

of inter-vertebral substance than the other regions, and whose concavity is chiefly due to the shape of the bones of the vertebræ and not to the shape of the inter-vertebral disks, as in the other regions.

As the inter-vertebral disks form about one-fourth of the spinal column, exclusive of the first two vertebræ, and as they are both compressible and extensible, it will readily be seen that they exercise a very important influence upon the production of extension of the spine. And here I wish to have it understood exactly what is meant by the word *extension* in this connection.

Extension is a word used to define the condition of a joint, or any portion of the body, produced by traction exerted in such a manner as to stretch it.

Traction is the active cause; *extension* the result—and it should not be confounded with the same word when used to express the motion of a limb as opposed to flexion. In addition to the inter-vertebral substance, the *ligamenta subflava* should also be given prominence as a factor in allowing the vertebral column to be elongated by traction. They are interposed between the laminae of the vertebræ from the axis to the sacrum, and consist of *yellow elastic tissue*, the fibres of which are almost perpendicular in direction. In the cervical region they are thin in texture, but very broad and long; thicker in the dorsal region, and in the lumbar region are noticeably so.

These ligaments are very elastic, serving to preserve the upright posture, and to assist in resuming it after the spine has been flexed. When traction is exerted during posterior curving of the spine, the extension condition is allowed to be produced mainly by the elastic nature of the inter-vertebral disks, and this is limited chiefly by the resistance of the anterior common ligament.

In the same manner, when traction is exerted during anterior curving of the spine, the extension condition is allowed mainly by the elastic nature of the *ligamenta subflava* and is limited chiefly by the resistance of the supra-spinous ligament. The construction of the capsular ligaments is also such as to permit this stretching to be accomplished. They are thin and loose ligamentous sacs attached to the contiguous margins of the articulating processes of each vertebra through the greater part of their circumference, and completed internally by the *ligamenta subflava*. They are longer and more loose in the cervical than in

the dorsal or lumbar regions, and are lined on their inner surface by synovial membrane.

Attention is called to those ligaments particularly, because in anterior curving of the spine it will be noticed that their sac-like construction does not interfere with the gliding upward of each inferior articular process of the vertebræ upon the articular process of the vertebra beneath, and does not oppose an obstacle to the stretching of the *ligamenta subflava*.

I shall first invite your attention to the merits of traction during posterior curving of the spine, as an essential principle of the treatment of Pott's disease. It is a well-known fact that this disease very rarely involves any other portion of a vertebra than its body in the early stages, and this clinical fact must be borne in mind in considering the mechanical treatment of this condition. Traction may also be exerted symmetrically instead of posteriorly in this disease, and it will perhaps lead to a more complete understanding of the nature of the latter if we study symmetrical traction first. By this term is meant the force which tends to convert the spine from a column into a chain, and so exerted that the main portion of the vertebræ and the posterior segments are both stretched to the same degree. This may be produced by any force which pulls the head and pelvis apart in a straight line, and the principle is utilized in several forms in the treatment of Pott's disease.

This form of traction may be produced by: 1st, the *upper extremity* (the ancients used to tie a patient head downward to a ladder in the time of Hippocrates).

2nd, *Horizontal traction*, which is the essential principle of the various flat extension beds and frames employed*; and 3rd, *by the weight of the lower extremity*, which embodies the principle of suspension now so generally employed and known as Sayre's Method.

Heather Bigg, of London, in commenting upon the latter method,† states that by it "the spine is changed from a column into a chain; from a mutual repose upon each other through their facets to a condition of mutual dependence upon their ligaments." He also asserts that "retching

*An interesting account of these can be found in the American Medical Transactions for 1880, by Dr. Benjamin Lee, of Philadelphia.

†Orthopragms of the Spine, 1882, p. 103.