Lectures ON ORTHOPÆDIC SURGERY.

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LECTURE I.

ON CURVATURES OF THE SPINE.

CURVATURES of the spine are anterior (*lordosis*), posterior (*cyphosis*), and lateral (*scoliosis*).

These terms, *lordosis*, *cyphosis*, and *scoliosis*, have been applied to curvatures of the spine ever since the time of Hippocrates. They were not used then, however, exactly in the same sense as they are now understood; for the term *scoliosis*, which now signifies lateral curvature of the spine, was then frequently applied indiscriminately to every form of spinal distortion. Before we proceed to consider these pathological conditions, however, it may be advantageous to glance at the normal—physiological—curves of the spinal column, as they occur in the *fœtus in utero*, after birth, and in the adult; and to

consider very briefly their formation and their purposes.

Normal or Physiological Antero-posterior Spinal Curves.

The spine in the *fœtus* is bent forwards, being moulded in its curve by the walls of the uterus; the head is bent upon the breast and the thighs upon the abdomen.

In the infant, the spine remains almost straight when in the horizontal position; the sacrum is then but little curved, and the obliquity of the pelvis is greater than in the adult.

The normal—antero-posterior—curves are developed slowly, and depend in great measure on muscular action, and on the erect position which man is destined to assume. At birth they do not exist. And in the young child, they are not constant, but disappear in the horizontal position. Gradually, however, they become more or less permanent; and before growth is complete, the spine has lost much of its flexibility, and has gained, as a constant condition, lumbar, dorsal, and cervical curves.

On examining carefully the spinal column in the erect position, it will be seen that the base of the sacrum is so placed that it is immediately above a straight line which may be supposed to pass through

Fig. 1.

Fig. 2.

the heads of the thigh-bones, and which has been called the inter-femoral line. (See Fig. 1.) This fact was demonstrated by MM. Weber. Nægele also proved the position of the pelvis. Before he demonstrated the fact, it was believed that the pelvis was more horizontal than is absolutely the case. The pelvis is so oblique that the anterior wall (pubes) presents upwards and backwards, and the posterior wall (sacrum and coccyx) downwards and forwards, as is shown in Fig. 2. Such, then,

being the positions of the pelvis and of the sacro-lumbar articulation, how is equilibrium maintained?

Equilibrium is the result of certain forces acting in front of, and behind, the spinal column; namely, the action of the flexors and extensors of the trunk, neck, and head, and the resistance of the ligaments that hold together the several vertebræ which form the spinal column. In the erect posture, these structures combine to poise the head and the ver-

tebral column in the vertical line on the heads of the thigh-bones. (See Fig. 3.)

In considering this question, the weight of the viscera should not be forgotten. In this sketch, however, the chief points only will be considered.

The position of the sacro-vertebral articulation being, then, such as has been described, it becomes necessary for the maintenance of equilibrium, and that the head may be poised (its centre of gravity corresponding with a vertical line which coincides with the axis of the trunk, and which shall fall on the inter-femoral line), *first, that the lumbar vertebrae shall be curved backwards.* This lumbar curve is the result of muscular action in the endeavour to maintain the erect position. It is the reverse of the sacral curve; and it springs from the sacro-lumbar articulation upwards and backwards, the sacral curve commencing at the same articulation, and presenting downwards and forwards. But the lumbar curve having been formed, it is essential that a second curve—the dorsal—shall restore the direction of the spine towards the perpendicular line; and, for the same reason, the cervical curve is formed in the same direction as the lumbar curve. These several portions of the spine differ somewhat in flexibility, the lumbar and dorsal portions possessing this quality very nearly in equal degrees; but in the cervical region the flexibility is three times that of either of the former. A structure is thus composed of segments of various circles, strong, yet elastic, fitted to bear the superincumbent weight, and to resist the effects of shock.

It would perhaps be impossible to imagine a structure more perfectly adapted to its purposes than the spinal column, formed as it is of separate pieces, severally united by discs of fibro-cartilage, bound together by numerous and strong ligaments, and surrounded and acted on by powerful muscles. Its flexibility and its curved form are points of even more importance than its great strength: these adapt the spine specially to its purposes.

Not to enter too minutely into questions of physiology, I would only allude to the opinions of some eminent physiologists, as the Webers, Cruveilhier, Bishop, and others, who have stated their belief that the normal curves of the spine depend on varying thicknesses of the bodies of the vertebrae and of the intervertebral substances. It is true, as the Webers have shown, that in the dorsal region of the spine especially, differences exist on the anterior and the posterior surfaces of the vertebrae; namely, that on their anterior surfaces—in the concavity of the curve—they are somewhat thinner than posteriorly; while in the lumbar and cervical regions, the fibro-cartilages are especially affected, being compressed posteriorly. It has been already shown, however, that the physiological—antero-posterior—curves do not exist at birth; and that, when first observed, they are not permanent, but are lost in the horizontal posture. It should also be remembered that these inequalities in the vertebrae and the inter-

Fig. 3.

tebral substances do not exist at birth, nor are they found until the spinal curves commence to be permanent. Such being the case, it follows as a necessary consequence, that these differences in the anterior and posterior surfaces of the bodies of the vertebrae, and especially of the fibro-cartilages, are due to the antero-posterior curves—are due, in fact, to the erect position and to the pressure from above downwards consequent on that position.

The effect of pressure on the intervertebral cartilages is shown by the loss of height which is sustained at the end of the day. Thus it is well known that a man of middle stature, who has remained in the erect posture during the whole day, will have lost nearly one inch in height; and that this will only be regained after he has been in the recumbent position for six or eight hours. It is only logical, therefore, to conclude that these varying thicknesses of the bodies of the vertebrae and of the intervertebral substances are produced by pressure as a result of the erect position; and that they would never be developed, any more than the antero-posterior curves themselves, in the horizontal position.

Thus it may be stated that the antero-posterior curves of the spinal column result from the erect position, and from muscular action to maintain equilibrium; and that unequal pressure occasions thinning of the bodies of the vertebrae and of the intervertebral substances in the concavities of the curves. This view will be confirmed by the consideration of pathological curves.

OUR LONDON MILK. Mr. Cosmo Logie, of the Horse Guards, says, that he has lately visited several London dairies. He finds that all new cows are inoculated, and in this way: a slit is made in the tail, and in the slit a bit of pleuro-pneumonic lung is inserted, and tied up. Suppuration follows; and he has seen milking going on beneath the pus-dripping tail, and asserts that pus often flies off from the wagging tail into the neighbouring milking-pail.

AGE OF THE PEOPLE. England (including Wales) was found to have in it, when the census was taken in April 1861, 593,721 babes and sucklings under one year old; 2,107,661 infants of one year but under five years old; 2,344,066 children of 5 to 10; 1,059,889 boys and 1,045,287 girls 10 to 15; 957,930 youths and 974,712 maidens 15 to 20 (though, to speak by the card, we should distinguish 29,719 as thus early wed); 1,594,497 young men and 1,804,160 young women 20 to 30; 2,947,534 men and 3,149,320 women of middle-age, 30 to 60; and 641,282 old men, and 733,515 old women, 60 to 80; and 47,260 very aged men, and 65,990 very aged women, above 80. The young population under 20 amounted in number to 9,082,666; the population 20 years old and upwards were 10,983,558. In the 10 years 1851-1861 the young population under 20 increased by 971,654, and the population 20 years old and upwards by 1,166,961. The rate of increase, though very nearly the same in both classes, was slightly higher among the young than among the older population; not only the absolute number of births, but the ratio of births to population, is increasing. The population of England divides into two equal parts in respect to age at a little over 22; and it is nearly 29 times the annual number of births. These statements do not include our soldiers, sailors, and merchant seamen abroad, so that the number of men in the middle period of life is to a certain extent unduly depressed. The very aged have not in the last ten years increased in near the same proportion as the general population.