the bones were fastened together in exactly the same way as in the last case. I found I had removed $\frac{3}{4}$ inches of the tibia. The growth was a typical myeloid sarcoma, but there were no hæmorrhages or cysts.

Fig. 3.

Microscopic examination showed the usual structure of such a tumour. The growth was only covered by a thin shell of bone on its posterior aspect, and on its anterior and outer surface there was only a capsule with plates of bone in it. Above it had not reached the articular cartilage. The foot was put up in the same way as in the last case, on a long back splint with footpiece. I have no note of any trouble from rotation of the femur outwards. I think probably the screw held the bones so well together that this could be prevented by fixation of the foot against the vertical footpiece. Primary union was obtained, except where the screw had protruded. The screw was removed on November 1st, and on the 13th the limb was put up in plaster. She continued the plaster case until March, 1898, as some movements remained between the bones, and I hoped for bony union. On March 17th a light poroplastic case, such as a patient would wear after fracture of the patella, was substituted for the plaster and a high-soled boot made for her. When seen on May 15th there was still a little movement between the bones, but with the poroplastic case and the high-soled boot she could walk a little in the house without artificial support.

NOTE AND REFERENCES.

¹ *System of Surgery*, 1882, vol. i, p. 881. ² *Edinburgh Medical Journal*, 1897, N. S., vol. i, p. 156. ³ *Treves's System of Surgery*, vol. i, p. 916. ⁴ *Clin. Soc. Trans.*, vol. x. ⁵ *Ibid.*, vol. xxvii, p. 290. ⁶ *Ibid.*, vol. xxvii, p. 86. ⁷ *Medical Chronicle*, 1887, vol. v, No. 4, p. 291. ⁸ *Clinical Surgery*, 1881, p. 451. ⁹ The English and American Textbooks of Surgery do not suggest such an operation, though many of them recommend excision in the bones of the forearm or the fibula. ¹⁰ *St. Bartholomew's Hospital Reports*, vol. xxxi, p. 35. ¹¹ *Ibid.*, p. 36. ¹² *BRITISH MEDICAL JOURNAL*, 1898, i, p. 555. ¹³ *Bristol Medico-Chirurgical Journal*, June, 1897, p. 212.

COXA VARA OR DEFLECTION OF THE NECK OF
THE FEMUR.*

By A. H. TUBBY, M.S.LOND., F.R.C.S.ENG.,

Senior Assistant Surgeon to Westminster Hospital; Surgeon to the National Orthopaedic and Evelina Hospitals.

THERE can be little doubt that the condition of the bones—that is their tone, so to speak—varies from time to time quite as much as that of the muscles and ligaments. In infantile rickets this is so, and one is accustomed to form some of the elements of prognosis on the elasticity or otherwise of the bones. During adolescence and adult life from time to time there occur various changes in the resistance of the bones to strains, changes which are not associated with gross lesions, such as osteomalacia or osteitis deformans, but conditions which are thoroughly dependent on the varying states of health at different times. What may be called the true tone of bone is its power of resistance to continued pressure. Loss of power of resistance will necessarily be shown in those parts which are subject to the greatest pressure at a mechanical disadvantage. Such a part is the neck and head of the thigh bone, and the effect of pressure *plus* softening of the bone is to push the head of the thigh bone downwards, to cause the neck to become more horizontal, and so to give rise to the deformity under notice.

Fig. 1.—Outline of the depressed head and neck of the femur in coxa vara in Müller's specimen. The unusual position is shown by the dotted line (after Royal Whitman).

Fig. 2.—Outline of the depressed head and neck of the femur in coxa vara in Hoffa's specimen, contrasted with the normal position shown by the dotted line (after Royal Whitman).

The existence of downward deflection of the neck of the femur in rickets has not often hitherto been noticed, but if one takes the trouble to examine a considerable number of cases of rickets, it is met with very frequently. So long ago as 1843 Roser observed bending of the neck of the femur in the otherwise healthy bone of adolescence. And in 1857 Richardson described in the *Transactions of the Philadelphia Pathological Society* a case of deformity of the neck of the thigh bone simulating fracture; and Keetley, in the *Illustrated Medical News*, September, 1888, and *Annals of Surgery*, vol. ii, p. 308, has put on record a curious case which gave rise to a good deal of difficulty in diagnosis, but which, in the light of subsequent researches, appears to have been a probable case of coxa vara. At any rate, Mr. Keetley successfully employed treatment which we now know to be necessary for the restoration of the deformity arising from the affection under notice.

The essential nature of the deformity being a downward bending of the neck and head of the femur in such a way that the latter comes to lie below the level of the great trochanter and to form an acute angle with the shaft of the femur, it is necessary to note the varieties of the affection and the time of their occurrence. In the most recent article on the subject by De Quervain in *La Semaine Médicale*, January 29th, 1898, the following varieties are described. First of all, congenital, which is admitted to be rare; then the most common form, the rickety form of coxa vara, in which bending of the neck of the femur may take place either directly downwards, or downwards and backwards. Lauenstein¹ had in his possession specimens taken from a child, aged 6 years, who died after osteotomy for other rachitic deformity in the lower limbs. Both femoral necks were in this case much bent.

* A paper read before the Hunterian Society.

Nélaton had previously noticed elevation of the trochanters in rachitic children. Two cases have recently come under my own observation at the National Orthopædic Hospital, one in a child aged 4, and the other in a child aged 7. In the first-mentioned case the affection was bilateral, and the trochanters were half an inch above Nélaton's line. In the second case the left hip only was affected, and the trochanter was three-quarters of an inch above Nélaton's line. In neither was there any of that downward movement of the trochanter on traction of the leg so characteristic of congenital hip displacement, a condition with which coxa vara has been often mistaken.

The next variety is coxa vara of adolescence. Three forms of this have been described. Coxa vara adducta, or direct downward displacement of the head and the neck of the femur; then downward and backward displacement of the neck, with rotation of the head on its long axis as a modification of the last-named; and a class of case which is characterised by elevation of the trochanter and anteversion of the head of the femur. Another variety is coxa vara of adults which is generally due to osteomalacia. With reference to the etiology, the majority of cases of coxa vara is due to rickets, either infantile or adolescent (late rickets). In the latter case the disease is said to be local in its manifestation. It seems that there are some conditions which are predisposing. These are inflammatory processes in the neck of the femur, generally osteomyelitic or arising from the epiphyses, and employments which necessitate much standing or lifting of weights. Occasionally there is a distinct history of injury preceding it. The affection may be unilateral or bilateral. It is, perhaps, more often bilateral, and is seen more frequently in males.

The symptoms in the adolescent form are as follows: Often without apparent cause or following a slight injury, the patient begins to limp and to complain of fatigue and pain about the affected joint on exertion. Shortening of the limb is soon apparent, and is accompanied by elevation of the trochanter above Nélaton's line. The limb is usually extended or flexed to a few degrees and somewhat rotated outwards. The motion of the joint is diminished particularly in adduction, as a rule there is no local tenderness on pressure. The most striking signs are the adduction of the thighs, the shortening of the limb, and the elevation of the trochanter. Royal Whitman,² to whom we owe a very graphic description of the affection, details several cases. I may, however, briefly sum the symptoms as follows:

1. Age: Either in infancy or adolescence, less often in childhood.
2. Class of patients: Rickety and those who carry weights or do much walking and are subject to prolonged fatigue.
3. Onset: Peculiar stiffness of hip, spoken of as "growing" pains, the stiffness is worse on rising after sitting for a time, but is relieved by complete rest.
4. Limping, if one side is affected; waddling, if both sides.
5. Shortening, amounting to as much as $1\frac{1}{2}$ inch.
6. Prominence of the trochanter, especially on flexing the thighs.
7. Displacement of the trochanter above Nélaton's line, and sometimes backwards.
8. Rotation outwards of the limb and eversion of the foot.
9. Limitation of inversion and final loss of abduction, with, in extreme cases, scissor-leg progression and inability to walk without crutches.
10. Tilting of the pelvis and consecutive scoliosis.
11. Signs either of infantile rickets or of late rickets, the so-called rickets of adolescence.

Negatively, the absence of the following symptoms may be observed:

1. No local swelling except that presented by the displaced trochanter, and no tenderness on pressure.
2. Absence of the up-and-down movement or telescopic movement on traction of the limb so characteristic of congenital hip displacement.
3. Suppuration never occurs, nor is the thickening of the trochanter found.

I here append notes of two cases of my own and two of Royal Whitman.

CASE I.—A. H., aged 9 years, came under my care at the Evelina Hospital on July 21st, 1897. The mother had observed that the left leg seemed longer than the right when the patient was a baby about 18 months or

2 years old, and she had since noticed that the left leg got longer gradually, and the right did not seem to grow as quickly as the left. There was no history of tubercle except in the case of the grandfather, who had died of phthisis. The child complained of some pain in the right hip, and was limping considerably in walking. On examination, the right leg was found to be three-quarters of an inch shorter than the left; the trochanter was three-quarters of an inch above Nélaton's line, whereas

Fig. 3.—Coxa vara on the right side: the tilting of the pelvis, the prominent great trochanter, and the shortened limb are well seen.

Fig. 4.—Back view of the case of coxa vara in Fig. 3.

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.

REFERENCES.

- 1 Bemerkungen zu dem Neugungswinkel des Schenkelhalses, *Archiv für klin. Chir.*, Bd. xi, s. 2, 44. 2 Observations on the Bending of the Neck of the Femur in Adolescents, *Trans. Amer. Orthop. Assoc.*, vol. vii, pp. 273-293.

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

By D. LOWSON, M.D.,

Surgeon, Hull Royal Infirmary and Hull Orthopædic Hospital.

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