

which bones may be divided, other deformities, such as knock-knee or *genu valgum* and bow-leg or *genu varum*, have been remedied by operation. Drs Macewen of Glasgow, Ogston of Aberdeen, Schede of Hamburg, and the present writer have been working at this subject and have devised, more especially in knock-knee, various methods of remedying the deformity. Operations are only justifiable when the deformity has become chronic. During the advancing stage, when the deformity is getting worse, when the bones are still cartilaginous and plastic, the evil can be remedied by mechanical means. This statement may be best illustrated by a short consideration of the development of the lower limbs and the changes which normally take place. At birth all children are more or less bandy-legged. The child lies on its nurse's knee with the soles of the feet facing one another; the tibiae and femora are curved outwards; and, if the limbs are extended, although the ankles are in contact, there is a distinct space between the knee joints. During the first year of life a gradual change takes place. The knee joints approach one another; the femora slope downwards and inwards towards the knee joints; the tibiae become straight; and the sole of the foot faces almost directly downwards. While these changes are occurring, the bones, which at first consist principally of cartilage, are gradually becoming ossified, and in a normal child by the time it begins to walk the lower limbs are prepared, both by their general direction and by the rigidity of the bones which form them, to support the weight of the body. If, however, the child attempts either as the result of imitation or from encouragement to walk before the normal bandy condition has passed off, the result will necessarily be either an arrest in the development of the limbs or an increase of the bandy condition. If the child is weakly, either rachitic or suffering from any ailment which prevents the due ossification of the bones, or is improperly fed, the bandy condition may remain persistent. As a rule, however, in children that are precocious as regards walking, if proper care is taken the bandy condition will disappear without any special treatment. In a healthy child who does not attempt to walk until the limbs are prepared to support the weight of the body, no further abnormal change takes place. But in a weakly child in whom the development already described has occurred, in whom the limbs as regards their general direction are prepared for the support of the body, but in whom the bones forming the limbs are not sufficiently ossified, as in the rachitic child, the shafts of the femora above the knee and the shafts of the tibiae below the knee bend forwards; at the same time a change takes place at the knee joint,—the condition called *knock-knee*. In the normal limbs, the tibiae being vertical and parallel, and the distance between the upper extremities of the femora being greater than that between their lower extremities, the femora necessarily slope inwards towards the middle line, and there is therefore in every properly developed person an angle at the knee joint. If at this stage the bones are sufficiently rigid to bear the weight of the patient, no further change takes place; but, if the limbs give way and are not sufficiently strong, the normal angle at the knee joint increases and the internal lateral ligament of the knee joint becomes stretched,—the result being knock-knee. The condition may be arrested in its earliest stage by an improvement in the general health of the child; but, if no such improvement takes place, and if the child is allowed to walk, then definite changes occur in the bones which form the knee joint. These changes are the direct outcome of a general law, namely, that diminished pressure results in increased growth, increased pressure in diminished growth. The best example of the former principle is the rapid growth that takes place in a child that is confined to bed during a prolonged illness. The distorted, stunted, shortened, and fashionable foot of the Chinese lady is an example of the latter. In the knee joint there is diminished pressure between the internal condyle of the femur and the inner condyle surface of the tibia; there is increased pressure between the external condyle of the femur and the outer condyle surface of the tibia. The result is an increased growth of the internal and a diminished growth of the external condyles; the knock-kneed condition is intensified, and will go on as long as the primary cause is at work, getting worse and worse, and will only cease when the bones become fully developed. As long as the disease is getting worse, the application of a rigid splint to the outer side of the limb fixed at the foot and at the upper part of the thigh, and the arrangement of an elastic bandage so as to draw the limb towards the splint, the person being kept in the horizontal posture, will cause a diminution in the pressure on the external condyles followed by their increased growth, and by an increased pressure on the internal condyles followed by

a diminished growth. This effect may be obtained by applying a weight to the limb; and by mechanical means founded on this general law cases of knock-knee that are getting worse can be improved. At first there is an arrest in the abnormality, which is soon followed by improvement. The different methods that have been recommended for division of the bones are only necessary in those cases in which they have become permanently distorted.

(3) Lateral curvature of the spine is a deformity which occurs during the developing period of life before the bodies of the vertebrae are fully ossified. In young people who are growing rapidly, and whose muscular system is weak, any bad habit, as, for example, that of standing and throwing the weight of the body constantly on one leg, gives rise to a drooping of the pelvis on one side; or, if, when writing at a desk, they are allowed to sit in a twisted position, a lateral curvature of the spine takes place. By constant indulgence in these bad habits the cartilaginous spinal column gets set in an abnormal direction. In the concavity of the curve there is increased pressure and necessarily diminished growth, in the convexity of the curve diminished pressure with increased growth. The patient's friends will probably notice first the right scapula being pushed backwards by the underlying ribs, which from their close attachment to the dorsal vertebrae participate in a rotatory movement occurring in the vertebrae themselves, and, unless means are taken to alter the abnormal distribution of pressure, the condition will become worse and worse, until complete ossification checks the progress of the deformity. The commonest curvature is one in which there is a dorsal convexity towards the right, with the right shoulder higher than the left. Compensatory curves in the opposite direction form in the lumbar and cervical regions. Along with the lateral curvature a rotation of the bodies of the vertebrae towards the convexity of the curve takes place; their spinous processes necessarily turn towards the concavity of the curve. Since the line of the spinous processes of the vertebrae can be easily traced through the skin, their deviation may mislead the superficial observer as to the true direction in which curvature has taken place. As the lateral curvature occurs the articular facets along the line of the concavity are pressed together, the line of these facets being posterior to the bodies of the vertebrae and their intervening elastic intervertebral disks. The result of this is that the vertebral column as a whole cannot fly away towards the convexity. The anterior parts of the bodies, being farthest away from the fixed point, are least restrained from movement, and they pass away to a greater extent than the posterior parts. The result is a rotation of each vertebra in the direction indicated. To counteract this deformity in the earliest stages, the patient (generally a girl) should be encouraged to walk about with a book on her head, to retain which in position she must necessarily keep perfectly erect. Muscular exercises, to strengthen the muscles of the back, ought to be enjoined and superintended by the surgeon. During the intervals of rest she should lie upon her back on a firm board, and should carefully avoid taking any exercise which gives rise to weariness of the muscles; for, whenever the muscles become strained, she will attempt to take up a position which throws the strain off them on to her ligamentous and bony structures. One of the best exercises is to lay the patient on her face, fix her feet, and encourage her to raise herself by using the muscles of the back. When the deformity becomes more marked the use of the trapeze should be prescribed. Hanging with her arms upon the trapeze, the weight of the lower limbs and pelvis will tend to straighten the spine as a whole, necessarily diminishing the increased pressure upon the cartilaginous bodies of the vertebrae towards the concavity, and increasing the pressure between the sides of the bodies towards the convexity. The tendency to rotation must be counteracted in another way. The pelvis being fixed, elastic bands attached to fixed points, one in front of the patient towards her left side, another behind her towards her right side, are to be grasped by her right and left hands respectively, the right arm passing in front of her body, the left arm behind it. When the patient stretches both hands simultaneously there will be an untwisting of the spine in a direction opposite to the abnormal rotation. In this description, the common curvature—namely, of the dorsal region towards the right—has been taken as a typical example to illustrate the treatment. When the dorsal curve is in the opposite direction, the untwisting of the curve must necessarily be in the opposite direction also. During the intervals of active treatment the patient must wear a rigid support, which in itself has no direct curative action, but will materially assist the treatment by preventing the good result obtained by the muscular exercises from being nullified. (S. C.)

SURINAM. See GULANA, DUTCH, vol. xi. p. 251.

SURRENDER is a mode of alienation of real estate. It is defined by Lord Coke to be "the yielding up of an estate for life or years to him that hath an immediate estate in reversion or remainder" (Coke upon Littleton,

337b). It is precisely the converse of release, which is a conveyance by the reversioner or remainderman to the tenant of the particular estate. A surrender is the usual means of effecting the alienation of copyholds. The surrender is made to the lord, who grants admittance to the