the left trochanter was just on the line. There was smooth free movement in every direction except abduction, which was limited by the adductor longus tendon, which became readily tense on attempting abduction. On walking the patient's gait was peculiar; she waddled, and the body was tilted towards the right side. The pelvis was also tilted, and the spine was curved to the right so as to bring the short leg down to the ground (Figs. 3 and 4). There was no difficulty in flexion of the thigh, but the muscles were somewhat wasted, and the thigh was somewhat everted. It was not possible to move the head of the femur up and downwards as in the case of congenital displacement of the hip, but the points which struck me so much were as follows:—The smoothness of movement of the joint, the shortness of the limb, the prominence of the trochanter on that side, the increased hollow between the trochanter and the tuber ischii, and the absence of any definite swelling. It was decided to watch the child, and so a cork sole of three-quarters of an inch was given to her. She was subsequently seen on September 23rd. She had not been taken off her feet nor allowed to rest as much as necessary; shortening was then one inch and a quarter. On February 21st, 1898, the shortening process had stopped, the loss of adduction was less, and it seemed as if the softening had ceased.

CASE II.—N. J., aged 7, was admitted to Westminster Hospital on November 14th, 1897. The mother stated that the child's knees had both turned in slightly from birth, but the deformity became more noticeable when she began to walk. The mother sought advice for the child, and splints were ordered, and when I saw her she had marked genu varum of the right leg and genu valgum of the left leg. These were subsequently rectified by operation, but the child still retained an inclination on the pelvis towards the right side, and the right trochanter was found to be half an inch above Nélaton's line. The trochanters seemed also to be placed too far backward, indicating an anterior curve (convexity forwards) in the femoral necks. The left limb measured 20½ inches in length and the right 20½ inches. The length of the left thigh was 11½ inches and that of the right 10½ inches. The length of the left leg was 9 inches and of the right 9½ inches, a considerable compensation having been made for the deficiency in the length of the right thigh by an overgrowth of the right tibia. The child still presented symptoms of rickets, and a skiagraph showed well the anterior curves in the necks of the femora and the downward deflection of the right caput femoris.

CASE III, given by Dr. Royal Whitman in his pamphlet on the subject.—A boy, aged 15, was seen with ½ inch actual shortening. This amount of shortening had all come on within one year, as at the age of 14 he was in perfect condition. After that age he noticed a gradual increasing limp, and the application of a cork sole became necessary. Flexion, extension, and rotation remained free, but abduction became entirely restricted. In the figure presented by Whitman, adduction of the right leg, tilting of the pelvis, and scoliosis are seen. It should be added that there was no up-and-down movement of the head of the femur in the acetabulum. All treatment was refused.

CASE IV (Royal Whitman).—The boy was aged 16 when he came under Dr. Whitman's observation. In infancy he was said to have had weak ankles and flat feet. For two years he had been working as a grocer's boy, standing, and carrying heavy weights. Lately there had been soreness and stiffness about the right hip, which were attributed to "growing" pain. On resting, these symptoms disappeared. When he resumed work they reappeared in an aggravated form, and were increased by extra work, but diminished on rest. On examination the trochanters were found to be slightly elevated above Nélaton's line, the gait was rolling in character, and abduction at the hip was limited to a third of its extent, and more marked on the right side than the left. The treatment, consisting of rest and gymnastic exercises, was neglected, and three months later he came again to the hospital, walking with much effort, the rolling gait being most marked, and abduction of the legs limited at the line of the body. Crutches were now ordered. Four months later the patient was seen. The adduction as the patient moved on crutches was so great that the legs were crossed, "scissor-legged deformity." On flexing the right thigh the limb crosses that of the opposite side, and with the thigh at a right angle with the trunk, outward rotation is such that the heel is in a line with the opposite anterior superior spine. With the limbs parallel and extended separation of the knees to 3½ inches only is possible. Flexion at once crosses them. The trochanters are now an inch and a half above Nélaton's line. Dr. Whitman, in the belief that the bending of the necks of the femora had nearly reached its limit, proposed to divide those bones below the trochanters so as to obtain sufficient abduction.

PATHOLOGY.

Hoffa's case showed that the neck of the femur had bent in such a way downwards and backwards that the head of the bone rested on the trochanter minor at an angle of 60 degrees with the shaft as contrasted with the normal of 28 degrees. On section, there was no evidence of previous disease, but the structural arrangement of the cancellous tissue differed from that which is usual. The femur was also rotated outwards. The trochanter was raised and pushed nearer to the middle line of the body. The difficulty in flexing the limb arose from the trochanter major coming into contact with the prominent upper and anterior margin of the acetabulum.

Local rachitis is frequently a cause, but the incidence of the disease in patients liable to much standing and prolonged fatigue, together with the absence of deformities in other of the long bones, points to the chief factor in the production of coxa vara in adolescence being overweight acting upon a slender and softened neck of the femur. The diagnosis of cases is by no means always easy, and the following conditions are liable to be mistaken for it: Congenital displacement of the femur, coxitis, fracture of the neck of the femur, and separation of the epiphyses. Congenital displacement

of the femur and coxa vara present certain symptoms much alike—namely, prominence of the trochanters with the upward and backward displacement, the waddling gait, and the shortened limb; but in congenital displacement the limb can always be lengthened somewhat by traction, and the gain thus obtained is at once lost on ceasing traction, while the head of the bone is felt not to be in the acetabulum. Then, again, in congenital dislocation there is little or no difficulty in flexion, and in certain early cases abduction is well marked, whereas in coxa vara there is no telescopic movement of the head of the femur, which is felt to be in its normal position, and there is frequently difficulty in flexing the limb, and the loss of abduction is well marked.

The early stages of coxitis present some similitude to that of coxa vara. In both we have pain present, in both limping gait, and in both there is some external rotation of the limb; but in coxitis, abduction and flexion are present; in coxa vara abduction is lessened and there is no flexion. These should suffice to distinguish them. From fracture of the neck of the femur, the upper part of the shaft, or separation of the epiphyses, the diagnosis is more difficult, but there can be no doubt that in obscure cases the use of the Roentgen rays will afford a guide.

The prognosis depends considerably upon the age. If we are dealing with a case in infancy, the affection as a rule spontaneously disappears as the rachitic attack subsides. But after this age, unless the patient seeks relief by rest, the depression of the head and neck of the femur continues, and the case, if left to itself, results in very considerable disability, as detailed in Case II.

The treatment is simple. In the first place, in infants, rickets should be treated, and, if the disease is at all marked, it would be well to place the infant in a Hamilton's or in a Bryant's splint, with the legs abducted as much as possible. If there is softening of bone still present, this position will serve to lever back the head into its original position, and, if the time of softening has passed, recumbency will prevent further development of the deformity. In the case of adolescents, the first thing to insist upon is cessation of habits of long standing or the necessity of weight-bearing. Rest will then quickly relieve the pain, and the deflection of the head and neck cease. But, if left to itself, a miserable result will follow, limping, shortening, persistent and chronic adduction of the limb, and in bilateral cases even scissor-leg deformity. If, however, the case comes to one when it is well pronounced and disability is great, I should not hesitate to recommend an osteotomy on the femur, done in one of two places, either obliquely through the great trochanter or below the trochanters. I think the best results would be obtained by the former procedure. If the patient should refuse operation, a cork sole is the only remedy.

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AN OPERATION FOR ELEVATION OF THE FEMALE BLADDER IN PROLAPSE OR CYSTOCELE.

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HERNIA, or breach of the musculo-aponeurotic layers of the abdominal wall, is difficult of cure and prone to relapse, and numerous mechanisms and operations have been devised for its remedy or relief. Similarly for hernia or prolapse through the pelvic floor pessaries innumerable have been invented and operations associated with great and well-known names have been proposed, approved, and ultimately abandoned. Kolporrhaphy and allied methods for narrowing the vaginal canal or ostium have been found wanting and have been discarded by many for the more satisfactory plan of elevation and fixation from above; and certainly in cases where there is descent of the uterus alone, hysteropexy or Alexander's operation when skilfully performed approaches in success the more recent operations for the cure of inguinal hernia. Many cases occur, however, where even these fail to relieve the

symptoms; and after the operation, though the uterus is found to be placed high up, almost beyond reach of the examining finger, the patient still complains of a sensation of downbearing and discomfort similar to her previous experience. In many of these cases it will be found on examination that the bladder is still prolapsed, and that this is the cause of the persistence of the symptoms, that in fact there is still left a cystocele which the elevation of the uterus has failed to cure. This unrelieved remainder after the operation of hysteropexy led me to examine carefully all cases of procidentia coming under observation, and I found that for purposes of practical surgery cystoceles may be divided into three classes, the classification being based on the anatomical relations between the uterus and bladder.

I. Prolapse of the Bladder without Descent of the Uterus.—Here the connective tissue attachment of bladder to the anterior aspect of the cervix uteri is loosened and extended, so that the bladder can come down without bringing the uterus with it. Nor is it difficult to see how this takes place. The physical connection between the two viscera is never very strong, and in the course of a married woman's life is subjected to many a strain; for example, in labour, especially when an impatient accoucheur prematurely applies the forceps before complete expansion of the os has taken place.

II. The Uterus and Bladder both Prolapsed, the Utero-vesical Connection remaining Normal.—Here the two organs descend together and contemporaneously.

III. Both Viscera are Prolapsed, but the Utero-vesical Connection is Loosened and Elongated as in I.—Clearly this is due to the fact that one organ has fallen before the other, and in such cases when the uterus is pushed up the bladder still remains down.

SYMPTOMS.

The symptoms complained of are chiefly these:

1. *Downbearing.*—This is often accompanied with backache, and a feeling as if "the inside were coming out."
2. *Vaginal Obstruction.*—A soft mass occupies the vagina, or even projects through the vulva, filling in severe cases the whole canal. This proves also an impediment to sexual intercourse.
3. *Cystitis* is often present; frequency of micturition, urine turbid, and sometimes offensive. The turbidity is due to mucus or pus or micro-organisms, in addition to lithates or phosphates.
4. The bladder is imperfectly evacuated, and the residual urine may decompose and produce the symptoms of vesical inflammation.

PRELIMINARY NECROPSIES.

To remedy prolapse of the bladder when the uterovesical connection is elongated (as in I and III) it is plain that elevation of the uterus alone would not be enough, but that elevation and fixation of the bladder is also requisite.

1. *The Urachus.*—One examination of the cadaver was enough to prove that the urachus could not be trusted either to raise the bladder or to retain it in position. It was indeed tough and fibrous in its upper reaches, but at its vesical end it spread out on the bladder wall in a cone of involuntary muscular fibre continuous with the vesical muscle, and little force was needed to uproot it.

2. *The Hypogastric Cords.*—With the object of gauging the strength of these I made ten separate dissections, and I was pleased to find that all ten subjects had cords of considerable strength, that they were firmly attached to the bladder, and even when not very thick they bore a considerable strain before giving way; and in no case were they uprooted at the vesical end, but broke at some point higher up. At subsequent investigations, however, on the dead subject, and in operations on the living, I discovered many more varieties in these structures. Some were surprisingly thick and tough, and others extremely fine. They varied also in symmetry and anatomical disposition.

1. The most frequent arrangement was this: The two cords ascended upward from the sides of the bladder, inclining to each other and to the urachus, but all three remaining separate and distinct cords as far as the umbilicus. (Fig. 1.)

2. In some cases the left cord crosses the urachus and joins the cord on the right side. (Fig. 2.)

3. The cord that crosses is sometimes a fine thread-like fibre. (Fig. 3.)

4. One cord may be wanting, and it appears to be the left that is most frequently absent. (Fig. 4.)

5. A common occurrence is a coalescence of all three structures at a point about 2 inches above the pubes in the middle line, all joining to form an alar expansion at the point of fusion. (Fig. 5.)

Fig. 1.

Fig. 4.

Fig. 2.

Fig. 5.

Fig. 3.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

6. Not infrequently a branch arises from one cord, and crossing inwards obliquely over the middle line, joins the opposite cord at a higher level, thus forming an anastomosis. (Fig. 6.)

7. Sometimes there are two cross branches, or a branch when crossing may divide into two, and join the opposite cord at different levels.

8. The transverse anastomosing branch is in some cases reduced to the size of a mere thread. (Fig. 7.)

As the hypogastric cords are really obliterated foetal vessels, it is not surprising that they should exhibit so many departures from the normal. It is well known that foetal vessels are most unstable structures, and that changes occur in their course with great readiness. Anastomoses are quickly formed, and a new branch will enlarge with such facility that the current is quickly diverted, the main channel shrivelling up and being superseded by the branch.

Soon after the completion of these investigations, a patient presented herself at the Hull Infirmary, with a long history of urinary trouble, and of some obstacle to married life in the shape of a large soft swelling entirely blocking the vaginal ostium. The cystitis from which she suffered was soon relieved by medicine, but she continued to have a considerable amount of residual urine after micturition, and she dwelt much on the symptom of dyspareunia. This gave rise to much mental worry, and encouraged a tendency to melancholia, which was aggravated by some remarks made by her husband. The patient was admitted on October 15th, and was operated on on October 18th, 1895.

OPERATION.

A little above the pubes a vertical incision, 3 inches long, was made through the skin fascia and rectus muscle, exposing the subperitoneal fascia. The sides of the wound were drawn widely aside by means of strong retractors, and the hypogastric cords looked for in the fat overlying the peritoneum. (They are found best about 2 inches above the pubic symphysis, where they are separated by an interval of about an inch.) Having found them, they were separated from the subjacent serous membrane well down to the sides of the

bladder. Next they were dragged well up into the wound, the bladder following, a stitch was passed through the sheath of the rectus and the muscle itself, then transfixing both cords, the needle was brought out through opposite rectus and the fascia covering it. The suture was tied firmly, and several others passed through the same structures above and below, so that the two cords were embedded for a considerable distance in the substance of the approximated recti. Skin sutures were then inserted, and the wound closed and dressed. At the time of the operation I was somewhat disappointed that the bladder did not seem to yield sufficiently to traction, and consequently, not expecting a favourable result, I made no vaginal examination for a week; when I did, I was agreeably surprised to find that the soft mass which had previously filled the vagina had now entirely disappeared. This case I examined quite recently, and it is still in as good position as immediately after operation.

The next case was not quite so successful; when recently examined there was a distinct though moderate recurrence of the cystocele. Five others were operated on with results equal to the first case, and then came a check. In searching for the cords in rather a stout woman but one could be found sufficiently strong for use—the right—the left being a mere thread. Still worse was the ninth case, in whom neither cord could be discovered, although the patient was a spare woman. The urachus was conspicuously present, but broke off on my attempting to utilise it. Clearly I could not wisely persevere with an operation that was based upon structures liable to so much anatomical uncertainty.

3. *By Peritoneal Flap* (see Fig. 8).—This improvement on the above method is performed thus. After the usual incision through skin, fascia, and rectus, the sides of the wound are well separated, and the hypogastrics looked for and defined. Midway between the pubes and umbilicus the peritoneum is divided transversely for about $1\frac{1}{2}$ inch, the mid-point of the incision corresponding with the middle line (1.....2, Fig. 9). From each end of this incision the peritoneum is divided with a pair of scissors downward and outward toward the sides of the bladder (1.....3 and 2.....4, Fig. 9), just outside the cords. (The flap thus formed is attached to the back of the bladder, and includes the hypogastrics and the urachus.) By dragging on this flap the bladder is drawn upwards, and is retained in position by sutures passing through the flap, recti muscles, and fascia. In this way one is independent of the hypogastric cords, though, if present, they help to strengthen the flap.

4. *Flap Operation with Separation of the Bladder in Front.*—The flap operation proved, on the whole, successful, but in 3 cases out of 14 the cystocele was not completely reduced. It was evident that more elevation was required. With this object in view I have in subsequent cases passed my hand behind the pubes, and completely separated the bladder in front and laterally. After this the bladder can be well drawn into the wound, and fixed at whatever level is considered advisable.

Up to December 31st I had operated on 25 cases by No. 4 method. Of these, 19 have given me absolutely favourable reports, expressing themselves variously—as “never better,” etc. Many of them I have examined digitally, raised on the elbow and when coughing. Three I have lost sight of, and one was, I believe, a failure, and was operated on by another surgeon. Three still complain, two of a persistence of the feeling of down-bearing, though on examination I find no sign of prolapse, and they are not free from symptoms of hysteria. The other complains of pain and frequency of micturition, and she has several times had a recrudescence of the cystitis from which she had long suffered. There have been no deaths.

THE INFLUENCE OF LOCALITY ON THE PREVALENCE OF MALIGNANT DISEASE.

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THE following extracts from my paper read at the annual meeting of the British Medical Association in London, 1895, gave very much the same evidence (facts) of the extra prevalence of malignant disease in river-watered valleys, as de-

scribed in Dr. E. N. Nason's paper in the BRITISH MEDICAL JOURNAL of March 5th. Moreover, the village in the Hampshire chalk valley I have described has alongside the main street a tributary to the river Test. This rivulet, when the local springs are low, disappears annually, and probably carries into the wells by “soakage” deleterious deposits to the drinking water.

In a paper read at the annual meeting of the Association in Bournemouth, 1891, I gave the history of a farmer's family living in a good substantial house at the terminal end of a long straggling village, containing about 800 inhabitants, situated in a chalk valley. The main road only divided the farmhouse from the village schoolhouse, a narrow strip of garden divided it from the churchyard, close to this on the other side was the vicarage, and near and below that was a labourer's cottage. Each of these dwellings had its separate well for drinking water sunk into the subsoil of chalk. There is also a rivulet running close to these dwellings part of the year. In all those dwellings I have seen and attended cases of cancer more than twenty years ago, and the successor to my practice there has attended and known of other cases of cancer since then at the same farmhouse in members of different families from those who previously occupied the same.

In the surrounding villages on the hills, where rain water from ponds is used much more than well water, the cases were not so prevalent. These ponds are kept clean when required for domestic purposes, fenced in to keep out cattle, and are kept free from vegetation. They supply all drinking water when the springs in wells are low. In the valley well water is almost entirely used for drinking purposes, and these wells are made in solid chalk.

The glandular system is more fully developed in women than men, and this may be one of the causes of the greater frequency of cancer in women. Women are habitual water drinkers; they suffer from habitual constipation, perhaps partly from their sedentary lives, and drinking hard water increases this trouble. Would not this suggest another cause for the greater frequency of cancer in women?

The cases among the men in the chalk valley, to which I have referred, and frequently following that common trouble there—constipation of the bowels—chiefly involved the intestinal tract, and were mostly cases of cancer of the rectum.

As Vice-President of the Dorset and West Hants Branch of the British Medical Association, I was called upon to open a discussion at their summer meeting held at Bridport in the year 1895, and I chose for discussion the question, Is Cancer a Waterborne Disease? with special reference to its frequent occurrence in chalk valleys and districts, containing periodical springs and rivulets. I then referred to the reported rapid increase of cancer in America, and suggested that it would be well if we could ascertain if it was of greater frequency there in chalk and limestone districts.

I also referred to this disease in grazing animals, and to the fact that horses in Australia suffer from swamp cancer in the axilla from grazing on stagnant marsh grass, the tumours growing to an enormous size. I also mentioned the fact of cattle and pigs wallowing in the shallows of sinking rivulets, and their excretions polluting the same. I spoke of a common practice in the bacon-producing counties of Hampshire and Wiltshire, of labourers eating their bacon uncooked, and of frugal farmers having been known to do the same to avoid waste of the fat in boiling. Is it possible, then, that cancer germs can find temporary lodgment and be reconveyed from animals to man? The question whether the hardness of water from lime deposits may have anything to do with forming a cancer matrix in them, and disorganising the absorbent and excretory glands, seems to be nearer the mark, and worth our consideration.

At our discussion at Bridport, Dr. McLean, of Portland, said that in making reports for the County Hospital, he noticed larger numbers of cases from the same places, and he thought it would be well for medical officers of health to make a note of this in their returns, and investigate those localities where the cases predominate. Mr. Parkinson, of Wimborne Minster, thought that the Government return should have a special column for cancer cases.

If Mr. Parkinson's suggestion can be adopted, and in the future Government returns be made to notify the nature of the subsoil, with special reference to the hardness or softness