UNIVERSITY of EDINBURGH.

1905 - 1906.

PATTISON PRIZE in CLINICAL SURGERY.

Report and Commentary of cases treated in the University Clinical Wards in the Royal Infirmary, Edinburgh, in competition for the above Prize.

By

W. KELMAN MACDONALD.

S Y N O P S I S.

I. TUBERCULAR DISEASE of the HIP-JOINT.

(Mainly Clinical).

(1) Report of Two Cases.

(2) Commentary.

(3) Report of two contrast cases.

(4) Model illustrating clinical features.

(5) Clinical Photographs.

(6) Specimen of excised Hip-Joint.

II. SARCOMA of KIDNEY with recurrence after NEPHRECTOMY.

(Mainly Pathological).

(1) Report of Case.

(2) Commentary.

(3) Drawings.

(4) Photographs.

(5) Microscopic preparations.

(6) Naked-eye specimens.

III. GASTROENTEROSTOMY.

(Mainly Operative).

(1) Report of Case.

(2) Methods of Operation.

(3) Photographs.

I N D E X.

TUBERCULAR DISEASE of the HIP - JOINT.

TUBERCULAR DISEASE of the HIP-JOINT.

In this are included :-

I. REPORTS of two cases :

(1) Jeannie Gordon - Ward 8 R.I.E.

(2) Isabella Shand Ward 14 R.I.E.

II. COMMENTARY consisting of :-

Pathology.

Symptoms.

Diagnosis.

Treatment.

III. REPORTS of two contrast cases.

(3) George Rorrison Ward 7. R.I.E.
(sacro-iliac disease)

(4) Mrs Kirkby Ward 8. R.I.E.
(Tubercular Hip disease with Trauma)

IV. Model illustrating Clinical Features.

V. Photographs.

VI. Specimen of excised hip-joint.

REPORT of CASE I.

Jeannie Gordon. Age 17. Admitted to Ward 8 R.I.E. on 9th October 1905.

Complaint - "Hip-joint Disease."

History of Present Illness. The attention of the patient was first drawn to her left hip-joint by an accident which she sustained about May 1904 - seventeen months before admission. She was travelling along the road in a van when she was thrown off, her left hip striking the ground with considerable violence. Patient had great pain with bruising of the left hip but was able to walk home all right. No bones were broken and the pain soon disappeared - a Doctor who had been consulted treated patient for 10 or 11 days.

Then about a month after the accident patient noticed that she had a limp. This limp was at first very slight but gradually got worse and worse, and the left leg was very easily tired. During the remaining part of the year 1904 patient suffered from gradually progressing lameness but as there was little or no pain, patient did not have the condition treated in any way.

But in the beginning of January 1905 - eight months after the accident and seven months after the commencement of the lameness - there developed a swelling - about the middle of the /

the thigh on the posterior and outer aspects. There was no discolouration over the swelling and no signs of inflammation. There was absolutely no pain in the tumour. It was just simply a soft, boggy, diffuse, painless swelling causing little but mechanical inconvenience. Hot fomentations were applied to the swelling with the result that there was great improvement. But a fortnight later the swelling got worse, and got red in the centre. The skin broke over the reddened area and a large amount of soft caseous matter came out. Patient remained at home for a week or two but in the end of January 1905 was admitted to the Royal Infirmary, Edinburgh. While in hospital patient was operated upon and the abscess dealt with but although her stay amounted to ten weeks the sinus would not heal. Patient went home in the beginning of April requiring the aid of a stick to enable her to walk. The sinus continued to discharge and the wound was dressed for a time by the doctor and later on by patient's mother.

It was at this time (about April 1905) that patient first noticed that the left thigh was bent up on the abdomen and that the knee was also bent at an angle. During May, June and July patient managed to get about all right on crutches but in the end of August 1905 she became so lame that she had to go to bed. As the condition did not improve patient was recommended to go to Hospital and was admitted to Ward 8 R.I.E. under Professor Annandale's care, on October 9th, 1905.

The /

The social conditions are quite satisfactory but there is a distinct Family History of tubercle. One brother - 13 months - died of chest complaint: one sister - 4 years - died of tubercular meningitis and a brother - age 14 - died of the same condition. Three brothers, one sister, father and mother are alive and well.

When patient was very young she had measles and whooping-cough.

On admission patient was seen to be a very emaciated. badly nourished girl with a distinctly unhealthy appearance.

She had no pain to complain of or any subjective sensations.

On Inspection the left thigh is seen to be extremely emaciated - marked wasting of the thigh muscles. There are several sinuses around the left hip joint on the outer and posterior aspects. The nates are flattened and the gluteal fold is less distinct on the left than on the right side. The movements at the left hip-joint are restricted, especially those of external and internal rotation. The left thigh cannot be fully extended - there is almost 45° of Flexion at the left hip-joint. The left thigh is slightly adducted and when the two limbs are placed parallel to one another the left anterior superior iliac spine rises one inch higher than the spine on the right side. There is distinct thickening of the great trochanter and the neck of the femur but no fluctuation /

fluctuation can be detected. When the legs are placed parallel the left leg is 1½ inches shorter than the right but measurement from the anterior superior iliac spines shows only a difference of ½ inch.

There is distinct lordosis of the spine which disappears on flexing the affected limb.

On October 12th, 1905 Professor Annandale cut down over the great trochanter and dealt with a very large abscess cavity, but did not interfere with the hip-joint.

After the operation patient was put to bed and extension applied at first in the line of deformity but by gradually altering the direction of the extension the limb was ultimately got into good straight position.

But all the time patient was in hospital the sinuses continued to discharge. The general condition of the patient was not very good: her appetite was poor and she did not sleep well. She had considerable sweatings at times. The pulse only fell below 100 on one or two occasions, it was usually about 116 per minute but at times rose to above 130. The temperature too showed the characteristic swinging outline, being low in the morning and swinging up at night. Average morning temperature was about 97°.6 while evening temperature was frequently between 99°.5 and 100° but on several occasions it reached above 102°. The respirations varied from 16 to 24 but were never high. Malt and the three /

three syrups were given to the patient twice daily, but although the appetite improved the condition already described continued during November and December 1905.

In January 1906 the same condition still persisted. The sinus continued to discharge and the temperature to rise in the evening. On the 1st of the month it rose to 100°.4: on the 4th to 101° and on the 6th to 101°.6: then for a time there was slight improvement in the temperature chart but on the evening of the 20th it rose to 102°.6, on the 21st to 101°.4: on the 22nd to 100°.6, and on the 23rd to 101°. After that, again, there was a little improvement not only in the temperature and general health of the patient but also in the local condition. The diseased leg was quite straight and in very good position and showed only a very slight amount of shortening when compared to the right limb. Although the sinus did not cease to discharge, patient was dismissed from Hospital on January 26th 1905, as she was anxious to return home.

REPORT of CASE II.

Isabella Shand. Age 15. Admitted to Ward 14 R.I.E. on November 14th, 1905.

Complaint Lameness of right leg and inability to walk.

History of Present Disease.

About three years ago towards end of 1902, while patient was playing among the rocks on the sea-shore she slipped and fell. She felt no pain at the time and was able to walk home without any inconvenience. About a month after this accident patient became lame and the lameness increased gradually until patient was unable to walk without the aid of crutches.

At this time there was no pain to complain of and patient did not notice anything wrong with her right leg; she noticed nothing but the gradually increasing lameness and the fact that the right leg appeared to be longer than the other.

About six months after the lameness appeared patient consulted a Doctor and acting on his advice went to bed, her right leg being extended and a weight being applied. No application was made to the hip joint. Patient remained in bed for six weeks at the end of which time she got /

got up in order to get fresh air. Towards the end of 1904 patient consulted a bone-setter about her leg and after being treated for some time was able to go about with the aid of a stick. But the lameness continued and in beginning of 1905 a swelling appeared in the outer aspect of the thigh at the junction of the upper and middle thirds of femur. The swelling at first small increased in size and patient having been advised to come to Hospital was admitted to Ward 3 R.I.E. on May 6th 1905 complaining of inability to walk and swelling on right buttock. At this time there was marked wasting of the thigh muscles and the right lower extremity was slightly adducted at the hip joint. There was marked arching of the back which disappeared on flexing the affected limb. The right limb was shorter than the left by two inches, ½ inch of this being due to tilting of pelvis. Right trochanter major was fully 1½ inches above that on left. Rigidity at the right hip joint was noted at this time, flexion being limited to an angle of 90°: rotation was much restricted but there was no pain. On the outer aspect of the right thigh at junction of upper and middle thirds there was a diffuse swelling but no redness. The swelling reached as far up as the upper margin of the great trochanter, was soft and fluctuated freely and was not painful on pressure.

Six days after patient was admitted to Hospital she was /

was operated upon by Professor Chiene. At the operation the abscess was opened into: finger being inserted before pus escaped and walls being scraped. The pus which was very flaky was evacuated and the cavity swabbed with gauze. The cut edges were touched with pure carbolic and wound was closed with horse-hair sutures. The abscess remained closed and showed no tendency to refill. Patient went home on June 9th 1905 to return in time to have her leg straightened.

After dismissal from Hospital patient spent as much of her time as possible out-of-doors. No more abscesses formed but lameness increased to such an extent that when patient stood upright only the toes of her right foot reached the ground, and patient was quite unable to walk. Patient was then admitted to Ward 14 R.I.E. on November 4th 1905 in order to have her limb straightened.

History of Previous Health:
Patient had measles when very young: also suffered from whooping-cough before, and influenza after, her accident. Apart from these, patient was quite healthy until the accident took place in 1902.

Social History:
Patient has a comfortable home and lives with two elder sisters. She sleeps with one of her sisters in a large kitchen and is in the habit of keeping the windows open.

The /

The surroundings, too, are good - house being situated near the sea coast. Patient has always had plenty of good food.

Family History:

Mother died from a shock.

Father died after an operation (~~performed by Mr Cathcart~~) for some inward trouble.

Five sisters and four brothers are alive.

One sister has suppurating glands in the neck, for which incisions were made to allow pus to escape by the family doctor on advice of Mr Miles. The glands were hard.

Condition on Examination:

Patient is a poorly developed girl for her age and her muscularity is extremely poor; she is very emaciated. Pulse is 92. Temperature 97.8.

Subjective: The right limb does not feel hot and patient has no pain or throbbing in her leg. She is afraid to put her weight on her right limb.

Objective: On Inspection of affected limb there is no redness or discolouration. The right lower extremity is markedly emaciated, the thigh muscles being especially wasted. The cicatrix from last operation is very small and scarcely visible. There is no swelling around the hip joint. /

joint. The nates are flattened and the gluteal fold is lost. Patient lies in bed with her right thigh adducted right across the left knee, and flexed to a considerable extent at the hip joint (See Photograph). The leg is also rotated inwards. There is marked lordosis to be seen and the hand can easily be passed under the arched back. On eliminating the compensatory lordosis by flexing the sound limb to its fullest extent upon the abdomen the right thigh is found to be flexed almost to a right angle. (See Photograph). The spine shows lateral curvature with the convexity towards the affected side. The rigidity of the right hip joint is very obvious and any attempt to move the right thigh raises the pelvis with it. When the legs are placed parallel to one another the right anterior superior iliac spine rises one and half inches above the level of the left spine. The upper margin of the right great trochanter is fully one and a half inches above the level of that on the left side. The left leg measures 29 inches while the right measures 27½ inches showing a difference of 1½ inches.

There is nothing to note in the Respiratory or Circulatory systems: the lungs are quite sound and there is no evidence of organic disease of the heart.

Operation: Mr Miles. Nov. 14th 1905. Under chloroform an incision was made over the outer surface of the /

the thigh and an osteotome introduced. The femur was partially divided below the small trochanter and then broken through. The wound was stitched up and the limb was put up abducted on a splint and extension applied.

Patient got good union in excellent position and when extension was taken off there was only about one inch of shortening and patient got about very well with crutches. Patient was discharged on January 15th 1906, having been in Hospital for nine weeks.

Progress.

November 4th. Patient admitted to Hospital.

November 13th. Day before operation.
Pulse 76. Temperature 98.

November 14th. Day of operation.
Pulse 104. Temperature 98.8.

November 15th. Pulse 104. Temperature 98.

November 17th. Pulse 88. Temperature 98.

November 24th. Extension was removed - weight taken off.
Tenth day after operation.

November 27th. Limb was dressed. Stitches were removed: wound was dry and quite firm. Pulse 84. Temperature 98. Thirteenth day after operation.

January 7th. Up for first time. Seven weeks and five days since operation.

Patient was given :- Three Syrups m $\overline{xL}$ t. i. d: p.c.
Cod Liver Oil Emulsion ½ oz. t. i. d

COMMENTARY.

PATHOLOGY.

Formerly, tuberculosis of the joints was not recognised as a specific disease, but went under various names, the most common of which was white swelling. About the middle of the nineteenth century largely owing to the work of Rokitansky, Virchow, Köster and others tuberculosis of bones and joints was established as a definite form of disease. But it was not till 1882 that Koch showed that the constant etiologic factor is the bacillus of tuberculosis and placed the question beyond all doubt.

Tubercular tissue may be regarded as presenting two chief forms: it may be a tissue presenting well marked "tubercles," that is to say, more or less well marked nodules or it may be a tissue which is infiltrated with the essential tubercular elements - a condition called "tubercular infiltration."

The "tubercle" occurs as a microscopic nodule, which, when cut in section and stained, is seen to consist of two parts: (1) a central portion - large and stained faintly - the essential portion and (2) an external part - narrow: deeply stained - the adventitious portion. A "tubercle" is composed of cells of three classes: the giant cells: the epithelioid cells and the lymphocytes.

It /

It may be described histologically as a microscopic nodule, generally round or oval in shape, composed of a central portion made up of epitheliod cells and sometimes giant cells of inflammatory origin, or of more completely formed fibrous tissue.

In "tubercular infiltration" the epithelioid cells are scattered throughout the tissue and giant cells are also frequently seen in the tissue. The infiltration may resemble either granulation tissue, or young fibrous tissue.

Histologically, tuberculosis is not to be distinguished by the peculiarity of any of the elements of the tubercle, but especially by the arrangement of the several proliferative elements into a focus, the sum of which is the tubercle. The tubercular nature of the tissue is made absolutely certain by the concomitant identification of the typical tubercle bacillus.

Tuberculosis is a frequent joint disease. It may develop as a clinically primary tuberculosis of the synovial membrane, but is more frequently secondary to tuberculosis of the bones.

The changes in the synovial membrane may be divided into four main groups :-

(1) Diffuse thickening of synovial membrane;

(2) Limited thickening of synovial membrane;

(3) Acute miliary tuberculosis of synovial membrane;

(4) Tuberculous hydrops or empyema of joints.

The /

The changes in the bone may be divided into the following groups :-

(1) Miliary tuberculosis of bone;

(2) Soft caseating deposits in bone;

(3) Tubercular deposits with sclerosis of bone and necrosis;

(4) Superficial tubercular disease of the articular surfaces of bone;

(5) The condition termed "caries sicca";

(6) Diffuse condensation of bone with tuberculous disease;

(7) Diffuse softening of bone and formation of "red marrow";

(8) Tubercular periostitis and osteomyelitis.

As in other joints tubercular disease of the hip joint may commence either in the synovial membrane or in the bone. The relative frequency of each varies with different observers but perhaps in two-thirds of the cases or more the disease issecondary to tuberculosis of the bones. When the disease commences in the bone the seat of the primary osseous deposit is more frequently femoral than acetabular. In the femur the deposit is usually at the lower part of the neck, while less frequently it is situated further out in the neck or even in the trochanter; it is seldom found in the epiphysis. In the acetabulum the disease frequently starts near the Y-shaped cartilage.

During /

During the course of hip joint tuberculosis all the constituent parts of the joint may be successively involved, namely, the synovial membrane, the ligaments, and perisynovial tissues, the articular cartilages, and the articular ends of the bones.

The synovial membrane shows greyish and yellowish tubercles and tuberculous infiltrations with caseous degeneration and softening. Papillary outgrowths may be present or merely a thin layer of vascular connective tissue. At the same time there is into the joint cavity an exudate varying in character from serous to haemorrhagic or purulent. So called "rice-bodies" are frequently formed. These are smooth, whitish, and may be free; in structure they are fibrinous and are due to loosened and degenerated overgrowths of synovial membrane.

Later on the capsule, ligaments and periarticular tissues become infiltrated with yellowish granulation tissue.

The articular cartilage becomes more or less destroyed or absorbed by granulation tissue. In part it may be dissected off and perforated and the whole may become loose in the joint cavity.

The bones of the joint usually show osteoporosis, and are gradually destroyed by caries when the joint ends have been deprived of cartilage, so that marked deformities, spontaneous /

spontaneous luxcations and displacements may occur. When there has been destruction of the articular surfaces and the bone-ends, adhesive arthritis sets in and fibrous or bony ankylosis in more or less abnormal positions may terminate the process.

Thus in the case of Bella Shand the primary deposit, (if it were in the neck of the femur,) spread towards the surface. When it reached the joint cavity the synovial membrane became affected. The tuberculous tissue extended over the articular cartilages of the femur and acetabulum and reaching the surface of the bone produced the condition of caries. The carious destruction of the bones and the rarefying osteitis which accompanied it lead to absorption of the head and neck of the femur and of portions of the acetabulum resulting in true shortening of the affected limb. (In many cases shortening is also due to a "wandering" acetabulum and apparent dislocation).

Meanwhile there was caseation of the tubercular tissue and an abscess formed round the joint: the abscess extended in the line of least resistance and reached to the skin of the thigh on its outer aspect. This was dealt with surgically and there was no more abscess formation. In time the disease quietened down but left behind it a limb anchylosed at the hip joint and a limb fixed in such bad position that it was almost useless to the patient.

Again /

Again at this final stage there was surgical interference which gave a good result and a result likely to be permanent as the interference was only called for after the tuberculous disease had finished its work of destruction and disintegration.

SYMPTOMS.

In considering the clinical history of a case of tuberculous disease of the hip-joint it has been found convenient to speak of several stages. The main feature of the first stage is flexion and abduction at the hip-joint, the feature of the second stage is adduction with increasing flexion, while in the third stage the disease generally improves and there is more or less anchylosis with deformity. Some authorities recognise an additional stage of abscess and sinus formation but abscesses may form at almost any stage of hip-joint disease; they may indeed form early in the disease even, as in acute suppurative cases, before the second stage has been reached. The recognition of abscess formation as a distinct stage has therefore two objections:- (1) We may have abscesses and sinuses at any period of the disease and (2) Abscess formation is mainly of clinical importance while the division used below rests upon a pathological basis.

First Stage. From the onset of the disease up to the time when the bony changes take place. The cartilages are, in the main, intact at this stage. Clinically we find the thigh slightly flexed, abducted and rotated outwards.

Second Stage. Where true shortening is occurring and there are definite changes in neck of femur or in acetabulum or in both. At this stage there is increased flexion, adduction /

adduction and rotation inwards of the thigh.

Third Stage. Where the disease is improving and there is ankylosis, fibrous or bony, with varying deformity.

Symptoms of the First Stage.

The onset of tubercular disease of the hip-joint is as a rule insidious, in a few cases more or less acute. In about 40% or more of cases there is a history of injury as the exciting cause. Some time passes before any symptoms draw the patient's attention to the hip-joint. Thus in the case of Bella Shand we have a history of a fall on the sea shore followed in about a month by lameness, and Jeannie Gordon first noticed that she became limp about a month after a fall on the hip bone. At the very beginning there is noticed some slight stiffness of the limb, which is felt most in the morning. Difficulty in stooping forward is followed by a definite sense of fatigue and weakness in the limb. The patient then develops a limp and walks on the ball of the toes with the heel raised off the ground and the knee slightly flexed.

Pain is rather a variable symptom in the condition but it is of great importance to note that patients with early hip-joint disease often complain of pain on the inside or front of the knee. The knee is perfectly sound (in these cases) and palpation or manipulation of parts around the hip-joint /

joint increase and determine the pain. This sympathetic pain in the knee-joint has been variously explained. Coulson considered that it was due to spread of inflammation along fascia of muscles while according to Tyrrell it is due to a sympathetic affection of anterior crural and long saphenous nerves. Sir Charles Bell believed that the pain is communicated by means of the obturator nerve. "The obturator nerve," he says, "passes through the thyroid foramen down to the hip-joint, and, after supplying the muscles, is distributed upon the inner part of the knee. The nerve, in its course, is thus involved in the inflammation which affects the hip-joint, and the pain is referred to its extensive cutaneous branches at a part distant from the seat of disease."

Very slight movement of the hip-joint may excite pain, great tenderness of joint being accompanied by starting at night. The starting pain occurs just as patient is dropping off to sleep, for the muscles relax as voluntary control is withdrawn, and the movement of the inflamed parts causes pain. The tenderness is further evidenced by the way the patient supports the leg by the other foot, and by the position the limb assumes.

When the patient comes to be examined we can note on inspection that the hip and knee are slightly flexed, that there is slight apparent lengthening and that the thigh is abducted /

abducted and rotated outwards. The muscles of the thigh and buttock on the affected side are constantly seen to be wasted while the gluteal crease is diminished and the nates flattened. The fold of the groin in some cases is more filled up on the affected than on the sound side.

The hip-joint can only be satisfactorily examined when the patient is lying flat on the back on a flat table. As a rule the child lies with the two legs flat on the table and flexion at the hip-joint may not at first be evident. But it will be noticed that the hand can be passed with too great ease under the back - that there is, in short, an arching forward of the lumbar vertebrae - a lordosis. To eliminate the spinal curvature the sound limb is firmly and strongly flexed on the abdomen. As a result of this the back lies perfectly flat on the table but the affected limb rises in the air to an angle depending on the amount of flexion present. On rendering the affected limb straight again the arching of the back will once more show itself. This method of demonstrating flexion at the hip-joint may be modified a little. The affected limb is kept quite flat on the table while the sound limb is flexed on the abdomen: if flexion be present it is found impossible to flex the sound limb to the usual extent without raising the pelvis and the affected thigh off the table. Or again, both limbs are flexed completely on the abdomen, and the sound limb held in that position. /

position. The other thigh is then extended gently and slowly, and it will be found that when or before a right angle is reached the extension ceases and on attempting to push it further, the pelvis and back rise from the table. When at the limit of flexion, attempts at adduction, abduction or rotation involve movement of the pelvis. The mere presence of flexion at the hip-joint is not enough for diagnostic purposes for a similar condition may be got in the following conditions :-

(1) Sciatica;

(2) Dislocation of hip-joint into obturator foramen;

(3) Psoas abscess;

(4) Enlarged glands in the groin.

If the patient lies with his limbs parallel it will probably be seen that the anterior superior iliac spine on the affected side is at a lower level than that on sound side, and that in addition one can make out a lateral curvature of the spine with the convexity towards the affected side. All this indicates abduction at the hip-joint which has been concealed. To bring this abduction into view the two anterior superior iliac spines are placed on the same level and at once the abduction at the affected hip-joint is evident. At the same time the lateral curvature of the spine disappears.

After noting any external rotation which may be present the elements of the joint and structures around the joint should /

should now be examined. In many cases ,especially if carefully examined early in the disease, the primary seat of the lesion can be determined. The points to be examined are the relative size of the trochanters and the neck of the femora, the relative fullness in the groins, the condition of the inner surfaces of the acetabula as felt from the rectum, and the degree of restriction of movement.

Symptoms of the Second Stage.

The second stage of tubercular hip-joint disease sets in at a very varying period from the onset of the condition. Very acute cases rapidly pass into this stage while less acute cases take considerable time to develop the characteristic features of the second stage. On the other hand, in cases which are early recognised and treated correctly the disease may be arrested before the symptoms and signs of the second stage show themselves. The question may be asked - how can we recognise that a given case has reached the second stage? It is in attempting to answer this question that the value of a pathological subdivision into stages is appreciated. In the second stage the cartilages of the joint more or less disappear, the acetabulum enlarges in the upward and backward direction, and the neck of the femur becomes altered in direction and absorbed. As a result of these pathological processes certain clinical features can be recognised.

Coincidentally /

Coincidentally with the destruction of the articular cartilages and the caries of the surface of the bone the pain in the early period of the second stage increases in degree. There is also considerable increase in the starting pains and in the pain produced on movement and on jarring the limb. The atrophy of the muscles of the thigh and buttock becomes more marked as this stage develops and the power of contraction considerably diminished.

Meanwhile the position of the limb alters, and the position of abduction characteristic of an early stage of the disease is replaced by the position of adduction. Instead of external rotation the thigh is, as a rule, rotated inwards while flexion increases rapidly as the condition goes on. (see photograph).

The flexion has two factors in its production:- (1) greater ease of position, and (2) greater strength of the flexor over the extensor muscles as wasting goes on. On laying the patient on his back on a flat table and flexing the sound limb so as to get rid of the lordosis which is present (as indicated in the consideration of the first stage) the affected limb takes up a position of flexion and the angle which the thigh forms with the table can be measured. (see Photograph.) The angle may be anything up to 50° (or even as much as 60°) in this stage.

The adduction of the limb is, in many cases, evidenced by /

by the inclination of the affected limb towards the sound one. But this inclination is by no means seen in every case for quite frequently the two limbs may lie perfectly parallel to one another. In this case how can adduction be recognised? The presence of adduction is indicated:- (1) by the greater depth of the groove at the junction of the perineum and the thigh on the affected side.

(2) by the anterior superior iliac spine on the affected side being at a higher level than the spine on the sound side.

(3) by the apparent (not real) shortening of the affected limb.

(4) by the position the limb takes up when the two anterior superior iliac spines are put on the same level.

The degree of adduction can be measured by the goniometer. This adduction is due, early in the second stage, to changes in the capsular and other ligaments of the hip-joint. Continued flexion causes the head of the bone to exert pressure upon the ligaments of the joint. The fibres of the capsular ligament on the posterior aspect of the joint become stretched and lengthened while anteriorly the capsular ligament becomes thickened and shortened and the head of the bone passes backwards and outwards. The femur thus hangs by the ileofemoral band and the ileopsoas muscle and the leg is slung across the middle line giving adduction at the hip-joint.

Early /

Early in the second stage various bony changes take place. The head and neck of the femur become softened and carious and in time absorbed, while the angle of the neck and shaft becomes altered. The acetabulum, too, is variously altered and enlarges in an upward and backward direction: the head of the femur slips up and there may be partial or complete dislocation. It is as a result of the changes in the bones that real actual shortening takes place and the bony changes can, more or less, be accurately determined by careful palpation. When dislocation occurs on to the dorsum the position characteristic of the second stage becomes exaggerated, more especially the rotation inwards. Dislocations in other directions are rare but the head of the femur may pass upwards or forwards and come to lie just under the anterior superior spine of the ileum.

It is of the utmost importance in a case of hip-joint disease to accurately measure the distances from certain points to certain other points in order to arrive at a correct conception of the amount of bony change and the various factors producing deformity more especially the deformity of shortening. The points which are used in the following measurements include the following :-

Anterior superior iliac spine.

Umbilicus.

Tip of great trochanter.

Lower and posterior surface of tuber ischii.

Internal malleolus.

Apparent shortening includes the real shortening and the shortening due to tilting of the pelvis. It can conveniently be ascertained, as suggested by Lovett, by measuring the distance between the umbilicus and the internal malleolus of each side.

Real shortening is ascertained by measuring the distance between the anterior superior iliac spine and the internal malleolus on each side. Real shortening may be due not only to alteration about the hip-joint itself but also to deficient growth of the limb if the disease has lasted for some time. Shortening due to changes at the hip-joint itself can be determined by the use of Nelaton's line. Nelaton's line is a line drawn from the anterior superior iliac spine to the most prominent point on the lower and posterior surface of the tuber ischii. In health the line just touches the tip of the great trochanter, while in hip-joint disease the amount of shortening due to actual changes in the joint itself can be ascertained by measuring how far the tip of the trochanter is above Nelaton's line. The difference between this measurement and the total real shortening indicates the deficiency in the growth of the limb. It can be determined also whether the shortening is due to true dislocation on to the dorsum or simply to enlargement of the acetabulum by measuring the distance of the two trochanters from the middle line. In dislocation the trochanter /

trochanter will be further away from the middle line on the affected side than on the other while if the shortening is due to enlargement of and changes in the acetabulum the trochanter on the affected side will be nearer the middle line than on the sound side.

These measurements are very well illustrated in the two cases reported, but as the deformity is more marked in Bella Shand the measurements in her case are more instructive.

I. Apparent Shortening.

Length (from umbilicus) of left leg (sound) = 33 inches.
Length (" ") of right leg (affected) = 30 inches.
∴ Apparent shortening = 3 inches

II. Real Shortening.

Length (from ant. sup. iliac spine) of left leg = 29 inches.
Length (" " " ") of right leg = 27½ inches
∴ Real shortening = 1½ inches

But the tip of the right trochanter only extends 1 inch above Nelaton's line;

∴ Shortening due to changes in joint = 1 inch.
and shortening due to deficient growth = ½ inch.

III. Shortening due to tilting of pelvis is the difference between the apparent and real shortening = 3 inches - 1½ inches = 1½ inches.

Resumé :- /

Resumé :-

Shortening due to changes in joint = 1 inch.
Shortening due to deficient growth = ½ inch.
Shortening due to tilting of pelvis = 1½ inches.
Total shortening = 3 inches.

It is convenient here to consider abscess formation, but it must be borne in mind that an abscess may form early, as in the case of Jeannie Gordon or later as in Bella Shand: the commonest period to have an abscess is probably about the middle of the second stage. Too much stress cannot be laid on the fact that suppuration may occur very early in the disease. Abscess formation should, indeed, be looked upon as an isolated phenomenon for it does not in the least harmonise with the normal (if such a word may be used in this sense) sequence of pathological processes which is so characteristic of tubercular disease of the hip-joint.

When an abscess has formed it may appear outside the pelvis or inside the pelvis. An extra-pelvic abscess may make its way in various directions :-

(1) Abscess may burrow forwards in the line of least resistance and open at the most common situation - ~~first~~ just in front of and internal to the great trochanter.

(2) Abscess may come from posterior aspect of capsule and burrow outwards along the rotator muscles.

(3) Abscess may pass directly backwards to open in the gluteal region.

(4) /

(4) Abscess may pass forwards along the pubo-femoral ligament, and point on the inner side of the femoral vessels below Poupart's ligament.

(5) Abscess may communicate with bursa under psoas tendon and burst on the surface in the lower part of Scarpa's triangle.

(6) A case is on record where the abscess made its way down the whole length of the lower limb before it opened at the heel but this is quite a curiosity.

Intrapelvic abscess is somewhat rarer but occurs in a considerable number of cases. Haberen describes four modes of origin:- (1) Abscess perforates the acetabulum and makes its way into the pelvis.

(2) Abscess ruptures capsule and passes upwards over the innominate bone into the iliac fossa. This is rare.

(3) Abscess may pass into the pelvis along the ileopsoas muscle.

(4) Abscess may originate independently from suppuration of the glands in the iliac fossa.

The tubercular abscess is called a cold abscess because it lacks the characteristic clinical phenomena which attend the development of an acute or hot abscess. The abscess itself is always painless and not tender on pressure. The most important clinical feature of a cold abscess is its tendency to migrate; hence the name given to it by German writers, - Senkungs abscess. In the case of Jeannie Gordon the /

the characteristics of a cold abscess were very well seen and it was instructive to note the situation of the swelling, - half way down the thigh - well illustrating the tendency of tubercular abscesses to gravitate to a lower level. If a tubercular abscess becomes infected as in Jeannie Gordon with pus-forming organisms the subsequent symptoms are entirely changed and we get a typical picture of suppurative inflammation. The temperature increases and presents the characteristic daily curves, while the abscess becomes painful, hot, and tender on pressure.

In the case of Bella Shand the abscess pointed at a very common situation just in front of the great trochanter. It showed all the characteristics of a cold abscess - it was diffused, soft and fluctuated freely and was not painful on pressure. The temperature never rose a degree above normal either before or after the operation; the pulse and respirations too were perfectly normal. After the successful treatment of the abscess there was no recurrence of suppuration. The pus which was removed at the operation was typically tubercular but no tubercle bacilli were found. Examination of films showed what looked like staphylococci but nothing could be got to grow on culture.

The contrast between the two cases under consideration is very interesting.

Bella Shand was admitted to hospital with a swelling which /

which had not burst. When the abscess was opened asceptically and appropriately treated there was nothing in the way of rapid improvement. But unfortunately the case had not been treated very successfully in the early stages and the patient was left with a limb so markedly deformed that operative interference was necessary.

Jeannie Gordon, on the other hand, was admitted to Hospital with an abscess which had burst spontaneously and which had been contaminated with pus-forming organisms. There was mixed infection and the local condition was therefore difficult to treat. But the joint disease in this case had not progressed so far. It was not too late to employ expectant treatment as the bony changes, if there were any at all, were very slight. The progress of the disease in the joint could be and was arrested and any deformity prevented or remedied. The patient left Hospital with a straight leg but the sinus continued to discharge.

Symptoms of the Third Stage.

This is the stage in which there is an improvement in the disease. The characteristic essential feature is anchylosis with varying deformity. The anchylosis may be fibrous or bony and it may be partial and limited or it may be universal and complete.

The deformity varies greatly from the most favourable -

a /

a slight flexion up to the most unfortunate - extreme flexion, very marked adduction and great shortening of the limb. The amount of deformity depends largely on the early recognition and especially on the early use of appropriate treatment. The deformity in a late case of hip-joint disease is a very good indication of the success of early treatment of the case. When Bella Shand was admitted to the Hospital on the second occasion the disease, it is true, had settled down but what was the result of the march of the disease? There was bony anchylosis in extremely bad position. The thigh was flexed to a right angle and extremely adducted and rotated inwards. Consequently there was great lameness and actual inability to walk. The patient was, in short, a deformed cripple as the result of tubercular disease of the hip-joint. This would not have been the case if she had received the same care in the early stages as Jeannie Gordon received in the Hospital. She would probably have had an anchylosed hip-joint, it is true, but a hip-joint anchylosed in such good position that any further treatment would have been unnecessary.

DIFFERENTIAL DIAGNOSIS of HIP-JOINT DISEASE.

In the Diagnosis of Tubercular disease of the hip-joint the following points must be kept in mind :-

(1) Characteristic signs of disease of the hip-joint as already mentioned, remembering that restriction of movement especially rotation is a much more useful guide than mere flexion of the hip-joint. It is hardly possible that a patient with hip-joint disease could assume the tailor attitude. This therefore furnishes a fairly reliable test in conjunction with other symptoms and signs.

(2) Insidious onset.

(3) Quiescent interval after an injury when that is present.

(4) Evidence of tubercular disease elsewhere is suspicious but not decisive.

(5) Symptoms not yielding to treatment is commonly relied upon in clearing up the diagnosis.

It is my intention to take up the differential diagnosis rather fully, as I have been fortunate in having seen from time to time almost every condition which is likely to at all resemble or be mistaken for tubercular disease of the hip-joint.

Tubercular disease of the hip-joint must be diagnosed from :-

I. Other affections of the hip-joint.

II. /

II. Affections of other joints.

III. Affections of bones.

IV. Affections of soft parts.

V. Affections associated with nervous system.

I. Other Conditions of the hip-joint.

(1) Traumatic Synovitis. Here the symptoms are generally more acute and follow immediately on an injury. The effect of treatment must be carefully noted and if there is no improvement in the condition after ten days or so in bed the condition is probably tubercular. Quite commonly one sees cases of old people in which, after a fall on the hip, the pain persists for a considerable length of time and in which actual shortening of the limb results. In many cases a traumatic osteitis or rheumatoid arthritis is set up.

(2) Suppurative synovitis due to the gonococcus may resemble tubercular abscess but in the latter condition the pain is less and there are no signs of acute inflammation.

(3) Rheumatic arthritis is frequently polyarticular, is distinctly febrile (if acute) and is often accompanied by endocarditis and pericarditis. The chronic monarticular form closely resembles the condition of caries sicca (rare at the hip-joint but common at the shoulder joint).

(4) Rheumatoid arthritis must be diagnosed from tubercular disease. /

disease. In tubercular disease there is greater pain and fixity but there is no grating. Evidence of other tubercular lesions and formation of chronic abscess point to the nature of the case. In a case of rheumatoid arthritis recently treated in the Royal Infirmary the complaint was first of the knee and then of the hip-joint. The position of the limb suggested fracture of neck of femur and there was thickening of the great trochanter (sound side $3\frac{2}{10}$ inches diseased side - $4\frac{1}{2}$ inches).

Shortening of $1\frac{1}{4}$ inches due to changes in the neck of the femur added to the interest of the case: indeed it closely resembled comminuted extracapsular fracture of the neck of the femur and might readily have been mistaken for tubercular disease of the hip-joint. This case is somewhat rare in that the man had several attacks of acute rheumatism when a boy. Acute rheumatism and rheumatoid arthritis are seldom seen in the same patient.

(5) Syphilitic arthritis, when secondary, affects the synovial membrane, pararticular tissues and periosteum. Involvement of lymphatic glands and other signs of syphilis show the case is not tubercular. When tertiary there is formation of gummata which develop slowly and disappear under vigorous antisyphilitic treatment.

(6) Typhoid arthritis and inflammations in other acute diseases are sometimes seen in a medical hospital. It is

a /

a non-suppurative destructive joint affection closely resembling tubercular arthritis but the history of the acute illness should prevent the possibility of error. Affections of the joints are commonly seen in dengue, dysentery, Malta fever, scarletina and typhoid fever. Frequently also seen in Pneumonia.

(7) Growing Pains or "Fievre de Croissance" occurs most commonly at ages 15 to 17. The pain is more in the bones, is not limited to one joint and the fever subsides on rest in bed.

(8) Sarcoma of joint is so rare that it is liable to be mistaken for tuberculosis when it does occur. It may arise in soft structures of joint or in the bones. Sarcoma, however, is commoner in the knee joint. In a case recently in Hospital the diagnosis of Sarcoma of the joint was suspected mainly because of the nature of the swelling, which was much harder than is commonly seen in tubercular synovitis.

(9) Echinococcus is so rare that it need only be mentioned.

(10) True dislocation of the hip-joint is readily distinguished from tubercular disease by the sudden displacement after injury.

(11) Congenital dislocation of hip-joint is frequently mistaken for tubercular disease of the joint and vice-versa.

In /

In both conditions there is shortening of limb, limping and lordosis; but the excessive freedom of movement of the joint helps to indicate dislocation.

The diagnosis may be summed up thus :-

		Dislocation	Tubercular Disease.
(a)	Shortening	Limb shortened from first.	No change in limb at first: then lengthened and finally shortened.
(b)	On Manipulation	Limb can be lengthened without pain by pulling.	Limb cannot be extended without pain.
(c)	Condition of Nates.	Nates natural or slightly flattened.	Nates flattened at first then tense.
(d)	Condition of Thigh.	Not markedly wasted	Very much thinned and wasted.
(e)	Movement	Free Motion. Child is well but for lameness.	Motion much impaired: fever: pain.
(f)	When standing	Whole sole on ground	Only toes on ground.

II. Conditions of Other Joints.

(1) Knee Joint. In a case recently in Hospital the patient came complaining of pain in the knee joint but no disease was found in that joint. On examining the hip-joint it became evident that the patient was suffering from tubercular disease of the hip-joint. This is very instructive and it is a useful routine to examine the hip-joint in every patient complaining of pain in the knee.

If /

If there is pain in the knee and no signs of disease then go to the hip-joint. If there is pain in the hip and no signs of disease then go to the back. Always search higher up in the body.

(2) Sacro-iliac disease has to be diagnosed from hip-joint disease. In the former condition the movements of thigh are not painful if the pelvis be supported while there is pain on lateral compression of the pelvis but no apparent or real shortening of the leg.

III. Conditions of Bones.

(1) Femur.

(a) Encapsuled abscess in neck of femur: there is deep boring pain but the movements of the hip-joint are not really impaired.

(b) Osteomyelitis of upper end of femur may be mistaken for tuberculosis of hip-joint but in osteomyelitis there is greater fever, tenderness and thickening. There is very early formation of abscess.

(c) Gummatous epiphysitis and

(d) Tumour of upper end of femur are very rare but must be borne in mind.

(e) Malformations of the femur due to congenital changes or rickets may lead to difficulties in diagnosis.

(2) Pelvic bones.

Osteomyelitis of the ileum is rare but a case was recently admitted to Hospital.

The Acetabulum may be congenitally deformed and displaced /

displaced in any direction leading to shortening of limb.

(3) Spine.

Spinal disease (tubercular) with psoas abscess pointing at a situation at which a sinus from hip-joint frequently opens, has been mistaken for tubercular hip-joint disease. Though the thigh is flexed on the abdomen the movements at the hip-joint are not restricted. The diagnosis is aided by rigidity of spine and pain on pressure on the spines with more or less diminution of the lumbar curve.

IV. Conditions of Soft Parts.

(1) Suppurative bursitis may resemble hip-joint disease when it occurs in the bursa under the psoas muscle.

(2) Large glands in the groin may compel a patient to flex the thigh on the abdomen and may lead a not-over-careful observer to believe there is hip-joint disease.

(3) Sarcoma of soft parts. During the winter session a man was admitted to the Royal Infirmary with a large swelling of the buttock which had several points of resemblance to a cold abscess in connection with the hip-joint. It proved to be a large soft cystic sarcoma growing from the fascia. More deep-seated sarcomata present more difficulties in the diagnosis.

(4) Acute appendicitis may show itself by such atypical symptoms that it may resemble hip-joint disease at first sight. /

sight. This may appear ridiculous but the mistake has been made.

V. Affections associated with nervous system.

(1) Infantile paralysis. Here there is free mobility at hip-joint and loss of power in the limb.

(2) Hysteria. The writer some time ago saw a case where tubercular disease of the hip-joint was diagnosed and the patient - rather a nervous woman - was operated upon and though the neck of the femur was gouged no trace of any disease could be found. The woman was suffering from a hysterical joint. Presence of other signs of hysteria, irregularity of symptoms, absence of shortening and freedom of movement under chloroform are points which should help an observer in recognising a hysterical joint.

(3) Sciatica may be mistaken for hip-joint disease but a little care should prevent error. In sciatica tender points may be found along nerve and pain is much increased on putting the nerve on the stretch.

(4) General paralysis of the insane. It is unfortunate but true that pain in the hip is a common symptom of the prodromal period of general paralysis.

(5) Sympathetic conditions. Sir C. Bell has pointed out that owing to the distribution of the nerves cases do occur in which patients complain of pain and stiffness in the hip-joint /

hip-joint and in which careful examination shows, it may be, piles or stricture or kidney disease to be the cause of sympathetic pain in the hip-joint.

TREATMENT of TUBERCULAR DISEASE of HIP-JOINT.

There are two great sub-divisions in the treatment of tubercular hip-joint disease. The first is conservative, or expectant. It is largely symptomatic but aims at obviating the conditions, whatever they be, which keep up, or help to keep up, the disease. This expectant treatment comprises absolute rest and careful attention to the general health of the patient. The second variety of treatment is the operative treatment, and the object of this treatment, with but one exception, is to remove as far as possible all the diseased parts and at once attempt to arrest or even eradicate the disease. The exception referred to is operation, after arrest of the disease, to correct deformity.

No hard and fast lines can be laid down in the general consideration of the treatment of this disease but each individual case must be considered on its own merits. Therefore for the successful treatment of hip-joint disease the closest observation, and the most careful examination are necessary as well as a thorough knowledge of the pathology of the case under consideration. The questions, that must be constantly asked during the progress of each case, are not :- What should be done now? Should extension be applied? Should a splint be put on? Should an operation /

operation be done? The essential question is:- What is the condition of the patient in general and of his hip-joint in particular, and what do these conditions indicate?

I. Expectant Treatment.

The expectant line of treatment has now become the treatment of choice and as a general rule the question of operation in an early case of tubercular disease of the hip-joint, ~~the question of operation~~ never enters the head of the surgeon. Excision of the hip-joint is not, as formerly, an operation to be seen every day, and amputation at the hip-joint for tubercular disease is now a very rare procedure. Unless there is very urgent indication for operation every case should have the chance of benefit from expectant treatment. In this connection there is a point of some interest. If a tubercular focus is recognised in the neck of the femur before it has opened into the hip-joint it would be justifiable to cut down and gouge out the diseased bone. A case of this kind must be excessively rare but a few successful cases have been recorded. I mention this as being an exception to the rule of always starting an early case with expectant treatment.

Expectant Treatment includes :-

(1) General treatment. Hygienic, climatic, medicinal.

(2) Local treatment. Rest, fixation, extension, application of apparatus etc.

General Treatment. The first essential is that the patient /

patient should be kept in as good bodily health as possible. Anything, which tends to improve the general health, certainly retards the local lesion and brings about conditions favourable to cure. Pure air, and plenty of it, is requisite, and, if possible, life in the country.

The question of climate is not of such vital importance in surgical tuberculosis as in, say, phthisis, but climatic treatment is useful in the early stages and, later on, after operative interference.

Hygienic treatment cannot be neglected. Subjects of tuberculous joint disease should live in well-ventilated rooms, and have the windows always open but yet avoid chills. A well-selected diet will be found of great benefit and should consist mainly of:- milk, cream, eggs, raw meats and raw meat juice, plenty fruit; substances rich in potash should be avoided.

Internal Medication. There is no specific drug acting on tuberculosis as iodide does on syphilis. The most useful drugs are better tonics - the three syrups is as good as any - for the digestion, some preparation of iron if anaemic and perhaps the most important of all - cod-liver-oil. Guaiacol has been given with quite good results.

Local /

Local Treatment.

The local treatment must vary with the site, extent, and nature of the disease. The first essential in the local treatment of an early case of tuberculous hip-joint is, undoubtedly, rest. Absolute physiological rest is a cardinal point in the expectant treatment, and success largely depends on enforced, uninterrupted and prolonged rest: the first gives relief from pain: the second, added to the first, enables the case steadily to progress to a cure; the third secures that which has been gained. The rest must be prolonged for weeks, months, or even years, so long, in fact, as signs of disease continue, and for weeks after they have disappeared. Perfect rest obviates the irritation due to (1) voluntary movements: (2) Muscular spasm and, (3) transmission of body-weight.

The most perfect rest is attained by rest in bed with immobilization of joint. Rest in bed has no favourable effect and should not be prolonged beyond the indication of the local condition. A portable bed enables the patient to get into the open air and sunshine.

Immobilization of the hip-joint may be brought about by (1) plaster-of-Paris dressing embracing the affected limb, the pelvis, and the opposite limb as far as the knee-joint - this procures absolute fixation; (2) Thomas's Hip-splint - suitable for majority of cases; (3) extension - especially /

- especially for acute and sub-acute cases. Whether extension is necessary or not depends on the rigidity of the joint, on the site of the disease and on the amount of pain. But, as already pointed out, the pathological condition of the joint must be borne in mind. Thus, when the disease is purely synovial, the pain not marked and muscular contraction slight, what object can there be in applying extension? Extension is of no use in such a condition except, perhaps, to correct any slight deformity. It is in such a case that Thomas's Hip-splint is especially useful. This splint is now so well known that no detailed description of it is necessary. The inventor claims that by it patients can be treated "with no more mechanical assistance than can be rendered by the village blacksmith and saddler, and the poorer classes will, at a small cost, be assisted as effectually as the wealthier classes." The splint consists of an upright bar of malleable iron with three transverse wings to grasp the chest, the thigh and the leg. The splint is fastened to the body by shoulder braces and turns of bandage round the thigh and leg: it is accurately moulded to the body and affected limb, the upright bar being rounded forwards at the level of the buttock. When the hip-joint is flexed the upper and lower portions of the splint must be kept at an angle so as to fit the patient's abnormal position. /

position. As acuteness subsides the splint may be gradually straightened. Minute instructions were detailed by Thomas for the application of his hip-splint. When there is also abduction or adduction an additional half wing should be fixed between the level of iliac crest and the last rib. For adduction the wing will be on the same side as the disease, for abduction, on the opposite side. The patient should be kept recumbent till all the acute symptoms have passed off and even till the joint is on its way to cure. When the patient is deemed well enough to be out of bed, the boot on the sound side is raised on a patten and crutches are provided. The biped is converted into a triped. The affected limb thus hangs free and extends the joint by its own weight.

Now take a case in which there is considerable rigidity of the joint and starting pains. What do these symptoms indicate? The rigidity means that the muscles are firmly contracting and keeping the head of the femur firmly pressed against the acetabulum, thus leading to atrophy of the cartilage. The starting pains point to much the same condition but how are they produced? The tightly contracted muscles keep the joint surfaces in close apposition without any movement; but as the patient drops off to sleep the muscles relax, the joint surfaces are moved and this causes pain. This pain at once excites /

excites the muscles to firm contraction and a violent starting pain results. Here then is an excellent indication for extension. The object of the extension is simply to tire out the muscles and put a stop to their tonic contraction, and not to pull the bones apart. The weight to be applied varies but it is wise to start with 3 lbs. and increase or diminish the weight being guided by the sensations of the patient and the relief afforded. In time there is increased pain and tenderness in the joint after a period of great relief. This indicates that the object of the extension has been fulfilled - that the contraction of the muscles has been overcome and the weight is beginning to tell on the capsule of the joint. The extension should now be diminished or left off in favour of Thomas's splint.

When a case of hip-joint disease reaches the second stage and comes to be treated the condition of the joint must be carefully investigated. At this stage there is extreme tonic muscular contraction and great rigidity of the joint while the changes in the bones - caries, rarefying osteitis and absorption - are already in progress. What form of expectant treatment does such a case indicate? Does it indicate absolute fixation, say, in plaster-of-Paris? No! The essential treatment is extension. The first thing to do is to see what position the /

the thigh assumes when the pevis is made to lie even. When there is marked flexion the lower limb must be laid on pillows or on an inclined plane. When abduction is combined with flexion the inclined plane lies by the side of the other limb. When there is adduction the inclined plane should be arched to allow sound limb to pass under it. The foot of the bed is raised on blocks to allow the weight of the body to act as a counter-extending force. The limb is shaved and plaster-strips applied to the limb, amd a roller bandage covering the plaster. Tapes from the plaster are fastened to buckles fixed to a square of wood, with a cord which passes over the pulley and carries the weight.

When a joint is being treated expectantly and has reached this stage all we can expect is arrest of the disease with more or less anchylosis. It is of the utmost importance therefore that an effort be made to secure the limb in as good position as possible, otherwise a subsequent operation will be rendered necessary as in the case of Bella Shand.

Especially must adduction be avoided since the limb at this stage is actually shortened and patient can ill afford to have more shortening due to tilting up of the pelvis. Indeed in view of the actual shortening it is advisable to have the limb anchylosed in a slightly abducted /

abducted position for when patient puts the two legs parallel the pelvis is tilted down on the affected side and the actual shortening is compensated for: the result is diminution or absence of movement of the hip-joint but the two lower extremities are more or less of equal length. At the outset the extension must be in the line of the deformity and then gradually carried outwards so that limb becomes slightly abducted. The extension must be kept up for a long time, not only till all acute symptoms have come to a standstill but till a certain amount of consolidation has taken place.

All this time the patient is confined to bed and this is a disadvantage. Still, provided the general health does not suffer too much, it is advisable to give the local condition the best possible chance. But a time comes when it would be advisable to get the patient into the open air and sunshine. On this account the extension appliance is taken off and the patient put up in a Thomas's splint or some other apparatus such as Phlep's box. A double Thomas's splint may be found necessary as it is sometimes difficult, even with an extra pelvic band, for a single hip-joint to keep up distinct abduction.

External Local Treatment. From time to time various external applications have been recommended such as cupping, blistering, poulticing etc. Obviously these can have very little /

little effect on the progress of the disease. They may tend to improve the circulation in the parts.

Massage is of some benefit, not to the joint itself, but to the muscles of the affected limb which are always more or less atrophied. Later on stiffness of the joint can be improved by massage but there is not much doubt but that massage of an acutely tubercular inflamed joint aggravates the local conditions and might become a direct cause of metastatic foci in other organs.

Counter-irritation was formerly very largely used as a local treatment in tubercular hip-joint disease. I have never seen it applied in Hospital. Anything which destroys the skin over a tubercular focus adds to the suffering of the patient and may lead to secondary infection with most disastrous results.

Intraarticular injection. From time to time various antiseptic substances have been introduced into tubercular joints. The only one of any importance at the present time is Iodoform.

Iodoform is not a true antiseptic for organisms can be made to grow outside the body in the presence of iodoform. Yet it must be acknowledged that iodoform injection is a most efficient means of treatment of local tuberculosis. The mode of action is not well known. It is said that, under the action of iodoform, the poisonous products of /

of the organisms are decomposed and at the same time the iodoform is broken up with the liberation of iodine which may act destructively on the bacteria. Iodoform acts better in closed cavities away from the air, than on free surface so that open tubercular wounds are best treated by packing with gauze saturated in iodoform. The tubercular pus from the abscess or joint should always be cleared out before the iodoform is injected. It is a good working plan to inject as much iodoform emulsion as there was pus withdrawn. A 10% emulsion of iodoform in glycerine is the best form in which this remedy should be administered subcutaneously. Injections are made at intervals of one or two weeks and should be kept up for some time until repair has set in or until operative treatment is indicated. Symptoms of improvement should follow after the second or third injection.

Tuberculin treatment. In November 1890 Koch introduced the tuberculin treatment. Coming from such an eminent authority the treatment was vigorously taken up in all parts of the world. It was simply scandalous how medical men rushed blindly ahead with this treatment: it was recklessly given and greatly overdone. As is natural a reaction set in and this treatment was much discredited. It was left to Professor Wright of London to show how Koch's tuberculin should be used in order to get favourable /

favourable results. It is not necessary here to describe the technique of Wright's treatment but very precise directions must be closely followed in order to get good results. Wright uses Koch's tuberculin but regulates its use by the opsonic index. Corpuscles are separated from the blood and carefully washed: to them are added a centrifuged emulsion of tubercle bacilli and a certain volume of patients blood serum. As a control the same process is gone through with serum from the blood of a healthy person. The tubercle bacilli are taken up by the leucocytes and the opsonic index is the average number of tubercle bacilli per leucocyte in the patient's serum divided by the average number per leucocyte in your own (healthy) blood.

e.g. Average T.B. per leucocyte in own blood = 10

" " " " " " patient's " = 5

Patient's Opsonic Index = $\frac{5}{10}$ = .5.

The question is commonly asked - Is Wright's Opsonic Index treatment of any value? But the treatment has been too recently introduced and has not yet had a sufficient trial to allow this question to be fairly answered. Many medical men think highly of it, but even already there are a few careful observers who have given the treatment, what they consider, a fair trial and who are, on the whole, disappointed with it. Time alone will show.

II. /

II. Operative Treatment.

The question, as to which method - expectant or operative - should be employed in a given case of tubercular disease of the hip-joint, has already been answered to some extent and it will be sufficient,here,to give some of the indications for operative interference. Operative treatment is desirable in the following cases :-

(1) Chronic suppuration long continued.

(2) Localised focus in synovial membrane or bone - when recognised early.

(3) Deposit in bone - in late stages.

(4) When expectant treatment has failed.

(5) Cases where a better functional result can be obtained by operation.

(6) Deformities in adults which can only be remedied by operation.

(7) Cases of long standing septic sinuses.

(8) Cases when general condition demands an attempt at removal of disease.

(9) Operate in adults more frequently than in children.

(10) Operate in the poor more often than in the rich.

The operations which may be performed at the hip-joint for tubercular disease are of a very varied nature but the following are the most important :-

(a) Early extra-articular operations.

(b) Arthrotomy.

(c) Partial Arthrectomy.

(d) /

(d) Complete Arthrectomy.

(e) Excision of Hip-joint.

(f) Amputation.

(g) Operation to correct Deformity.

The indications for, and method of, each of these operations will now be considered.

Early Extra-articular Operation is called for when a tubercular focus is recognised in the neck of the femur before the joint is infected. An incision is made over the outer part of the trochanter; the bone is then gouged out until the focus is exposed. The diseased bone is thoroughly removed and the wound stuffed and drained or sewn up and allowed to heal by primary union.

Arthrotomy, or incision of the joint has a very limited sphere of usefulness as a therapeutic measure in the treatment of tubercular hip-joints. Arthrotomy may be indicated when the general condition of the patients renders more extensive operative interference impossible: it certainly relieves tension and tends to diminish inflammation. Once the joint is freely opened it is advisable to remove at least part of the disease.

Partial Arthrectomy is removal of part of the diseased tissues and the object of it is to arrest, and remove the greater part of the disease and yet have the chance of a very good result. Partial arthrectomy may be regarded as a conservative operation and in most cases it is better policy to completely remove all the diseased parts.

Complete /

Complete Arthrectomy is an operation consisting in the complete removal of the affected structures of the joint with preservation of the healthy portions of the articular extremities. Arthrectomy is complete when all the disease is removed not when the whole of the structures of the joint are cut away. The scope of Arthrectomy of the hip-joint is very limited.

Excision of the Hip-joint consists (1) in the removal of the head and part of the neck of the femur; (2) in removal of whole of synovial membrane and ligamentum tires and (3) scraping the acetabulum if diseased. Excision of the hip-joint is resorted to when the expectant treatment has failed and when the general condition of the patient does not contra-indicate it. The indications for excision are :-

(1) When a primary osseous focus cannot be reached by an extra-articular operation.

(2) When the disease is progressing and shortening increasing in spite of expectant treatment.

(3) When the symptoms remain persistent and there is evidence of acetabular disease.

(4) When true dislocation has occurred.

The advantages of excision of the hip-joint are (1) rapid recovery; (2) removal of source of general infection; (3) removal of sequestra from acetabulum. Shock, risk of operation, /

operation, poor recovery, and bad functional result, are points to be considered in every case. Excision is especially to be recommended in patients who have reached their full growth.

There are three chief methods of operating:- the anterior, external and posterior.

I. Excision of Hip-joint by anterior method.

Incision is made vertically down from anterior superior iliac spine for a distance of 3 or 4 inches. On sinking in between the muscles the joint is exposed and capsule incised to allow admission of examining finger. The neck of the femur is then cut obliquely downwards and inwards by Adams osteotomy saw. The head of the femur is now grasped with lion forceps and twisted out. The synovial membrane is clipped away and the acetabulum scraped if necessary. The wound is then closed but for a drainage tube or is stuffed with iodoform gauze.

II. Excision by external incision.

Incision from anterior inferior iliac spine downwards over the great trochanter to about 3 inches below it. Incision is carried down to bone and after muscles attached to upper and posterior aspects have been divided the capsule of the joint is exposed and opened for exploration. Now cut through the femur and take away the head, neck, and a large portion of the great trochanter of the femur. The bone is twisted out by lion forceps. Synovial membrane /

membrane and ligamentum tires are removed as well as any disease on the acetabulum. It is advisable to partially stuff the wound with iodoform gauze. In this operation it is not necessary to remove the trochanter and divide muscles if the disease is limited to the head of the femur.

III. Excision by Posterior Method.

Kocher uses an angular incision extending from the base of the outer surface of the great trochanter upwards to its anterior superior angle, and from thence obliquely upwards and inwards in the direction of the fibres of the gluteus maximus. After incision is made the gluteus maximus is split and attachment to great trochanter divided. On passing between the gluteus medius and minimus above and pyriformis below the posterior aspect of the capsule of the hip-joint is exposed and divided. The thigh is then flexed and rotated outwards and attachments of gluteus medius and minimus muscles are divided and the external rotators of the thigh separated subperiosteally. This is a rather complicated procedure but an excellent view of the hip-joint is obtained and disease can be thoroughly, removed. The muscles are sutured into position.

After excision of the hip-joint light extension is applied to the thigh and local support is given by dressings. Extension is usually maintained for a month or six weeks /

weeks after the operation. The patient can then wear a Thomas' hip-splint for six or eight weeks longer before trying to walk.

Amputation at the Hip-joint is rarely if ever done now-a-days. Disarticulation at the hip-joint may be indicated by extensive sinus-formation and bone disease in a patient who is rapidly going downhill. Various methods have been suggested but the operation is so rare that it need not be considered here. The operation itself presents great risk and in a large number of cases the patients die from shock. The shock is due to the high division of very large nerves and to the removal of such a large part of the patient's body: it is further increased by the low condition of the patient at the operation and by considerable loss of blood.

Treatment of Abscesses.

Formerly abscesses were, in many cases, left alone in the hope that they might become absorbed. But abscesses should always be treated whenever they are detected. To this rule there is hardly any exception and it is wise to follow the plan:- "when there is pus let it out." - a principle in surgery which is well acted upon.

In the case of Bella Shand the abscess was opened aseptically. After the pus had been evacuated and the walls scraped the cavity was swabed out and the cut edges touched with pure carbolic. The wound was closed with horse-hair /

horse-hair suture and there was no further occurrence of any abscess.

In many cases the wound is filled with iodoform and glycerine and stitched up. If any sequestrum (of bone) is found it is best to remove it after dilating the opening in the capsule. In the case of Jeannie Gordon the abscess had burst spontaneously a fortnight before admission to Hospital.

In extra-pelvic abscesses it is advisable to treat the abscess alone and not excise the joint in the first instance: it is preferable to first get rid of the abscess and then consider the question of excision remembering that excision is less extensive and less dangerous when there is no abscess formation.

In pelvic abscess immediate excision of the head of the bone seems advisable: a free opening can then be made into the pelvis - and the abscess cavity scraped out. Iodoform is then injected and the wound stitched up.

When sepsis is added to the tubercular disease the character of the disease is altered. Nevertheless successful results can be got in some cases with septic sinuses by enlarging the sinus, scraping out the cavity, removing any sequestrum, touching with pure carbolic and packing the cavity with iodoform gauze. But not infrequently the patient shows signs of hectic fever, waxy degeneration of internal /

internal organs; while other septic complications develop and render operative interference, in the shape of excision, absolutely necessary. These septic complications should always be anticipated and prevented as was done in the case of Bella Shand - by the early recognition and correct treatment of abscesses or by more extensive operative procedures.

Operative Treatment of Deformities.

As already pointed out expectant treatment properly carried out in the early stages of tubercular disease of the hip-joint will not allow a patient to reach the last stage of the disease with a deformity which necessitates operation. But in neglected cases or cases not properly treated the patient may present a deformity which calls for nothing but operative interference.

Such deformity may be :-

I. Adduction, with no bony anchylosis.

For this, division of the adductor muscles and the application of extension to the limb in abducted position, is sufficient.

II. Adduction with bony anchylosis as was the case with Bella Shand.

This calls for an osteotomy, the exact nature of which varies. In many cases the neck of the femur has been divided or a wedge taken out of the neck but perhaps the best method is that recommended by Gant. Gant performs a sub-trochanteric osteotomy - division of the bone below the trochanters. /

trochanters. This was the operation performed on Bella Shand by Mr Miles. An incision was made on the outer aspect of the thigh directly over the bone which was then exposed below the trochanter major. An osteotome was then introduced and the bone partially divided. The limb was then seized above and below the site of incision and the division completed by breaking the bone across. The wound was then stitched up and the limb put up in the abducted position. When the patient was put back to bed extension was applied, the limb still being kept in the abducted position. She stood the operation very well and the temperature never reached one degree above normal all the time patient was in Hospital. The pulse rapidly became normal after showing a reactionary rise to 104 for two days. Ten days after the operation the extension was taken off and three days later the stitches were removed. The wound was quite dry and firm: pulse and temperature normal: no pain or discomfort of any kind.

The result was highly successful (as shown in the photographs) for when the patient was allowed to rise out of bed nearly eight weeks after the operation there was only one inch of total shortening of the right limb. But the limb was in a slightly abducted position and when Bella Shand left the Hospital, a week later, shortening of the limb was not very obvious and in time as a result of the /

the abducted position of the thigh the pelvis will be tilted down on the right side and the legs will be practically of the same length. As has already been frequently pointed out, Deformity was prevented in Jeannie Gordon by correct expectant treatment in the earlier stages.

The question may be asked:- After the osteotomy to what extent must the limb be abducted in a given case? This question was ingeniously answered by Mr A. C. Mallace who showed the angle of abduction could be obtained by subtracting from 90° the angle whose cosine is the amount of shortening of the limb in inches divided by the breadth in inches of the pelvis measured between the anterior superior iliac spines. But as Mr Mallace himself says - "the skilful surgeon will be able to abduct the limb to a position that will give general satisfaction without going through any calculation."

REPORT of CASE III.

Tuberculous Disease of Sacroiliac joint.

George Rorrison, age 18. Admitted to Ward 7. R.I.E. under Professor Annandale's care on the 12th December 1905 complaining of pain in the right hip.

History. Two months ago, about the middle of October 1905, patient caught a severe chill. About a week after this he began to be troubled with a pain in his right hip which was at first slight but gradually got worse and worse until it became so bad that it made him limp. In the beginning of November 1905 patient, acting on the advice of a doctor, came up to the Outpatient Department and was advised to give up his work for a little and to rest as much as possible. However, he started work again but the pain increased and in a week patient was obliged to stop working. The lameness continued and patient spent most of his time on a bed or couch but during the day he limped about the house a little. The pain and lameness persisted all during November 1905 and patient called in a doctor who advised him to seek admission to the Royal Infirmary, Edinburgh. He was admitted to Ward 7. R.I.E. on 12th December 1905.

Previous History. Bronchitis when a boy.

Family /

Family History. Father died of consumption brought on by a chill. Mother, 3 mothers and 2 sisters alive and well. Two sisters died young.

Condition on Examination.
Patient is a well-developed man, with no obvious morbid appearances.

The pain, which patient complains of, varies in intensity from time to time and is most intense over the haunch bone, on the right side a short distance from the middle line of the back. But there is also pain in the gluteal region, in the hip and down the leg. Patient is quite unable to put any weight on the right leg as it causes great pain at the back. Coughing or sneezing or any sudden movement of the trunk cause the pain to become more intense, and on being asked to move his limbs patient complains of pain.

On objective examination there is no wasting of the thigh muscles to be noted. There is no fullness or discolouration in the region of the hips. On careful examination there is no restriction of the movements at the hip-joint: the thigh can be fully extended without causing pain. Further, if the pelvis is steadied, movement of the right thigh does not cause the slightest pain but on leaving the pelvis unsteadied movement of the thigh does cause pain. /

pain. When the legs lie parallel to one another it is seen that the right leg is one inch longer than the left but the measuring from the anterior superior iliac spines to the internal malleoli the limbs are seen to be equal in length. The right anterior superior iliac spine is on a lower level than the spine on the left side. This difference in level is not due to tilting down of the pelvis as a result of abduction at the right hip-joint but to the fact that the whole innominate bone is tilted downwards and forwards. The right iliac spine is not only at a lower level than the left spine but it appears to be more prominent.

There is no thickening of the great trochanter or neck of the femur and no pain on palpation of the right hip-joint but on examining the region of the right sacro-iliac articulation there is a suggestion of slight fullness, but it is not very marked. On pressing just below the posterior superior iliac spine on the right side there is great pain, while compression of the two innominate bones also cause pain in the situation already referred to.

It is perfectly clear, therefore, that the patient is not suffering from tuberculous disease of the hip-joint though at first sight there are several points which make one suspect hip-joint disease. The case, on the other hand, /

hand, is one of tuberculous disease of the right sacro-iliac joint and shows all the symptoms and signs of that condition.

It is interesting to compare and contrast the symptoms and signs in this case with those in Jeannie Gordon (Case I) and Bella Shand (Case II).

The following points are common to all :-

(1) Pain in the hip.

(2) Pain down the leg.

(3) Pain on movement of limb (pelvis unsupported).

(4) Gradually increasing lameness.

(5) Apparent lengthening of limb (early).

(6) Difference in levels of iliac spines.

But the diagnosis is made clear by the consideration of the following :-

(1) Situation of pain.

(2) Cause of pain.

(3) Signs of local disease.

(4) Manipulation of hip-joint.

(5) Cause of apparent lengthening.

(6) Position of limb.

(7) Changes in limb and back.

(8) Compression of innominate bones.

The points are well seen in a table :-

George /

George Rorrison.	Jeannie Gordon and Bella Shand.
(Sacroiliac disease)	(Hip-Joint disease)
Pain over sacro-iliac joint.	I. Pain in hip.
Pain on coughing.	II. No pain on coughing.
No pain on movement of leg if pelvis be supported.	III. Movement of thigh always causes pain. (early)
Compression of innominate bones causes pain.	IV. No pain on lateral compression.
Fullness in sacroiliac region.	V. Fullness in region of hip.
Hip-joint freely moveable.	VI. Movements of hip restricted.
Innominate bone tilted downwards and forwards causing apparent lengthening.	VII. Abduction of thigh causes tilting of pelvis and apparent lengthening.
No alteration in position of leg.	VIII. Limb flexed, abducted etc.
No changes in limb: no shortening.	IX. Shortening due to changes in bones.
No change in lumbar vertebrae.	X. Compensatory lordosis.

REPORT of CASE IV.

Mrs Kirkby, age 31. Housewife. Admitted on 13th June 1906 to Ward 8. R.I.E. complaining of pain in the hip and back for eighteen months.

History. In the beginning of November 1904 - a year and eight months ago - patient fell down a stair and hurt her right hip and back. The bruises were sore at the time but patient was able to walk all right and the pain soon passed away. But in January 1905 - two months after the accident - patient was suddenly seized with acute pain in the right hip, the pain was very intense. She says that she had no discomfort whatever during the latter part of November and during December 1904 although her neighbours repeatedly told her that she was not walking as she did before the accident she does not think she was lame at this time, but according to her friends she walked rather peculiarly not only immediately after the accident but also during December. The pain in the hip continued during January 1905 and soon began to extend down the inner side of the thigh and became very intense on the outer aspect of the knee-joint. Then in February 1905 patient became distinctly lame, the right leg appearing to patient to be shorter than the left. A doctor was consulted and advised rest in bed but patient was unable to

do /

do this as her husband was ill and required constant attention; as a result the pain increased and the lameness got worse and worse and forced the patient to lie up in bed. The rest in bed eased the pain slightly, but as it again increased in severity she was taken, on medical advice, to Whitley home in order to get the benefit of salt water baths. The baths did patient some good, but the death of her husband necessitated her leaving Whitley before the treatment had been carried out for more than three weeks.

When patient got home she was in a very bad state, and the pain in the hip and knee-joints was excessive. She was quite unable to get off her back but spent all her time between the bed and the couch. Her general health, too, at this time seems to have suffered. She slept very badly at nights, frequently being wakened up by violent starting pains which threw the whole limb into a spasm. She began to sweat a great deal at night, her appetite entirely disappeared, and she lost so much flesh so rapidly that patient thought she had consumption.

In September 1905 patient was admitted to Newcastle Infirmary where her right hip-joint was X-rayed. After being under observation for a week patient left the hospital and was told to go back in a fortnight. But when /

when she got home an aunt persuaded her to consult a bone-setter in Newcastle. This, patient did, and the bone-setter told her that her 'hip was out'. No manipulation brought out any movement at the hip-joint - and patient was told by the bone-setter that her hip was quite fixed: he could not get it in. The man then advised patient to bathe her leg with very hot water and to paint it with oil which he prescribed. This treatment was rigorously carried out by the patient for six months until the bone-setter left Newcastle. Patient believes that the anointing of the limb with oils did her some good and somewhat relieved her symptoms. She was able to walk about a little at this time: about fifty yards was as much as she could manage at a time, and patient noticed at this time that her right leg was a little longer than the left leg. But as the pain in the hip continued patient consulted an American doctor who told her that he could do nothing for her but advised her to undergo treatment in a Hospital. Dr Farmer of Newcastle was then consulted and having advised patient to go to hospital, he recommended her to go to the Royal Infirmary, Edinburgh, as patient was anxious to be treated there.

She was admitted to Ward 8. R.I.E. on 13th June 1906 under Professor Annandale's care.

This is the History, of a woman who was recently admitted /

admitted to Ward 8. R.I.E. There is very little in the history to lead one to believe that there is anything more than tubercular disease of the hip-joint. But on objective examination it is evident that besides the tubercular disease there are results of an old injury and dislocation. The objective examination is unimportant in view of the Reports of Cases I and II but the case is instructive in that it shows that the accident which is regarded as predisposing to the tubercular disease may lead to injuries which are at the time overlooked but which later on may lead to difficulties in the diagnosis and actual recognition of the condition of the hip-joint. The treatment of this case, which took the form of Adam's operation, does not fall to be discussed here.

Model illustrating Clinical Features of Hip-Joint disease.

Some time ago I constructed a model to illustrate some of the clinical features of Hip-joint disease, and I take the liberty of showing it in this connection.

The model consists of a wooden representation of the spine, pelvis and lower extremities. Two pieces of wood are united end to end by a rubber cord to represent the spine, and are fixed at right angles to a horizontal bar - the pelvis. The knee-joint is represented by an ordinary hinge joint and the hip-joint is represented by a hinge joint used in a peculiar way. One side of the hinge is fixed firmly with two screws to the pelvis piece while the other side is fixed to the top end of the thigh-piece by one screw which is put in so that movement can take place round it as a pivot after the top end of the thigh-piece has been rendered wedge-shaped to allow of lateral movement. This contrivance gives all the movements characteristic of the hip-joint.

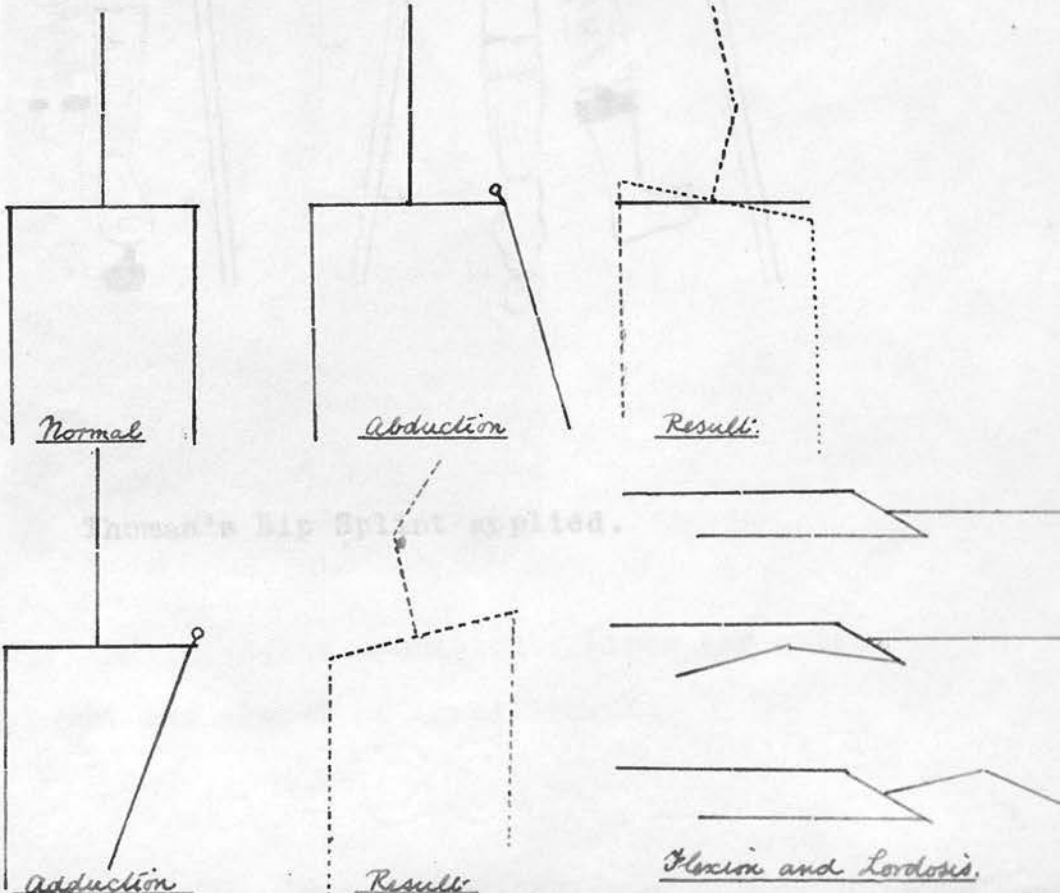
A piece of wire is then passed through the pelvis-piece into the thigh-piece and the latter assumes the different aspects which, as already pointed out, the thigh assumes in tubercular disease of the Hip-joint.

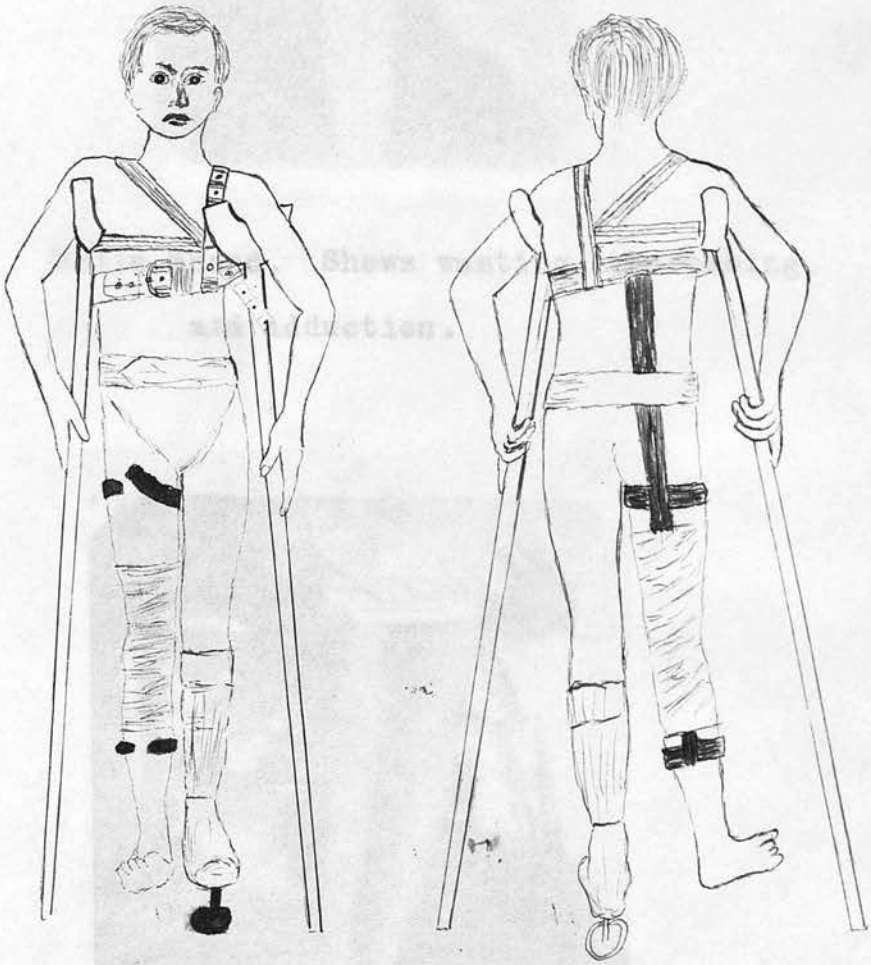
When the thigh is flexed the lordosis is at once seen /

seen and explained, while any degree of flexion is readily detected by flexing the sound limb up to its full extent when the flexed limb rises in the air.

When there is abduction and the legs are made parallel, the apparent lengthening is at once evident as is the apparent shortening when the hip is fixed in the adducted position. The change in the spinal curvature is also well seen.

The model clearly demonstrates that many of the so-called clinical features of tubercular disease of the hip-joint are not due to changes in the limb itself but result from the mere mechanical fixation of the hip-joint in certain positions.





Thomas's Hip Splint applied.

Fig. 1. Bella Shand. Shows wasting, shortening, and adduction.

Fig. 2. Bella Shand. After operation. Limbs are quite straight and almost of equal length.

Fig. 3. Bella Shand. Before operation. Shows shortening, flexion, inversion and compensatory lordosis.

Fig. 4. Bella Shand. After operation. Shows small amount of shortening and slight lordosis. The scar of the incision is well seen.

Fig. 5. Bella Shand. Flexion of the right thigh to 90° when the back is made to lie flat on table.

Fig. 6. Bella Shand. Shows improvement in amount of flexion after operation.

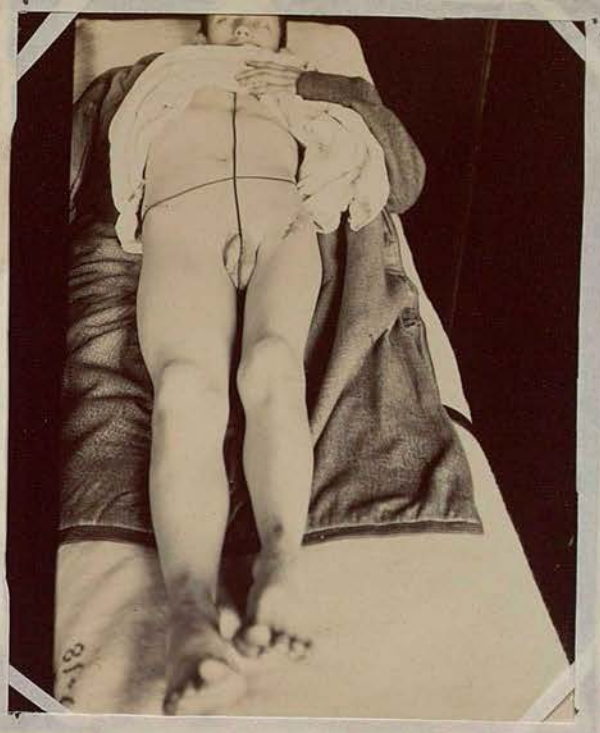


Fig. 7. Case showing sinus formation, deep pennial groove on left side: level of iliac spines limbs being parallel.

Fig. 8. Same case as Fig. 7. Shows marked adduction when iliac spines are placed on same level.

SARCOMA of KIDNEY with recurrence after NEPHRECTOMY.

SARCOMA of KIDNEY with recurrence after NEPHRECTOMY.

Report of Case. James Donaldson Ward 13. R.I.E.

Commentary.

Post-mortem Examination.

Microscopical Examination.

Drawings.

Photographs.

Specimens.

SARCOMA OF THE KIDNEY WITH RECURRENCE OF NEOPLASM IN PERI-NEPHRIC TISSUES, IN DUODENUM AND IN SUPRARENAL CAPSULE AFTER NEPHRECTOMY.

In order to appreciate the many interesting points in this case it has been thought advisable to embody the Report of the case in the Commentary or rather to comment upon the features of the case as they developed.

SHORT SUMMARY of CASE.

In December 1903 James Donaldson was admitted to the Royal Infirmary, Edinburgh, suffering from haematuria. This was recognised to be of renal origin and at the operation a tumour of the right kidney was found. The kidney was removed and microscopic examination showed the tumour to be a fibro-sarcoma. This operation was quite successful and patient remained well for two years, but in January 1906, the patient was again admitted to the Infirmary complaining of "a bad stomach and excessive vomiting." It was impossible to make certain whether this trouble was due to a return of the original disease or to some other independent affection. At the operation it was only too clear, that the sarcoma had returned, and was too far /

far gone to permit of its removal. The man died and at the post-mortem examination a tumour was found in the bed of the right kidney, invading the muscles of the back and the diaphragm, and extending into the suprarenal capsule. The duodenum was also invaded from the outside, but the tumour had not broken through the mucous membrane. The bile duct was nipped in the tumour mass and the gall bladder was greatly distended. Microscopic examination of the tumour and all the structures invaded showed a very actively growing mixed-celled sarcoma.

REPORT and COMMENTARY.

On the 15th of January 1906 James Donaldson age 44 a stoker from Ayr, residing in Edinburgh was admitted to Ward 13 Royal Infirmary, Edinburgh, having been sent over from the medical hospital. The complaint at this time was "a bad stomach and excessive vomiting." About two years previous to this, December 1903 to February 1904, patient was treated in the same Ward for pain on the right side about the Kidney. It is essential that the history of the case should be gone into from the very beginning.

On the 10th of December 1903 James Donaldson was admitted to Ward 13 Royal Infirmary, Edinburgh, complaining of "pain on the right side about the kidney." It was in the year /

year 1900 that patient first experienced pain in his right side and began to be troubled with his water. He dates the onset of his illness to a chill after a long bicycle ride. After the chill there was no pain anywhere but patient noticed that he began to pass blood in his urine. At first this was small in amount and occurred at long intervals. Gradually the blood increased in amount and the intervals became shorter and shorter until blood was passed in the urine every day. Then after a time the condition of the water improved and little or no blood was passed but the condition came on again and in 1902 patient continued to pass blood in his urine at intervals and began to be troubled with pain in the back on the right side. Clots of blood were frequently observed in the urine. His condition continued until the beginning of 1903 when difficulty of micturition set in - for a whole day at intervals no water was passed and it was only on painful straining that any urine came away. Numerous medical men were consulted but patient derived no lasting benefit from any treatment. During 1903 patient enjoyed intervals of relief from the haematuria - intervals of even two or three months duration. At this time there was no pain on micturition unless the flow of urine was stopped by a clot - which occurred at irregular intervals.

In June 1903 a stone was passed per urethram and,

subsequent /

subsequent and previous to this small stones were passed at infrequent intervals. ~~since~~. In addition to the stones which were hard and firm patient passed in his water a substance like sand which was soft and crumbled when touched. Sudden movement or jolting did not cause pain anywhere and there was no pain when he was at work.

As the condition of the urine became bad again patient was advised to come to Hospital and was admitted to Ward 13 R.I.E. on the 10th December 1903 complaining of pain on the right side about the kidney and blood in the water.

On admission to Hospital patient was found to be a well-developed and strong looking man of 44 years. Beyond slight inflammation of the bowels seven years before admission there is nothing to note in the previous health of the patient. The Social History is excellent and there seems to be no hereditary tendencies on inquiring into the Family History - the father died of inflammation of the lungs, the mother of a liver complaint.

From the History of the case we learn that the patient has been suffering for three years from haematuria or blood in the urine associated with some indefinite pain in the back on the right side over the kidney region and, in addition, pain with~~out~~ a suspicious relation to the passage of clots in the urine. The pain in the back radiates round to the groin and is increased at times. Patient says /

says he can feel the clots coming down from a point on the right side two inches above the anterior superior-iliac spine along the groin : passage of the clots along the penis is also felt by the patient but this is not painful if the passage is easy. There is no pain or discomfort in any other part of the body.

The haematuria which has lasted for three years is intermittent and irregular, but while it lasts it is severe. Haematuria may be due to (1) General diseases; (2) Renal causes; (3) Affections of the Urinary passages; (4) Traumatism.

In this case general diseases and traumatism can be at once excluded. The bladder was examined with the cystoscope and there was no evidence of any ulceration or tumour. There is no history of gonorrhoea and the prostate is not enlarged. But before we can exclude affections of the urinary passages as the cause of the haematuria stone in the ureter must be eliminated. The pain which patient suffers from is not so severe as the pain in renal calculus. There is no agonising pain starting in the flank and shooting down the line of the ureter to the inner side of the thigh and radiating through the abdomen: the pain is not intense. The pain on the other hand is of a dull dragging character and is mostly in the flank. There is no nausea or vomiting during the pain nor is there any preceding chill or subsequent /

subsequent rise of temperature: no perspiration and no collapse. Further the haematuria has lasted for three years while there is no history of passage of a stone till about six months before admission. The examination of the urine helps the recognition of the source of the blood. The urine is reddish in colour and contains long worm-like dark red clots. The blood is intimately mixed up with the urine. It would no doubt be possible to get such a haematuria from calculus but several competent authorities go so far as to say that blood-casts of the pelvis and ureter, alone or together, - such as were passed in this case - are absolutely typical not only of renal disease but of renal cancer. Therefore on considering (1) the history of the case; (2) character of the urine; (3) symptoms and signs of the patient renal calculus can be excluded as the cause of the haematuria.

So far the source of the haematuria has been limited to the kidney, but there are various renal causes of blood in the urine. Probably all can be excluded but one and that one is new growth. Bright's disease or inflammation from any toxic agent can be excluded : so also can the parasites filaria sanguinis hominis and Bilhanzia as patient has never been abroad. Renal infarction presents no difficulty for there is no evidence of any primary cause such as ulcerative endocarditis.

It may be allowed, therefore, that from

(1) the character of the haematuria,

(2) the character of the pain,

(3) the exclusion of other affections likely to produce a similar condition, the cause of the haematuria and the diagnosis of the case is New growth of the Right Kidney. On examining the abdomen there is nothing to note on inspection and deep palpation is not painful. The abdominal walls move freely on respiration. Some slight tenderness on palpating the right kidney region is noted but the right kidney is not palpably enlarged. There is no dulness on percussion.

The patient was therefore advised to undergo an operation. It was decided that the best plan to adopt would be to make a diagnostic incision on the right kidney angle, to investigate the kidney and deal with it as was thought best.

The operation was performed on December 18th, 1903, a week after admission to Hospital. Chloroform was used as the anaesthetic and the patient lay face downwards with a cushion under the abdomen. An incision was made on the right side posteriorly extending obliquely forwards from the kidney angle for almost four inches. The peri-nephric fat was exposed and when the kidney had been brought to the surface of the wound it was found to contain a tumour. /

tumour. It was considered necessary to excise the kidney - to do a nephrectomy. Care being taken not to wound the peritoneum the pendicle was transfixed with a needle and strong silk but on attempting to tighten the ligature the tissue gave way. After the ureter had been dealt with and the vessels had been secured with forceps and a strong silk ligature passed round the pendicle there was scarcely any bleeding. Several interrupted catgut sutures were put in and iodoform on a long swab was passed deep down into the wound. The patient took the chloroform very well notwithstanding the prone position.

On examining the removed organ it was seen that the kidney was only slightly enlarged but a considerable part showed tumour growth growing into the renal pelvis . On the upper half there were a number of small cyst-like growths. Microscopic examination of the kidney shows that the tumour consists of a fine reticulum of fibrous tissue rich in spindle-shaped cells. The fibrous tissue varies in amount but forms an important part of the elements constituting the tumour. The cells in the fibrous reticulum are of varying shape but the majority are small spindle-cells with a deeply staining nucleus. The intercellular substance is very abundant and distinctly fibrillar. The section is a typical example of fibrosarcoma.

On the evening of the operation, Dec. 18th, 1903, the temperature /

temperature was 98° and the pulse 76. Next morning, December 19th, the condition was the same but in the evening the temperature rose to 100°.8. Delay in closure of the wound was caused by the silk ligature which sloughed out. On the 20th of December the wound was again dressed. Up to the end of December the wound was dressed every second or third day - during this time the pulse was quite satisfactory but the evening rise in the temperature, although by no means important, persisted. It was frequently over 99° and on one occasion reached 100°.2. During the first half of January the silk ligature gradually was removed and came away - four weeks after the operation. The wound was dressed on the 16th and 18th and on the 22nd when a drainage tube was inserted. A rubber tube was again put in on the 30th of January and patient was allowed to get up for the first time - six weeks after the operation. Two days later the drainage tube was removed and iodoform worsted inserted. On the 3rd of February 1904 patient left Hospital with a small sinus packed with small quantity of worsted. After returning at intervals to have the wound dressed, patient finally left the Royal Infirmary in excellent health and making his water freely.

Patient then returned to his home at Morningside and continued to live a healthy life with good social habits. But it was only for a period of two years 1904 and 1905 - that /

that he enjoyed good health. Towards the end of the year 1905 patient began to be troubled with a "bad stomach" and constant vomiting,which condition compelled patient to again seek admission to the Royal Infirmary.

About the beginning of December 1905 is the approximate date of this second illness. At first patient suffered from troublesome flatulence, the wind coming up from the stomach soon after meals and having a very foul-smelling odour. No cause can be ascribed by the patient and the condition persisted for some time but very soon was aggravated by severe vomiting. The vomiting, which was as persistent as severe, had a distinct relationship to the taking of food. Regularly during December 1905 the vomit occurred at an interval of one or two hours after each meal. No matter what the food consisted of it was constantly followed by vomiting. Dr Veitch was consulted as to the condition and advised the stoppage of all solid food. This gave some relief for a time but as soon as solid food was taken into the stomach then the vomiting started once more. Medicines were given but no improvement resulted. As the vomiting became more excessive and as patient was rapidly loosing weight Dr Russell was called in and at once advised patient to come to the Royal Infirmary. This, patient did and was admitted to Ward 23 on the medical side of this Hospital. As dieting and medicinal treatment had

failed /

failed the stomach was washed out but within a week it was evident that any treatment, which would give patient any relief, must be in the shape of operative interference. Consequently patient was sent to the surgical side of the Hospital and was admitted to Ward 13 on the 15th of January 1906.

On approaching the bedside the first point that strikes one is the appearance of the patient. The skin of the face, and indeed of the body generally, is deeply pigmented. The colour is something between a very deep lemon-yellow and a light olive-green. But there is more than that. The face has a peculiar dusky earthy shade which is not commonly seen till very late on in the malignant forms of jaundice. It is noteworthy that when the patient is talking to you he does not appear to look at you but seems to keep looking past the observer as if he were taking an interest in some distant object. There is not much doubt as to which region of the body is at fault for the patient has the words "abdominal case" written on his face. In addition the appearance is suspiciously like that of a patient being overwhelmed by some toxin. The patient feels no pain anywhere but has a general uneasiness in the abdomen. When asked to locate this feeling of uneasiness the patient lays his hand on the epigastric (and right /

right and hypochondriac) regions. On examining this region there is no redness or discolouration or evident swelling. There is no inequality of the infracostal grooves, no evidence of peristalsis, or aortic pulsation and nothing to note about the umbilicus. The right epigastric region does not show any fullness on the right side when compared with the left side.

Some tenderness is complained of when the hand is laid on the epigastric region and on careful palpation slight resistance can be made out. This resistance is not due to the rigidity of the rectus muscle but is deep-seated. The area of resistance is not very easily marked out but it extends to and is limited to the right of the middle line. In a downward direction the resistance does not extend below the level of the umbilicus although it can be felt to the right of the umbilicus. Percussion gives no additional information to that obtained on palpation.

The questions now to be considered are :-

I. What are the affections which could give rise to this condition already described and which could cause the symptoms and physical signs presented in this case ?

II. Which of these affections can be excluded and why ?

III. Can a diagnosis be made ?

I. /

I. The affections which could give rise to those symptoms and physical signs are :-

(a) Cancer of the Pylorus.

The symptoms and physical signs closely resemble those in a typical case of cancer of the pylorus: the following points may be noted :-

(1) Age. Fully 75% of all cases of gastric cancer occur between the ages of 40 and 50. This patient is 46 years.

(2) Loss of Weight, which is progressive and not arrested by dieting, medicines or washing out of the stomach, is a marked symptom in this case and occurs typically in all cases of pyloric cancer.

(3) Emaciation and cachexia are common symptoms of gastric cancer. There is, as in this case, often a yellow or lemon tint of the skin. Pigmentation of the skin may occur in any abdominal cancer or growth.

(4) Anorexia, or loss of desire for food, is an important functional disturbance which may result from gastric cancer. It is present in the case under consideration.

(5) Vomiting. The history of this patient clearly shows that the vomiting is :-

(a) frequent.
(b) persistent.
(c) excessive.
(d) delayed 1-2 hours after food.

and this is a typical picture of the vomiting in pyloric cancer.

(6) Haemorrhage did not take place in this case but it is only present in about one in every five cases of gastric cancer.

(7) Pain and tenderness in the epigastric region as previously described are quite consistent with pyloric cancer.

(8) Objective examination of the patient cannot definitely exclude pyloric cancer while perhaps all the signs which are present could be accounted for by pyloric cancer. This will be referred to later on.

(b) Return of original disease.

The original disease was, it will be remembered, fibrosarcoma of the right kidney, for which nephrectomy was done two years ago. It is quite conceivable that the sarcoma has recurred in the perinephric tissues and, having grown slowly for a time, has taken on very active growth during the last two months.

All the symptoms and physical signs could be explained if there were a return of the original disease. The vomit would be reflexly produced and the diffuse nature and deep-seated character of the resistance on palpation would be expected in a return of the sarcoma.

(c) /

(c) Tumour of the Pancreas.

The following symptoms and signs, which were present in this case, could be produced by a tumour of the head of the Pancreas :-

(1) Epigastric pains.

(2) Jaundice, due to pressure on bile duct at entrance into duodenum.

(3) Resistance in the epigastrium.

(4) Rapid wasting and cachexia.

(5) Vomiting and nausea.

(d) Addison's Diease.

Addison's disease is suggested by the peculiar pigmentation of the patient's skin. There are other symptoms - such as the vomiting and extreme loss of strength - which are common to this patient and a patient with Addison's disease. In favour of this we may note :-

(1) Pigmentation of the skin - which is diffuse and of dark lemon or brown colour.

(2) Gastro-intestinal symptoms are similar to those in Addison's disease.

(3) Asthenia is absolutely essential in the diagnosis of Addison's disease: it is present in this case.

We may now consider :-

II. /

II. Which of these affections may be excluded and why ?

Addison's disease can at once be excluded not by the character of the pigmentation which is not deeper on exposed parts or regions of normal pigmentation or not by the asthenia, which, however, does not form such a prominent symptom in this case as in Addison's disease, but by the following fact. In the disease first recognised by Addison of Guy's Hospital it is necessary that the function of both suprarenal capsules should be interfered with before the characteristic symptoms are produced. In this case whatever is causing all the disturbance is situated in the epigastric and right hypochondriac regions. We can therefore exclude Addison's disease.

Tumour of the Pancreas is rather a rare condition, but this by no means excludes the condition as a possibility when an individual case is being considered. It would be erroneous to argue that, because a certain affection is rare, a patient is probably suffering from some other ~~cancer~~ rarer affection.

The character of the vomiting is against the possibility of tumour of the pancreas for although vomiting certainly is a symptom of that condition it tends to be irregular and variable and not nearly so excessive and persistently /

persistently regular as occurred in this patient. The jaundice, too, is not such as occurs in tumour of the pancreas. The tumour of the pancreas obstructs the bile duct completely and the jaundice which results is very severe and there are no remissions as occurred once or twice in the present case. Lastly a pancreatic tumour almost invariably leads to aortic pulsation in the epigastric region from the close relationship of the pancreas to the aorta. The patient is probably not suffering from tumour of the pancreas.

III. Can a diagnosis be made ?

This is the most interesting question, but it is very doubtful if the answer can be given in the affirmative without any qualifications.

The patient is either suffering from cancer (adenocarcinoma) of the pyloric end of the stomach or from a return of the sarcoma in the kidney bed and invasion of neighbouring organs.

The answer is very difficult for even the most careful consideration of the symptoms and signs of the case gives disappointingly little help. The progressive loss of weight and strength and the increasing emaciation are characteristic of malignant disease in general but do not aid the final diagnosis. The same remark applies to the cachexia. The pain is too indefinite to be of any

diagnostic /

diagnostic value. The pigmentation of the skin is worth considering, and it consists (1) of the ordinary icterus or jaundice.

(2) of pigmentation commonly seen in malignant disease in the abdomen - and probably due to absorption of toxins.

Jaundice is not a prominent sign of pyloric cancer unless the disease is very extensive or unless adhesions implicate the bile duct. On the other hand the slightest recurrence of the sarcoma in the kidney bed would readily interfere with the bile duct as it passes into the second part of the duodenum for the duodenum lies in contact with the right kidney not even peritoneum separating th two organs. Were the sarcoma to return, therefore, in the kidney bed, one of the first structures with which it would come in contact would be the duodenum. If this were so the bile duct could not escape being caught in or in some way affected by the growing sarcoma.

The vomiting is so excessive as at first sight to suggest pyloric obstruction, and the whole character of the vomiting entirely agrees with the vomiting in a case of cancer of the pylorus. But vomiting of very similar nature would no doubt be produced reflexly from a return of the sarcoma. Whether it be a return of the original disease or a pyloric cancer certain is it that the malignant growth /

growth has not made its way through the whole thickness of any part of the alimentary canal for there never has been any suspicion of blood passed per rectum and the vomit has never contained blood or resembled "coffee-grounds." But haemorrhage is not a characteristic feature of pyloric cancer, indeed only in 20% of cases of cancer of the stomach is there any haemorrhage.

The resistance which is felt on palpation is too deep-seated and too indefinite to give much information, but one would expect to find a pyloric cancer a more definite tumour which would move on respiration or on manipulation. But on the other hand extensive adhesions would altogether obscure the outline of the tumour and prevent any mobility.

The question as to whether the patient is suffering from cancer of the pylorus or return of the sarcoma in the perinephric tissues must therefore be left unanswered. Whatever it is the patient is obviously going downhill. Something must be done? What? The best plan is to cut down into the abdominal cavity and insert the hand in order to investigate the condition. If a tumour of the pylorus is found then consider if it can be removed. If not then consider the advisability of performing the operation of gastroenterostomy which would diminish the rapidity of growth of the tumour and relieve some of the symptoms.

On /

On the 23rd of January 1906 patient was operated upon by Professor Chiene assisted by Mr Miles.

The following is a report of the operation, which is interesting in that it shows, how the investigation was carried out, what actually was found and what were the conclusions arrived at during the operation.

The patient took chloroform very quietly and well. At 12.30 p.m. after the skin had been prepared a vertical incision was made in the middle line. After a few subcutaneous bleeding vessels had been caught up the wound was enlarged up to ziphistemum and down to the umbilicus. The rectus sheath was then split and fascia transversalis and peritoneum divided. The forefinger of the left hand of the surgeon was then inserted into the wound and felt "a tremendously distended gall bladder and a great hard indurated mass below the gall bladder." Continuing - "The mass is nodular and the size of an orange: it is not like as if it were in the pylorus but is lying behind it pressing the pylorus forwards." Mr Miles confirmed, saying - "The mass lies behind the pylorus." Professor Chiene again examining said - "Probably a recurrence of the sarcoma in the kidney bed. Stomach is healthy enough but dilated. A very doubtful case." Question:- "Any obstruction at all?" "Main trouble is in gall bladder. The vomiting is reflex. There is no obstruction /

obstruction to the duodenum. The mass does not implicate the duodenum or the pylorus: it is lying in the retro-peritoneal tract. He has got general infection."

The patient meanwhile continued very quiet under the anaesthetic and at 12.32 p.m. it was decided that nothing could be done to help the man. The peritoneum was then stitched up, the aponeurosis was drawn together and the skin incision was closed with horse-hair sutures. Time 12.45 p.m

"Patient has a neoplasm - a recurrence of the kidney trouble: gastro-enterostomy is not justifiable, he would vomit from the artificial opening."

Progress of the case :-

January 15th, 1906. Patient admitted to Ward 13 R.I.E.
Temperature 98.4. Pulse 60. Trional grs. xx 10 p.m.

" 12th. Temperature 98. Pulse 88. Hypo. Strychnine, gr. $\frac{1}{40}$. 2.30 a.m.

" 23rd. Operation performed. Temp. 97. Pulse 98. Trional xx grs. Hypo. Strychnine gr. $\frac{1}{60}$. 11.40 a.m.

" 24th. Day after operation. Temperature 98. Pulse 98. Patient says he feels pretty well. There has been no sickness but patient is very apathetic and more jaundiced-looking. The pulse is 98: is of good quality and is not easily compressed. At 8 o'clock this evening patient had an /

an attack of vomiting. The vomiting was severe in character and contained blood. Patient continued to vomit a blood-stained fluid more or less all through the night. Hypodermic Injection of atropine $\frac{1}{100}$ gr. was given.

January 25th. This morning patient was in a very serious condition. The vomiting which had persisted during the night continued during the day somewhat less severely.

Temperature 97.2. Pulse 110.

The urine is dark brown in colour: reaction is acid. No albumin or blood present. Heavy deposit of urates.

January 26th. Patient had another very bad attack last night. The vomiting was much the same in character as formerly and was very severe. Patient is feeling very much worn-out. Temperature 96.8.

7 o'clock p.m. Patient has not been vomiting for some little time.

7.30 p.m. Patient began to bring up with very little effort dark reddish fluid : he seemed merely to have to spit the fluid out. Hypo. Inj. Strychnine $\frac{1}{40}$ gr.

8.30 p.m. Patient succumbed.

POST-MORTEM EXAMINATION.

Permission was granted for a post-mortem examination and the section was done on 27th January 1906 by Dr Geo. Lyon.

Summary: Recurrent sarcoma in region of right kidney.

No Peritonitis, general or localised.

In region of old operation wound for removal of right kidney there was extensive infiltration of the muscles and tissues in posterior abdominal wall, (right lumbar region) with sarcomatous new growth which had involved and partially destroyed the right suprarenal gland. The glands around the second part of the duodenum were enlarged and sarcomatous and had invaded the wall of the gut, - the tumour nodules projecting underneath the mucous membrane but there was no ulceration.

The Common Bile Duct had been obstructed, as it lay behind the 2nd part of the Duodenum, and the Gall Bladder, Cystic and Common Ducts were found to be distended and filled with thick viscid bile, but there were no gall stones.

There were no new growths in the Liver or other organs.

The Stomach was dilated but there was no ulceration.

The Spleen showed nothing abnormal.

There was no new growth in the left kidney or left suprarenal. The left kidney weighed 6 oz: no naked eye change.

MICROSCOPIC EXAMINATION.

Tumour of Right Kidney (removed at operation).

Section of the kidney shows a malignant growth composed of sarcoma cells and large amount of fibrous tissue. The stroma of the tumour is made up of fibrous tissue forming a kind of network of reticulum. The fibrous tissue in some places is dense and almost homogeneous but is for the most part of a very fine fibrillar nature. The branching of the fine fibrils is very extensive but the fibrous tissue itself is not very cellular. There are numerous loculi or spaces to be seen in some of which isolated sarcoma cells lie. In other places the sarcoma cells are more closely packed together but at no place in the tumour can a mass of malignant cells be seen in which the individual sarcoma cells are not surrounded by and separated from one another by some amount of fine fibrous tissue. The bloodvessels in the tumour are of small round spaces bounded by a single layer of endothelial cells.

Tumour (obtained at post-mortem examination).

Numerous sections of the tumour mass show that the tumour is mainly composed of round and spindle sarcoma cells both large and small. Some sections consist entirely of small round sarcoma /

sarcoma cells with lightly staining, homogeneous or finely gradular protoplasm and more deeply-staining large nucleus of varying shape with abundant chromatin. In other sections the sarcoma cells are distinctly spindle-shaped and are arranged in characteristic whorls or strands. Large areas of the tumour are cut off by well-formed dense fibrous tissue which is extraordinarily rich in bloodvessels, while finer strands of fibrous tissue pass into the tumour and divide up the mass of cells. In some places, indeed, especially at the growing margin, the tumour consists of round or oval masses of sarcoma cells surrounded by fine fibrous tissue which is, in most places, very vascular and in which perivascular lymphatic spread can be recognised. The tumour is very vascular and the vessels are very badly formed. In some there is a distinct endothelial lining but many others are mere channels or spaces in between the sarcoma cells, crammed in some cases with blood corpuscles. It is of interest to note that in the lumen of many small bloodvessels, at some distance from the actual tumour itself, distinct sarcomatous cells can be recognised among the blood corpuscles.

Suprarenal capsule.

Only about ¼ inch remained of the right suprarenal capsule - the rest was completely invaded by the sarcoma. The invading edge shows actively growing round sarcomatous cells arranged /

arranged in circumscribed masses surrounded by fibrous tissue and a certain amount of tissue composed of the secreting cells of the zona glomerulosa and zona fasiculata of the suprarenal body. The fibrous tissue between the masses of sarcoma is very cellular and shows numerous large blood-vessels.

Most of these points can be seen in the pen and ink sketch of the suprarenal capsule.

The left suprarenal capsule is perfectly normal.

Duodenum.

In the wall of the duodenum there is a large sarcomatous growth. The cells, as shown in numerous sections from different parts of the duodenum, are of the mixed-celled variety of sarcoma and are of extremely active growth. The nodule is surrounded by very vascular fibrous tissue.

Sections of the tumour were taken from eleven or twelve different situations and after careful microscopic examination the conclusion was formed that at no place was the sarcoma more active - more malignant than in the wall of the duodenum. The extreme malignancy is very impressive. There is no line of demarkation between the tumour and the duodenal wall and the sarcoma cells can be seen invading the sub-mucous coat of the duodenum. In certain places the peri-vascular lymphatics can be seen to be filled up with malignant cells, /

cells, while at other places thin lines of sarcoma cells can be seen occupying lymphatic vessels. Then, in the neighbourhood of the tumour, there are numerous isolated clumps of sarcoma cells while large single, distinctly sarcomatous cells can be recognised in the submucous coat of the duodenum at considerable distance from the sarcomatous nodule.

The other organs were examined microscopically but nothing of interest was found. The liver showed very marked fatty infiltration and slight degree of cloudy swelling of the cells. The pancreas showed no evidence whatever of the tumour but there was a considerable amount of fatty infiltration.

The Report and Commentary of this case include in addition :-

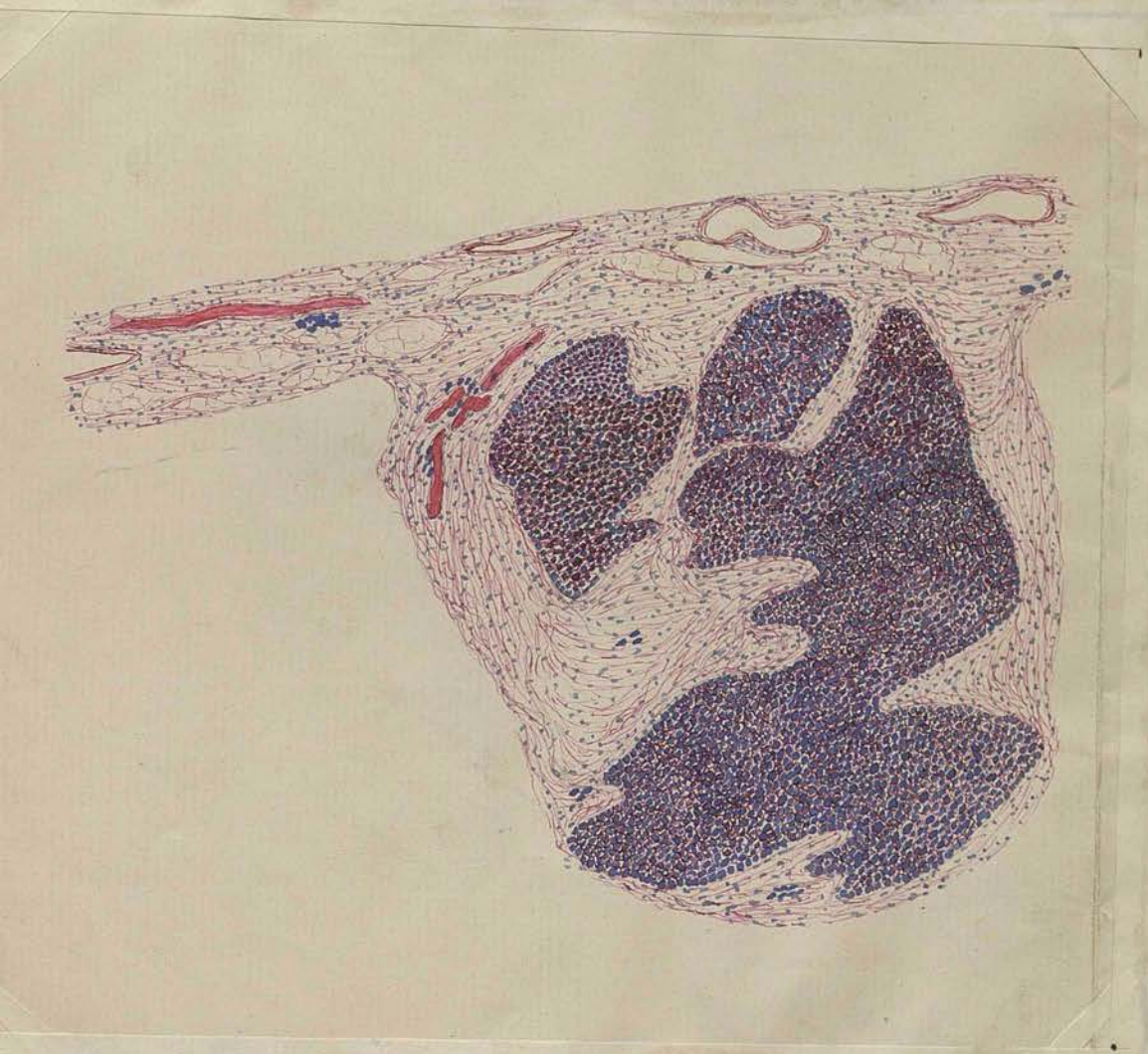
I. Two naked-eye preparations. One showing the tumour invading the Duodenum and obstructing the Bile Duct. The greatly distended Gall Bladder is well seen. The smaller preparation shows the sarcoma and the invasion of the right suprarenal capsule. The glands about the inferior rena cava are sarcomatous.

II. Photographs of these specimens.

III. A few microscopical slides (chosen from a large number of sections) in order to illustrate the Pathology of the case.

IV. /

IV. Pen-and-ink drawings of the tumour as it invaded the Duodenum and Suprarenal Body.



Sketch showing invasion of Wall of Duodenum by Sarcoma.

Sketch showing invasion of Right Suprarenal Capsule by Sarcoma.

I. Photograph of Specimen showing distended Gall Bladder and Bile Duct and nipping of the latter by the tumar behind the 2nd part of the Duodenum.

II. Photograph of Specimen showing distended Gall Bladder and the Sarcomatous growth in the wall of the 2nd part of the Duodenum.

Photograph of Specimen showing Recurrence of Sarcoma in Kidney bed and invasion of Suprarenal Capsule. Aorta and Inferior Vena Cava are also shown.

GASTROENTEROSTOMY.

GASTROENTEROSTOMY.

Report of Case James McGilvern Ward 13. R.I.E.

Commentary.

History of Operation.

Various Operations.

Photographs.

GASTRO-ENTEROSTOMY.

The operation of gastro-enterostomy is performed, when, for some reason, there is great dilatation of the stomach with stagnation and fermentation of the gastric contents. It is also performed when there is a tumour in the pyloric region which is not removable. It is done, also, in connection with gastric ulcer for the ulceration is often kept up by improper drainage of the stomach. Stenosis of the pylorus (secondary to gastric ulcer) is another indication for this operation.

The percentage mortality of gastro-enterostomy is now very much improved and the technique is now excellent. Post-operative complications are, however, unfortunately not very rare and are being carefully investigated in order to perfect the operation and its results as much as possible for many physicians now look upon and recommend gastro-enterostomy as a therapeutic measure.

The results of operative interference and the prognosis must be excellent before the surgeon can convince himself that operation is the correct thing to recommend when the indication is not impending death but mere disability.

That inoperable pyloric tumour and pyloric stenosis are excellent indications for gastroenterostomy no one will deny.

As /

As to gastric ulcer, the condition is kept up so long by imperfect drainage and the risks of perforation are so great that gastroenterostomy is regarded as the best treatment in many cases.

But it is altogether different with dilatation of the stomach. Every case of dilated stomach should first be treated for a long time by medicinal means. The drugs commonly employed in the treatment of gastric catarrh, dyspepsia, hyperacidity, hyperchorhydria, etc., should get a fair trial. If these means fail the stomach should be washed out every day and it is only, when, in spite of lavage, the condition steadily gets worse and patient loses weight rapidly, that gastroenterostomy should be resorted to.

In January 1906 a patient - James McGilvern - was admitted to Ward 13 R.I.E. who had suffered from dilatation of the stomach for 3 years, and was steadily losing weight. The history of the case, which brings out the characteristic symptoms and signs of a progressive dilatation of the stomach, refusing to yield to all medicinal treatment, is of little importance but the objective examination of the patient shows the typical condition of gastric dilatation indicating operative interference in the shape of gastroenterostomy.

Objective Examination.

Inspection of Abdomen.

There is normal fullness of the abdomen: no protuberance: no /

no local bulging but the recti muscles stand out well.

No pulsation in the epigastrium.

The movements are normal and equal on both sides. The walls move markedly during respiration which is more abdominal than thoracic. No peristaltic waves are visible. On the surface there are no evident veins and no pigmentation. The umbilicus is level with the surface.

Palpation.

No resistance is felt anywhere: nothing but the normal doughy resistance. There is some slight tenderness on palpation in the subcostal angle and extending into and occupying the whole of the epigastric region. No tumour is palpable.

Splashing (two hours after breakfast) can be elicited over region of stomach and right down to umbilicus. The umbilicus is moveable and liver, spleen and kidneys are not palpable.

Percussion.

Stomach.

Lower border is 1½ inches below umbilicus in the middle line.

Upper border: at 6th Rib in parasternal line.
at 5th Rib in midclavicular line.

Left border: at 7th Rib - 4½ inches from middle line.
at 10th Rib - 5 inches from middle line.

Right border: At umbilicus 1 inch from middle line.
At 'mid' point 2 inches from middle line.

Liver.

	Mid-line.	Mammary.	Mid-Axil.	Scapular.
Upper-limit - Deep.	(Heart)	4th Rib	7th Rib	9th Rib.
- Superficial		6th Rib	8th Rib	10th Rib.
Lower Limit:	Hands breadth below Ziphisternum	Margin of Chest	10th Rib	(Kidney)

∴ Normal throughout: no displacement: no enlargement.

Gall Bladder cannot be felt.

Spleen and Kidneys show no abnormalities.

Gastro-enterostomy is most important to the surgeon - not only because of its frequency now-a-days but because no operation in surgery has conferred greater benefit upon suitabl patients than this one. The operation has an extremely interesting history.

The operation, as first performed by Lücke, who cut down and exposed the stomach and to it sutured the first loop of small intestine which presented itself, has nothing to recommend it nor has the method of Alsberg, who placed the suture only about 3 feet above the ilio-caecal valve. These operations are now quite obsolete - and rightly so - and call for no further consideration. The two methods which have to be investigated are (1) anterior gastro-enterostomy as devised by Wölfler and (2) posterior gastroenterostomy as devised by von Hacker and modified by Murphy, Ochsner, Mikulicz /

Mikulicz and later by Mayo Robson, Moynihan, and Mayo of Rochester.

In anterior gastroenterostomy a loop of jejunum it brought forwards anterior to the omentum, and transverse colon and stitched to the anterior gastric wall. To this method there are two obvious objections.

(1) The jejunum is apt to constrict the transverse colon and lead to obstruction. On the post-mortem table adhesions and obstruction of colon have been found and in some cases a few feet of small intestine have travelled through the noose.

(2) Drag of the gut is apt to produce a spur or kink, and, in addition, the traction tends to favour contraction of the gastroenterostomy opening.

Although the posterior operation is the operation preferred by the majority of surgeons there are a number of distinguished surgeons who still think anterior gastroenterostomy the operation of choice. Thus Kocher refuses to employ the complicated method of Hacker. While admitting that the posterior operations appear to be reasonable he says they have the great disadvantage of rendering the introduction of suture difficult. He complains that the intestinal contents are apt to escape into the peritoneal cavity as the parts cannot be drawn far enough down out of the abdomen. In spite of this, however, obstruction of the /

the transverse colon, the risk of contraction and jejunal ulcer seem to convince most surgeons that the posterior operation is the better of the two especially for benign disease. Of course in cancer the disturbance is less with the anterior than the posterior method: the anterior operation, therefore, has some few indications.

The operation of posterior gastro-enterostomy is associated with the name of von Hacker. In the von Hacker operation after a hole has been made in the transverse mesocolon a suitable loop of jejunum is applied to the long axis of the stomach posteriorly, so that the direction of onward movement of the intestine corresponds with the flow in the stomach. This direction is regarded as of essential importance. The operation will be described in detail further on.

If the Murphy button is employed, one of medium size should be selected. Its use has the advantage that the union can be brought about more rapidly - a point of some importance in severe cases where a very little turns the balance in one way or the other. The Murphy button is least liable to be followed by passage of bile into the stomach but fatal terminations have at times resulted from the pulling apart of the attached surfaces in from six to ten days and before now symptoms due to a button retained

in /

in the stomach have necessitated gastrotomy.

In the operation as performed by Mikulicz, the opening is made in the jejunum within three or four inches of the origin and, moreover, the intestine is opened by a transverse incision. But this transverse incision limits the size of the opening to one-half the diameter of the intestine diminished by the amount required for suturing. A very small opening results and is a distinct objection to this procedure.

A few years ago Mr Robson recommended the bone bobbin operation, with the suture on a ten-inch loop. But to-day suturing of the intestine can be so rapidly and efficiently done that artificial aids are being dispensed with. The bone bobbin operation has not "caught on", and few will regret that the bobbin is already more a thing of interest than of any great practical importance.

It cannot be denied that with the loop operation the food frequently passes into the proximal arm, the peristalsis of which becomes inefficient, giving rise to difficulties. But Peterson has pointed out that, if the jejunum were attached to the stomach short without a loop (one to three inches from the origin of the jejunum), it would require a reverse peristalsis to carry food into the duodenum. This fact is embodied in what is now known as the /

the "Moynihan operation." In this operation the gastric opening is placed on the posterior wall, obliquely from above downward, and from left to right and extends a short distance on to the anterior wall in order to insure that the lowest point of the gastrojejunostomy be at the lowest point of the stomach. One feature of the Moynihan operation is the special use of clamps which greatly simplify the technique. (Details will be given later on).

Mayo, of Rochester, in a report of five hundred cases of gastroenterostomy, says that the operation of choice is the posterior operation without a loop. He has lately performed fifty-six operations by this method with a single death, which occurred in a patient practically moribund at the time of operation (1.8 per cent.) In two of the cases there was so much trouble from "vicious circle" that a second operation was required when it was found that the cause of the trouble was angulation of the jejunum at its gastric attachment.

In all the operations considered up to this point isoperistalsis (i.e. the peristalsis of the sutured intestine being in the direction of the onflow of stomach contents) has been regarded as an essential principle. But Mayo makes a distinct departure from the generally accepted principle when he asks the question - "Is the idea of continuity of peristalsis between the stomach and jejunum a matter /

matter of theory or has it some practical significance?" After careful clinical observations and close study of the anatomy of the region he comes to the conclusion that the majority of the post-operative complications of gastro-enterostomy are due to the partial twisting occasioned by adherence to the principle of isoperistalsis first laid down as essential by Wölfler. Mayo has therefore abandoned reversing the jejunum and in 65 cases has not had a single case of trouble and no death. He applies the jejunum to the stomach in its correct anatomical relation and there results no disturbance of the normal relationships of parts to one another and no kinking or twisting.

It may be that it is too soon to judge the merits of this new method and that any opinion as yet would be premature but the "Mayo operation" rests on a sound anatomical basis which, after all, is better than any principle no matter how long regarded as essential. It is extremely interesting to note that Kocher, in his work on Operative Surgery, while recognising the principle of isoperistalsis laid down by Wölfler, distinctly says that the most important point, in his opinion, is that the contents of the stomach should be able readily to reach the distal portion of the intestine, and that kinking and spur formation should not take place between the two limbs. What more is necessary in the performance /

performance of gastro-jejunostomy than that there should be a large opening in the lowest part of the stomach and - most important - that the jejunum (or, indeed, any part of the alimentary canal) be left undisturbed and in no wise displaced from its normal anatomical position ?

There are endless varieties of gastroenterostomy but the following five are worthy of description :-

I. Anterior :

(1) Wölfler. Anterior: bowel parallel to stomach.

(2) Kocher. Anterior: bowel vertical to stomach.

II. Posterior :

(3) von Hacker. Posterior: loop.

(4) Moynihan. Posterior: no loop.
Intestine attached from left to right.

(5) Mayo. Posterior no loop.
Intestine attached from right to left.

(1) Wölfler's Operation:

A vertical incision is made in the middle line through the linea alba. After the peritoneal cavity has been opened the stomach is exposed and examined. An incision is made in the stomach through serous and muscular coats parallel

to /

to the great convexity and about 1½ inches from its lower edge. The incision in the jejunum is longitudinal and is situated along the anti-mesenteric border. The divided coats are united on lower side by a row of fine catgut stitches. The mucous membranes are then incised and sutured. The lateral and upper segments are closed by a double row of stiches.

(2) Kocher's Operation :

An incision is made in middle line of epigastrium down to umbilicus. After getting into the abdominal cavity the omentum is thrown up and the origin of the jejunum is exposed. A loop about 16 inches from origin of jejunum is selected and applied to the stomach at right angles and so that proximal portion of loop ascends and distal portion descends. The intestine must be opened, not longitudinally, but transversely upon its convex side, to the extent of almost half its circumference. An artificial valve is constructed by making a curved incision into the convexity of the intestine at some little distance from the stomach. The edge of the flap is left free, and the margins of stomach and intestine stitched together. A posterior serous suture is first put in and then a second continuous posterior suture through entire thickness. Then comes the anterior mucous suture and suture through entire thickness

of /

of wall and lastly the anterior serous suture.

(3) von Hacker's Operation :

The mesial incision is made and abdominal cavity opened in the usual way. The transverse colon and omentum are pulled out and thrown up over the chest wall. The origin of the jejunum is located and a suitable loop is selected. After a hole has been made in the transverse mesocolon to reach the posterior gastric surface the bowel is clamped and sutured to the stomach by a method similar to that in von Hacker's ~~Kocher's~~ operation.

(4) Moynihan's Operation:

An incision is made ¾ inch to right of middle line. Abdominal cavity is opened, transverse colon thrown up and origin of jejunum exposed. Three or four inches of the jejunum opposite mesentery are drawn into a slightly curved clamp-handles of clamps being to the right. The mesocolon is opened within the vascular loop of the middle colic artery and stomach exposed. After the great omentum has been separated for a short distance from the stomach the anterior gastric wall is drawn through posteriorly and a clamp applied with handles to the right. The two clamps are laid side by side and the stomach and intestine can very easily be united after the manner already described. The margins of the incised mesocolon are /

are now united to the suture line by three or four interrupted sutures, and the parts returned into the abdomen.

(5) Mayo's Operation:

The steps in this operation are identical with those in the Moynihan operation up to the point when the transverse meocolon is torn through. When this is done the stomach is drawn through the opening. The posterior gastric wall is drawn into a clamp in such a way that an anastomosis can be performed, beginning at a point one inch above the greater curvature on a line with the longitudinal portion of the lesser curvature and ending at the bottom of the stomach; an opening is made in gastrocolic omentum and ½ inch of anterior gastric wall pulled through behind. The jejunum (1½ to 3½ inches from origin) is also drawn into a clamp. The low point of the gastric opening lies to the left in the tip of the clamps and the distal point of the jejunum lies also to the left. The two clamps are placed side by side and the operation completed in the usual manner by two-row suturing. The rent in the mesocolon is fastened carefully to the suture line so that there may be nothing to cause adhesions to form between the mesocolon and the jejunum beyond the anastomosis.

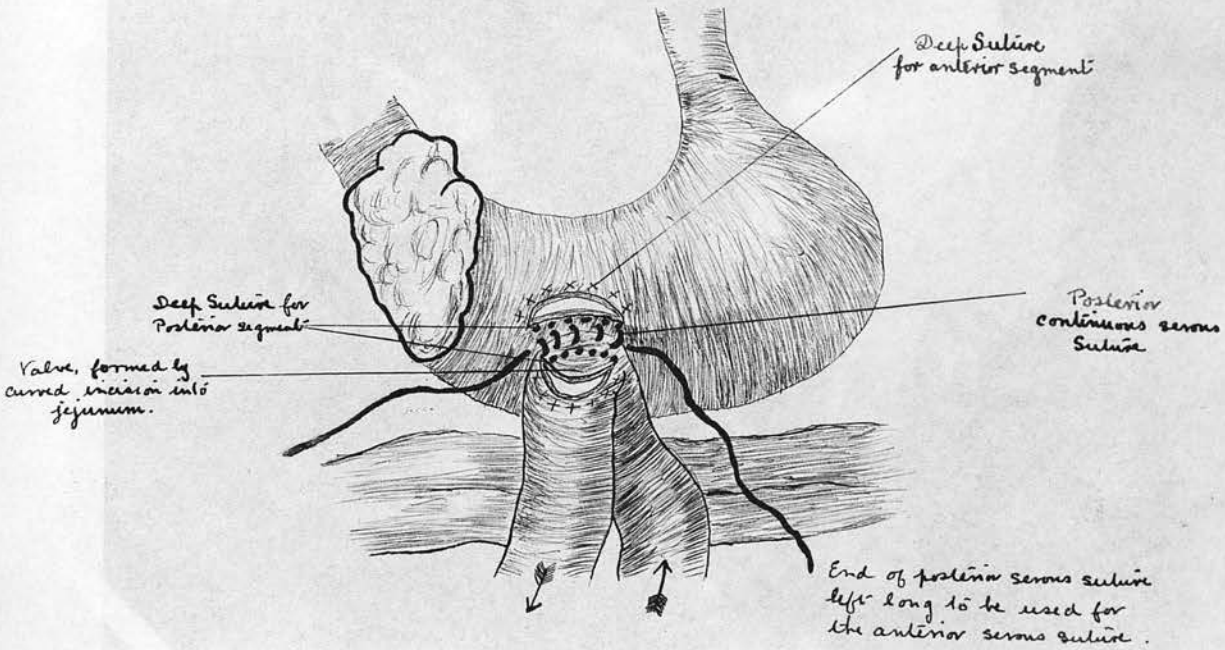


Fig. I. Kocher's Gastro-jejunostomy. The jejunum is placed vertically to the stomach, the direction of peristalsis being shown by arrows. A flap is formed from the intestine to prevent regurgitation into the stomach.

Fig. II. Wölfler's Operation. Anterior Gastroenterostomy. A loop of small intestine 16 inches from origin of jejunum is pulled over the omentum and transverse colon and sutured to the anterior gastric wall. The tendency to constrict the transverse colon is well seen.

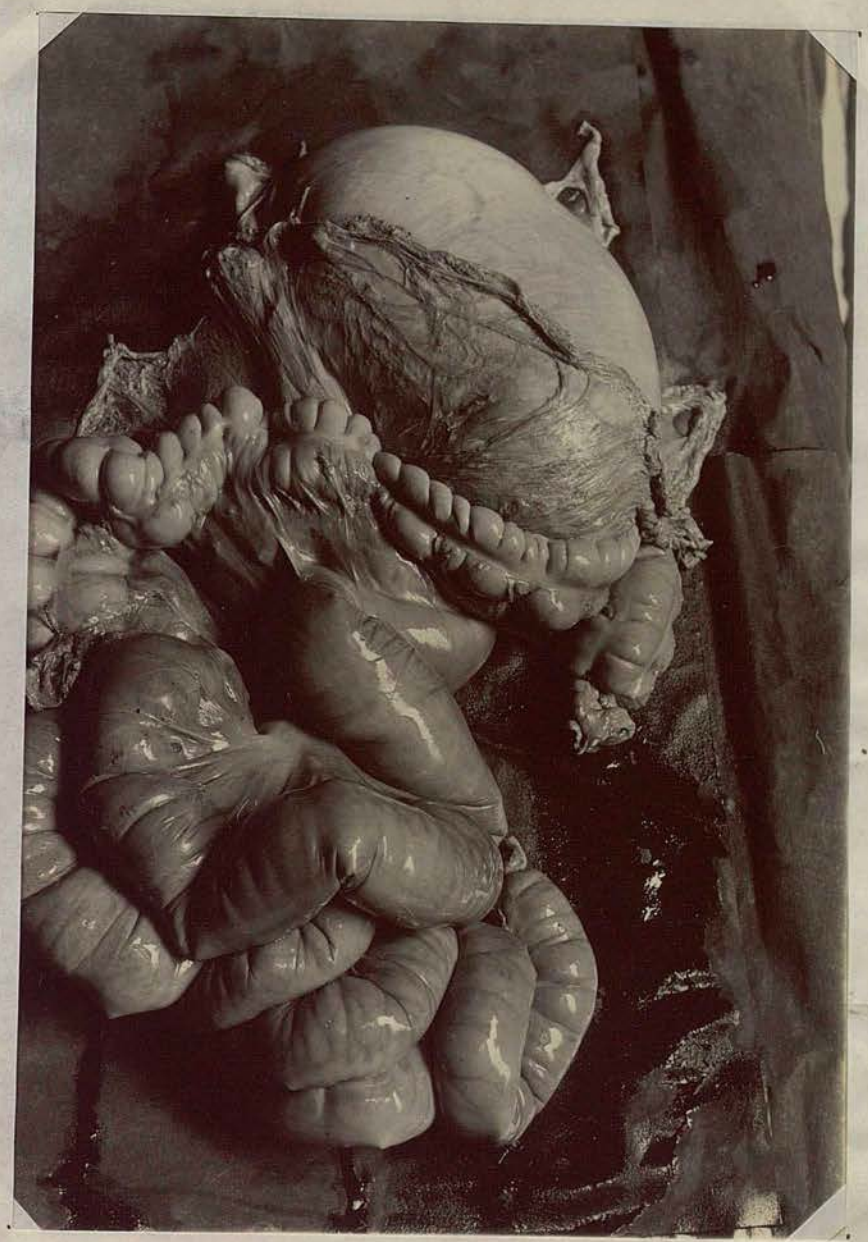


Fig. III. Shows the normal condition of parts after the great omentum and transverse colon have been thrown up over the stomach. The termination of the duodenum is seen curving forwards to be continued as the jejunum, the first part of which falls at once down to the left. The ligament of Treitz is well seen passing from the origin of the jejunum to the transverse mesocolon.

Fig. IV. Mayo's Operation. Posterior Gastroenterostomy with no loop. The jejunum (1½ to 3½ inches from origin) and posterior gastric wall (from above downwards and from right to left) have been clamped and the anastomosis half completed by suture.

Fig. V. Mayo's Posterior Gastroenterostomy completed. The opening in the mesocolon has been joined to the sutured line. The jejunum falls away to the left from the posterior gastric wall. On comparing with Fig. III very little alteration in the normal relations is seen.

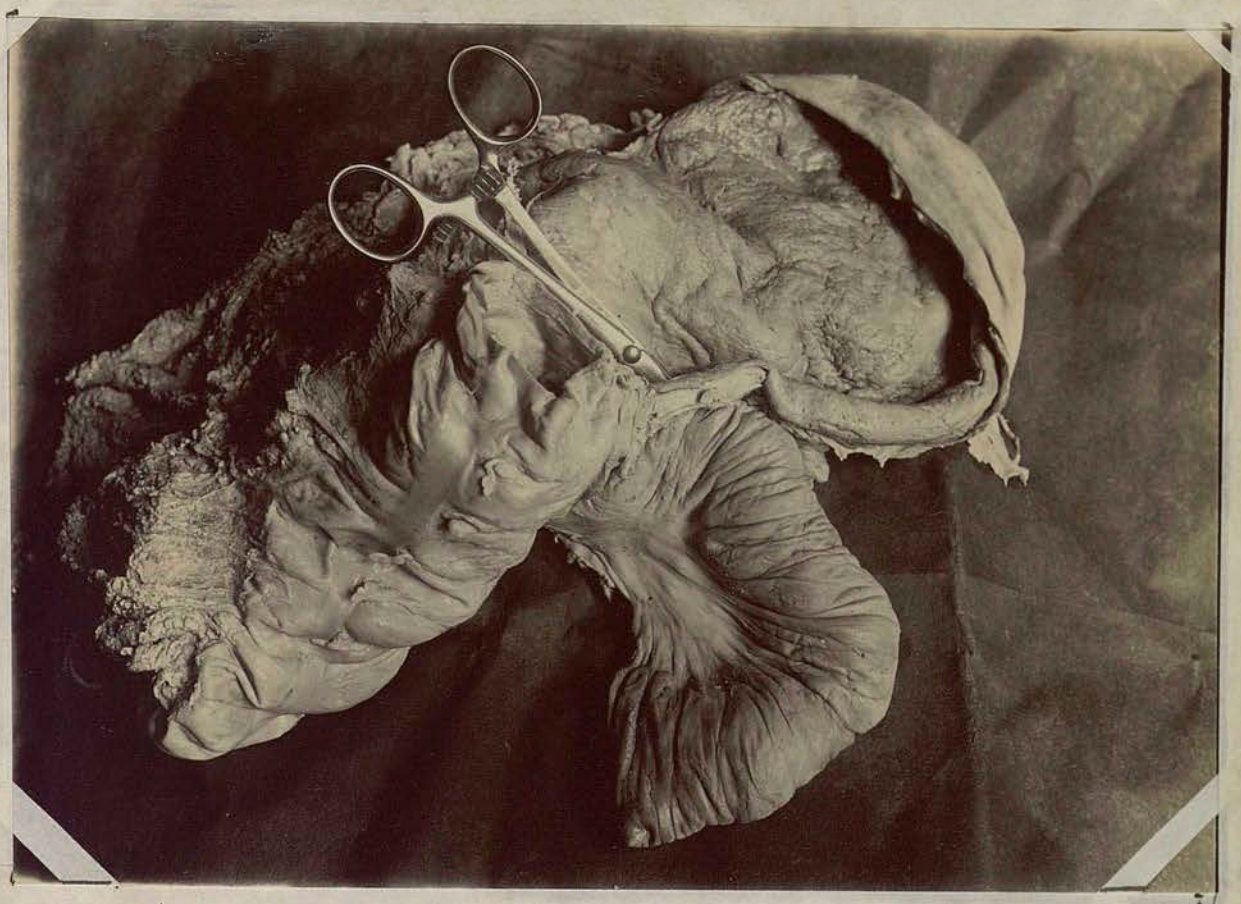


Fig. VI. Photograph of a specimen obtained in the post-mortem room from a case which died from pneumonia and in which Mayo's operation had been performed. The stomach has been opened and part of the transverse colon removed to show the seat of operation. A pair of Forceps has been passed through the gastroenterostomy opening into the jejunum which at once falls away to the left. This specimen is of extreme interest as it is about the first of this operation which has ever been obtained. Mayo has done 65 cases but has had no opportunity of post-mortem examination.