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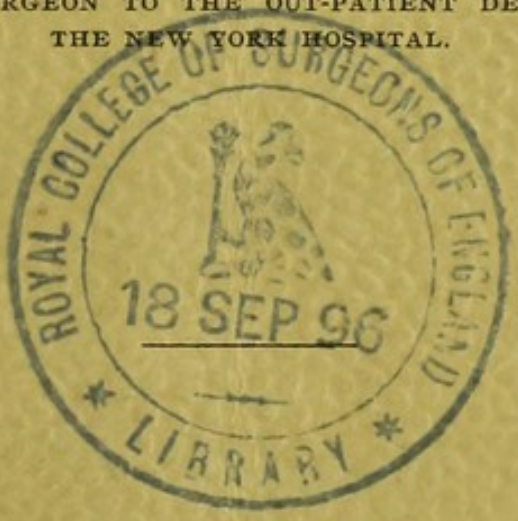

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PRACTICAL INFERENCES FROM CLINICAL OBSERVATIONS IN LATERAL CURVATURE OF THE SPINE.[1]

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IN a majority of the patients affected with lateral curvature of the spine it becomes evident at the very first examination that the curvature and rotation are diminished when the weight of the upper part of the body is removed from the vertebral column. This weight may be removed by causing the patient to lie down or to suspend the body by the hands. When the patient is hanging from an overhead bar the deformity largely or entirely disappears. The curved line of the spinous processes partly straightens itself, and the lateral prominences, caused by rotation, partly subside; and when the patient releases the bar these elements of deformity reappear. These changes occur with the repeated use of the bar in a sudden and striking manner. They are also seen when the patient alternates between standing and recumbency. If the patient lies prone the spinous processes arrange themselves in a comparatively straight line, and the shoulders and hips approach symmetry. But when the erect position is resumed deformity returns in full force. Doubtless the same alternations oc-

[1] Presented at the Tenth Session of the American Orthopedic Association at Buffalo, N. Y., May, 1896.

cur with the supine, as well as the prone attitude, but they are not, from the nature of the case, then visible.

It is an interesting question whether spinal curvature and rotation can occur in a child whose attitude is absolutely uninterrupted recumbency, whose body has never been either actively or passively placed in a vertical position. If we say that the downward pressure of the head and the upper extremities is the immediate cause and that some, as yet unexplained, inability to properly sustain this weight is the indirect cause, we may be right in the supposition that absolute recumbency would be a preventive of lateral curvature. However this speculative question may be viewed the facts above recalled will surely furnish useful hints for the treatment of this deformity in a growing child. "As the twig is bent the tree is inclined" is a proverb applicable here. It follows that suspension and recumbency are two attitudes which should be prescribed, and the more time given to them the greater is the advantage to be gained from the growth of the patient. In suspension there should be no muscular effort beyond that required to keep the fingers flexed on the suspension bar, and in the meantime the body should swing gently, as a means of timing the suspension, seven vibrations, backward and forward, measuring one-quarter of a minute, which is commonly sufficient for each effort. Recumbency should be practised several hours daily, the position being supine, with an air-pillow so placed under the

back as to maintain lordosis, and this should be observed so far as it is practicable at night.

Continuing our observations, it is seen, sooner or later, that fatigue or general weakness increases the deformity. If the patient comes in after a long walk or a tiresome journey, or if she is suffering an indisposition, the deformity is greater than it would otherwise be. So that if the patient is pale and tired examination will reveal more than the customary curvature and rotation; while, on the other hand, if she is not tired and is sustained by good sleep and digestion, the general well-being will find expression not only in the face but also in a diminution of the curvature and rotation.

The fact that the intervention of general fatigue increases the deformity is in accord with the view that one of the causes of lateral curvature is muscular failure to hold the spine erect under its natural burden. A sequence of causes may be arranged as follows: Diminution of the capacity of the chest is caused by rotation; rotation is caused (1) by the comparative wide lateral excursion of the bodies of the vertebræ, while the processes are hindered from wide lateral mobility by their entanglement in the posterior parietes; (2) by the curvature; the curvature is caused by failure of the muscular system of the spine to hold the vertebral column erect under its natural burden; failure of the muscles to do their duty is caused by defective innervation; the cause of defective innervation is as yet conjectural.

Whatever may be thought of this arrangement of factors, practically we may accept a hint from the observation that fatigue accentuates the deformity. Throughout the growing period over-exertion should be avoided. The child should not be told to "sit up straight," but rather to lie down. The recumbent position should be often taken and for long periods. Moderation should be the rule in all active amusements, and in all the duties, physical and mental, which fall to the lot of the child at home and at school.

Continuing our clinical observations, we become aware of the fact that the chest is expanded during suspension. This attitude expands the chest with as much directness as manual traction and counter-traction enlarge the cavity of a pair of bellows. The anatomical and physiological reasons for this effect were originally stated by our Honorary Member, Dr. Henry G. Davis.[1] When suspension is practised the muscles, which pass from the ribs to the humeri, attach the sternal ends of the ribs to the suspension bar by the intervention of the arm, forearm, and hand, while the vertebral ends of the ribs are powerfully drawn downward by the combined weight of the body and the lower limbs, producing forced inspiration in a very positive manner. This position is an exaggeration of Sylvester's method for the resuscitation of the apparently

[1] "On the development of the thorax by special exercises, as a prophylactic and remedial measure in phthisis and other chronic affections of the lungs." *American Med. Monthly*, March, 1858, pp. 161–173. "Conservative Surgery," 1867, pp. 283–307. These pages were reprinted with the title, "Curability of Pulmonary Consumption."

drowned, in which the operator produces artificial inspiration by drawing the arms forcibly above the head. In suspension, however, the force applied is the weight of a large part of the body, and is much greater than can be applied by manual traction on the arms of a supine patient. The repeated and persevering application of this force may be reasonably expected in time to have a lasting effect on the size of the thorax and the size of the lungs, and further consideration will show that in this agent we have a method of directly opposing the deformity, of doing what we vainly try to do by the use of mechanical pressure. A brace is powerless to reduce rotary lateral curvature. Its application is injurious rather than beneficial. As the ribs are attached chiefly to the processes instead of the bodies of the vertebral column, the first effect of the lateral pressure made by a brace on the ribs is to increase rotation, and curvature, and contraction of the chest. With suspension, however, what we cannot do by pressure from without, we can do by over-filling or inflating the space within, by a forced development of its normal contents. The emphasis thus given to the value of suspension is increased by the consideration that improved respiration applies a stimulus to the general health and indirectly gives tone to the muscular system, whose failure is one of the causes of lateral curvature.

Our knowledge of the pathology of this affection is insufficient to determine its treatment, but clinical observation provides a rational

ground for active and persevering treatment, with a certainty of preventing an increase of deformity and a prospect of improving the condition in favorable cases.