 1st August a hip spica was applied and he was discharged home being told to report again in six weeks time. On 19th September x-ray out of plaster showed that in fact there was an increase in the rarefaction just reported as will be seen from X-Ray 3 and by comparison with X-Rays 1 and 2. In addition there is definite narrowing of the epiphyseal line as compared with the other side and with the previous X-Rays. At this time examination out of plaster showed "very little movement present in the left hip joint".

The erythrocyte sedimentation rate was recorded at 33 mms. per hour and the White Cell Count at 9,600 cells per cu.mm. (No differential count being carried out).

A hip spica was reapplied and Richard was again discharged home to be seen again in/



X-RAY 4

in ten weeks on 5th December.

At this time all investigations were repeated and revealed the following:-

E.S.R. - 38 mm. in the first hour

White Cell Count 8,500 per cu. mm.

Mantoux Test showed definite enythema and induration of 1 cm. in diameter.

RADIOGRAPHIC EXAMINATION OF HIPS AND PELVIS

SHowed a very marked progression of the previous features (as can be seen in X-Ray 4) and in particular:-

1) A definite loss of density and of architecture of the femoral head and shaft on the left side, this also extending into the acetabular region. These features are also more marked than in the previous X-Ray of 19th September (cf X-Ray 3).

(ii) There is further narrowing and almost loss of the epiphyseal line.

(iii) There is marked diminution of the joint space; this being definite now for the first time.

CHEST X-RAY/

CHEST X-RAY was reported by the radiologist as showing no pulmonary lesion.

A few days later a Heaf Test was carried out and this showed within two days a strongly positive reaction with coalescent vesiculation.

In view of these findings positive Mantoux and Heaf tests, a high E.S.R. and highly significant X-Rays - very much in keeping with tuberculous infection, that diagnosis was provisionally made and the child was transferred to Princess Margaret Rose for further treatment.

On admission there further enquiry into the history revealed no complaint of pain and that the general health was good. There was no history of alimentary, urinary disorder, the appetite was good and bowels regular. There was also no history of night sweats.

On examination there was no detectable abnormality of any system the only observation being that of a slightly pale looking boy. Also a number of tiny glands were palpable in both/

both neck chains, The subsequent course of treatment was now directed to

(a) Proving by biopsy that the hip infection was indeed tuberculous.

(b) Excluding any hitherto unnoticed sources of infection particularly in the renal tract and the rest of the skeleton.

On 22nd December a hip biopsy was carried out as follows:-

A vertical incision was made over the region of the hip-joint anferiorly, the tensor fascia latae reflected laterally and the sartoruis and rectus femoris medially. On opening the joint no free fluid or pus was found but the synovium was greatly thickened, reddened and friable. These findings were consistent with tuberculosis and possibly with chronic rheumatoid arthritis. The articular cartilege was quite normal.

Synovial tissue was taken for Bacteriological Examination and Pathological Examination as was an enlarged lymph mode from the femoral triangle.

The/

The wound was closed in layers without drainage. Before doing so streptomycin powder was put into the joint cavity.

Under anaesthesia the range of joint movement was:-

Flexion 30°

Abduction of Adduction 10°

Rotation only a trace.

THE BIOPSY WAS REPORTED BY THE PATHOLOGIST AS FOLLOWS:-

CAPSULE Fatty fibrous tissue and several fragments of what appears to be tuberculous granulation tissue.

Numerous tubercles of endotheliod cells were seen and giant cells were numerous. The process is probably taking place in the synovium and a lining of caseous tissue is seen in several places.

LYMPH NODE Numerous follicles composed of endothelisd cells and giant cells. No obvious necrosis.

ZIEHL-NEELSON STAIN Acid and alcohol fast bacilli seen in joint tissue and lymph mode.

Appearances in this biopsy compatible with the diagnosis of tuberculous arthritis with lymph node envolvement.

BACTERIOLOGICAL
INVESTIGATION of the lymph mode showed:-

Film - debris only

Culture - Scanty growth of Atypical coliforms

Concentration Method for M. Tuberculosis - negative

Three early morning specimens of urine were also sent for bacteriological examination and were reported negative for M. Tuberculosis.

X-Ray of whole spine showed no abnormality.

Thus the diagnosis of Tuberculous Arthritis of the hip was fully proven but the diagnosis cannot be completed without adding that it has arisen from a generalised tuberculous condition.

TREATMENT. Bed rest on an abduction frame. General measures to improve health and raise resistance.

DRUGS. Streptomycin Sulphate 0·5 g. per day

Pycamisan PH10 - 2 Cachets night and morning

This is equivalent to 50 mg. Isoniazid and 2·5 g. Sodium Aminosalicylate per day.

<u>COMMENTARY</u>

At his first attendance this boy presents a considerable diagnostic problem. Although in retrospect the diagnosis of tuberculosis may seem obvious, in fact most of the findings at that time are compatible no less than four conditions which affect the hips of children in this age group. The combination of limp, limitation of all hip movements and the radiographic evidence of slight generalised rarefactory could be found in, early Perthes' disease, sub-acute suppurative, arthritis, transient synovitis, and tuberculous arthritis. Indeed before x-rays were taken one would have had to consider also missed congenital dislocation of the hip and slipping upper femoral epiphysis.

The only finding which indicates that this may be an infective condition rather than Perthe's disease is the raised Enythrocyte Sedimentation Rate. However even this may have been due to another occult cause. It is to be noted, however, that the three other conditions have at some time been confused with tuberculous arthritis.

The Heaf test at this time was not helpful in aiding the diagnosis as one would have/

have expected in tuberculous disease of the hip that it would have been strongly positive or at least definately positive (in view of the fact that it is generally accepted that tuberculosis of bone and joint takes some 6 to 24 months to develope following a primary lesion) The chest x-ray is also not definite but should have immediately raised the suspicion of tuberculosis.

This being the situation, the only course of treatment was to adopt conservative measures and observe the condition, watching for changes in X-Rays and in the general condition. Four weeks later a general improvement is noted with falling E.S.R. and improved X-Ray. Although a definite diagnosis was not possible at this stage the possibility of this being Perthes' Disease becomes less likely owing to the lack of X-Ray changes, namely areas of sclerosis and a flattening of the femoral head. The exclusion of Perthes' Disease can be safely assumed a further seven weeks thereafter/

thereafter when there is still no appearance of the characteristics X-Ray signs of Perthes' Disease. Transient synovitis can also now be excluded at this time as the condition had not disappeared. The improvement four weeks after admission does not affect the possibility of this being a tuberculous condition because it is quite possible for such a condition to improve after general rest in bed, rest of the joint and raising of the general health.

Thus on the 20th of September some eleven weeks after he was first seen the diagnosis rests between that of tuberculosis and sub-acute non - suppurative arthritis.

However at this time the E.S.R. was 33 mm./hour but the white cell count was in the upper limit of normal. These signs definitely indicate an infective lesion (most likely in the hip) and the persistence and increase of rarefaction help to confirm this. The condition was obviously a low grade/

grade infection and although not the most common, as regards incidence the most likely (according to the facts) is tuberculosis.

Ten weeks later the evidence in favour of tuberculosis becomes overwhelming due to much more gross and characteristic X-Ray changes, the strongly positive Heaf and Mantoux tests and the finding of enlarged glands in both neck chains. By this time there is considerable loss of density and architecture in the left hip. The joint space is considerably narrowed and the epiphyseal line is reduced to a very faint area. Joint movements are severly limited and the E.S.R. is 45 mm. per hour.

Having made a diagnosis on clinical and radiographic grounds it may have been considered enough to instigate treatment without further delay but the drug of tuberculosis is so specific that it was considered absolutely necessary to biopsy the hip joint in order to obtain histological and if possible/

possible bacteriological evidence of tuberculosis, the latter being important in order to determine the sensitivity of the organisims to drugs.

The biopsy material gives firm evidence of tuberculosis but it was not possible to culture any tubercle bacilli from the lymph node. This is somewhat surprising as the pathological report clearly states the presence of mycobacterium tuberculosis in the lymph node. It may be that there was not sufficient bacteria in the specimen. This is the only likely explanation becuase tubercle bacilli can survive in most conditions (except sunlight) and it is unlikely that they died before being cultured.

The treatment adopted is conservative because the joint is still quite well preserved and a mobile joint is ultimately expected. One of the most important considerations of conservative treatment is the raising of the general health without which the boy cannot be cured. Bed rest and rest of the joint is necessary with/

with the hip in abduction and this patient is being treated on an abduction frame.

The question of synovectomy could legitimately be considered here although it would not alter the fact that the treatment was still conservative. Good results have been reported from partial synovectomy (Wilkinson M.C. J. Bone & J. Sung. 1959) which aims at removal of some of the diseased synovium in the expectation (usually fulfilled) that this will increase revascularisation and so accelerate healing. In this case the synovium was quite extensively diseased and was found at operation to be greatly thickened reddened and friable. It would in healing become rather extensively fibrosed and may in fact lead to limitation of joint movement. For this reason I think that partial synovectomy could have been confidently carried out in the hope of eventually having a fuller range of movement. However this may be considered unnecessary in view of the fact that there is no pus or sequestruim formation/

formation and it may be that synovectomy would be unnecessary.

Because the sensitivity of the organisims was not discovered all three anti-tuberculous drugs require to be employed, namely streptomycin, isoniazid and para-ammosailcylic acid. A most important fact to be realised is that this boy is suffering from a generalised tuberculous condition (the chest lesion was confirmed in December, 1961) and the hip condition has in fact arisen from that (and in a sense is an incidental one although one of considerable importance). The drug therapy will require to be continued for at least two years and all the members of his family should be surveyed, X-Rayed and given B.C.G. vaccination (if under 30 years).

Also important is the fact that there was not found to be any other tuberculous focus and in particular the spine showed no disease. While the hip is the second most common site of bone and joint tuberculosis, there are in/

in fact over twice as many cases of tuberculosis of the spine (Kirkaldy-Willis & Cathro). and Roaf - Surg. Treat of B & J. T.B. 1959)

The question of a contact is important and it now seems most likely that the child's uncle who had the operation was in fact the contact and it may have been that he had a discharging sinus which was removed by amputation.

What is the prognosis for this child? Fortunately at the present time a definite and confident prognosis if complete recovery can be made - although the treatment and rehabilitation will be prolonged. The points which indicate a good prognosis are the absence of pus in the joint cavity (operative finding) the absence of sequestrum and of any other evidence of severe joint or bone destruction. However, it would be my opinion that it will be possible for this child to develop tuberculosis again at any time in his later life. It is impossible to be sure that all tubercle bacilli in bone have been effectively dealt/

dealt ~~in~~ with by the drugs and although it is unlikely that he will have any subsequent trouble he should be followed initially at 6 monthly intervals and then at yearly intervals until he is well past puberty. Subsequently he should in my opinion be watched carefully by his general practitioner.

SUMMARY

In a nutshell this case is one of disseminated tuberculosis declaring as a limp due to infection in the left hip.

GENERAL COMMENTARY

As these cases are all of the one condition it would seem that a general commentary on the six cases as a whole would not be out of place.

These cases illustrate well various aspects of the the behaviour and treatment of tuberculosis of bone and joint in certain situations. There are certain sites of predilection for bone and joint tuberculosis and these are the spine (by quite a large percentage, 50% in some series) the hip and the knee. Other sites e.g. shoulder, ankle and sacro-iliac joint are much less commonly affected. The above cases illustrate therefore a fair range of tuberculous disease including as they do the spine, the hip, the shoulder and sacro-iliac joint.

The two cases of spinal tuberculosis illustrate the very earliest and the late stages of the disease. They demonstrate the difference in treatment at these two stages and also the fate of tuberculosis of the spine before chemotherapy. It is probable that if the early case of tuberculosis of the spine had occurred 20 years earlier she too would have ended in the same situation as the Pott's paraplegia which is described.

A comparison of the cases of the disease in the hip joint is also very salutary and again illustrates very well the fate of the condition before specific antibiotic therapy. /

therapy. The case of Richard Saunders also illustrates the difficulties of diagnosis of the condition and the importance of early diagnosis. The example of tuberculosis of the shoulder and sacro-diac joint illustrate the disease as it affects other joints and in these cases particularly the problem of complete cure even with chemotherapy.

The differences in surgical management of tuberculosis in bone and hoint is demonstrated in the fact that in 3 of the cases (Hubert de Burgh, Ann Maxwell, Isabelle Sandham) the treatment is operative and involves major surgical interference at the site of the disease to clear the area of pus, debris and sequestra and also to carry out bone grafting. In one case, however, arthroplasty and not arthrodesis was required - this is generally much less common.

The remaining three cases illustrate conservative treatment in the course of which biopsy and draining of an abcess was required (this does not change the fact that the treatment is conservative and not operative as these procedures might suggest).

This also illustrates the change in the ideas about the surgical approach to the problem.

Formerly the surgical treatment amounted to (a) the aspiration or draining of abcess and (b) anthrodesis (preferably extra-articular) when the disease was thought to be /

be quiescent. At the present time - in contrast the principles are -

(a) Operative intervention at the main site of the disease with the object of clearing pus debris and sequestra and,

(b) Arthrodesis in the diseased area with bone grafting where necessary.

However, one must not forget the very great importance of general measures and chemotherapy.

General measures (as described in the cases) are most important in promoting healing and recovery and preventing relapse. The success of any treatment for bone and joint tuberculosis is still dependent to a certain (unspecified - though important) extent on maintenance of a high level of general health.

Naturally the antibiotic therapy is of first importance and is always instituted. There are only two comments about this and these are:-

(a) the drugs must be taken regularly and in the proper dosage.

(b) the drugs must be taken for at least 2 years and longer if signs of activity persist.

The cases which present for treatment in this country seem in my opinion to be in one of two categories.

1. Cases of tuberculosis of long standing in which the disease has been present and/or active for many years (e.g. Hubert de Burgh, Isabelle Sandham, Ann Maxwell). Such cases will require operative treatment and radical procedures and represent a back-log of cases not cured or bady treated, or with persistent activity - from pre-chemotherapy days.

2. New cases in which the disease is detected early in a relatively "benign" form and before development of a dramatic situation, (e.g. Richard Saunders, Lillias Noble). It is with respect to these cases that ~~the~~ fresh understanding of the disease will have most benefit. There has been an immense and obvious change in incidence of bone and joint tuberculosis and the present generation of students virtually never see the condition. Therefore there may be, and I think there is at the present time a tendency to under diagnose the condition and consider it to be a "rare disease". Consequently there is the danger that the condition may be missed and although we tend now to think of tuberculosis as a relatively simple problem, and easy to treat, this is far from the truth and an undiagnosed case could have disastrous results.

A study of the above cases also raises many questions which to my knowledge are still unanswered. They relate to the activity of tuberculosis at the tissue and cellular level and would seem to connect very closely to the clinical /

clinical situation:-

e.g. How long and in what conditions do tubercle bacilli remain alive in apprently healed foci in bone and joint?

What factors cause a recrudescence of the disease after it has been inactive for a certain time (e.g. Hubert de Burgh's case)? Or put in another way what factors acting at the cellular level favour break down and reactivation?

Can tubercle bacilli be ever completely eradicated from bone and joint by antibiotics? Can the very hardy mycobacterium tuberculosis actually be incorporated into living bone in the healing phase of quiescent disease?

Can operative treatment (of any kind) cause reactivation of disease perhaps by liberating live bacilli incorporated into new bone?

It is such questions that would be worth answering and investigative work into these matters might considerably extend our knowledge of this disease. Unfortunately the fact that tuberculosis is no longer a common condition in this country perhaps prevents any active interest and research in it in the face of more apparently pressing problems (e.g. bone tumours). However tuberculosis is not so rare that it deserves neglect in the research field and I think that some work on the lines suggested above is indicated at this time.

The cases in this series were seen at the Princess Margaret Rose Hospital and the Edinburgh Royal Infirmary.

They are under the care of the Surgeons as indicated below.

CASE 1	Francis GLASGOW	Mr. J. Chalmers.
CASE 2.	Isabelle SANDHAM	Prof. J.I.P. James.
CASE 3.	Lillias NOBLE	Mr. G.A. Pollock.
CASE 4.	Hubert DE BURGH	Prof. J.I.P. James.
CASE 5.	Richard SAUNDERS	Prof. J.I.P. James.
CASE 6.	Ann MAXWELL	Mr. D.L. Savill.

Grateful acknowledgement is made to the above Surgeons who have kindly given their permission to report on these cases.