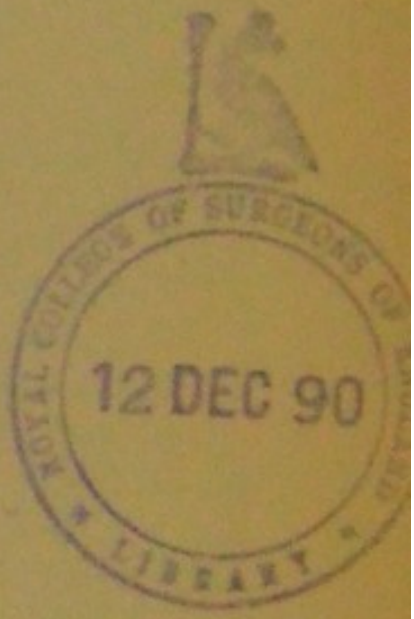
The rotary element in lateral curvature of the spine / by A.B. Judson.

The Rotary Element in Lateral Curvature of the Spine



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THE ROTARY ELEMENT IN LATERAL CURVATURE OF THE SPINE.

THE method of accounting for the rotation attending lateral curvature of the spine, which I proposed about fifteen years ago,[1] occurred to me when preparing a lecture on lateral curvature for the Women's Medical College in New York City. It seemed to me then, and I have seen no reason to change my opinion, that rotation takes place because the anterior part of the column, the bodies, are free to move laterally in the cavity of the chest and abdomen, while the posterior part of the column, the processes, are prevented from the same degree of lateral displacement by being entangled in the posterior parietes, composed of ribs, muscles, and fasciæ. This anatomical disposition of the parts is recognized when a subject is eviscerated on the dissecting-table. The vertebral bodies are seen projecting strongly into the cavity of the trunk, while the vertebral processes are fused into the parietes, as need not be mentioned to anyone who has dissected in this region. This arrangement is also seen in Fig. 1, which is copied from a drawing made by Mr. Alexander Shaw, for Sir Charles Bell's "Practical Essays."

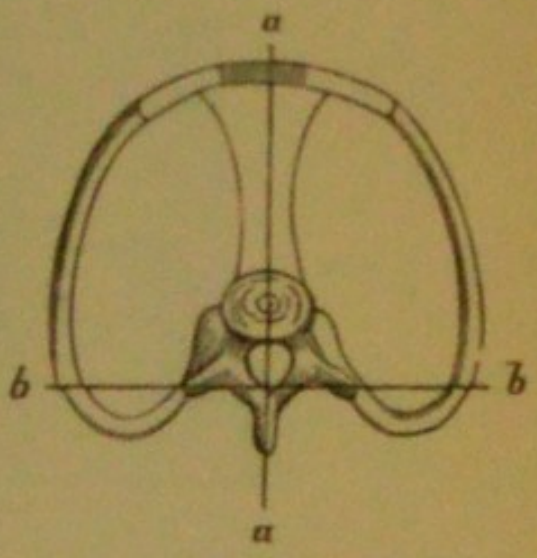

FIG. 1.

[1] Transactions of the New York Academy of Medicine, 1876, pp. 315-330.

The rotation attending lateral curvature may be seen in the preparations found in every pathological museum. Curvature, with due rotation, may also be produced in a preparation like that shown in Figs. 2, 3, and 4, in which

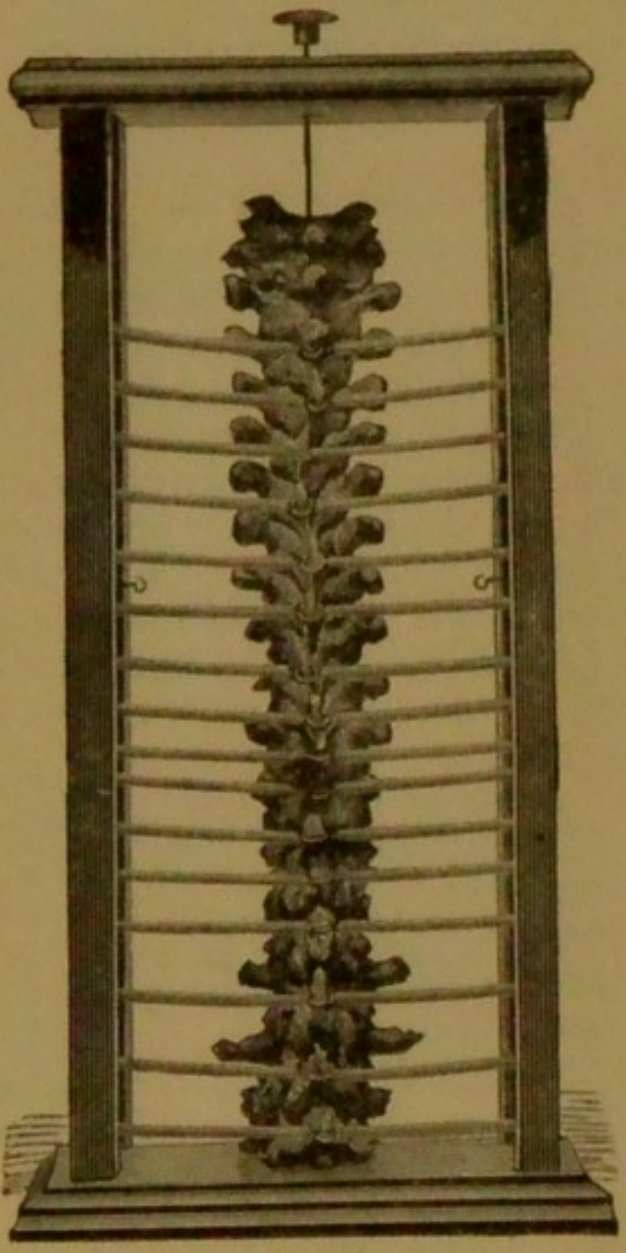

FIG. 2.

the vertebræ of a normal spine are assembled under mechanical conditions similar to those found in the body. They are strung on a rod which is flexible laterally, and the spinous processes are hindered from wide lateral excursion by elastic spiral wires. The column thus ar-

ranged, when subjected to downward pressure, exhibits rotary lateral curvature, and when the middle of the column is restrained we have a compensating curve with its

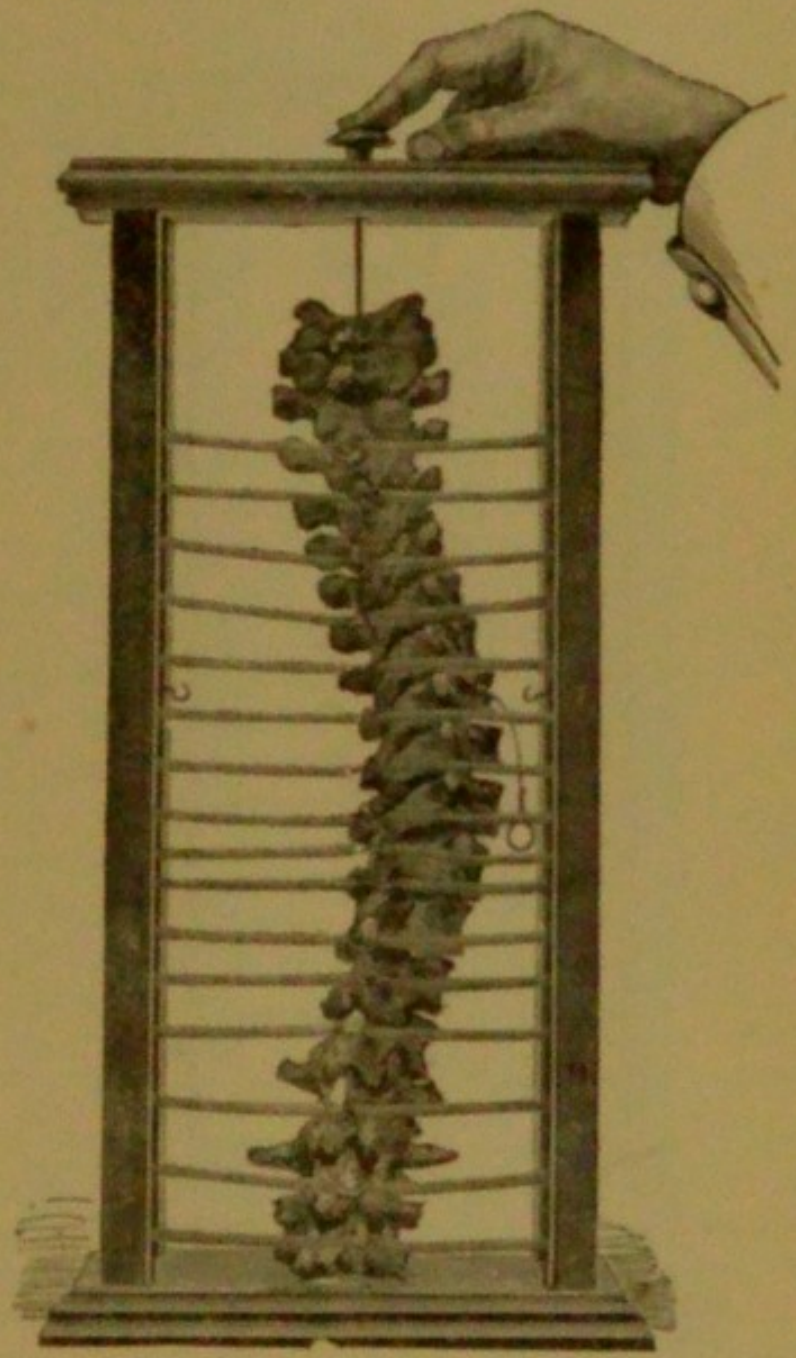

Fig. 3.

appropriate rotation, exactly as we have them in the healthy or diseased spine.

When we consider a single vertebra in rotation it is

seen that, as it moves away laterally from the median line, the body makes a wider excursion than the spinous process, the body moving three-fourths of an inch perhaps,

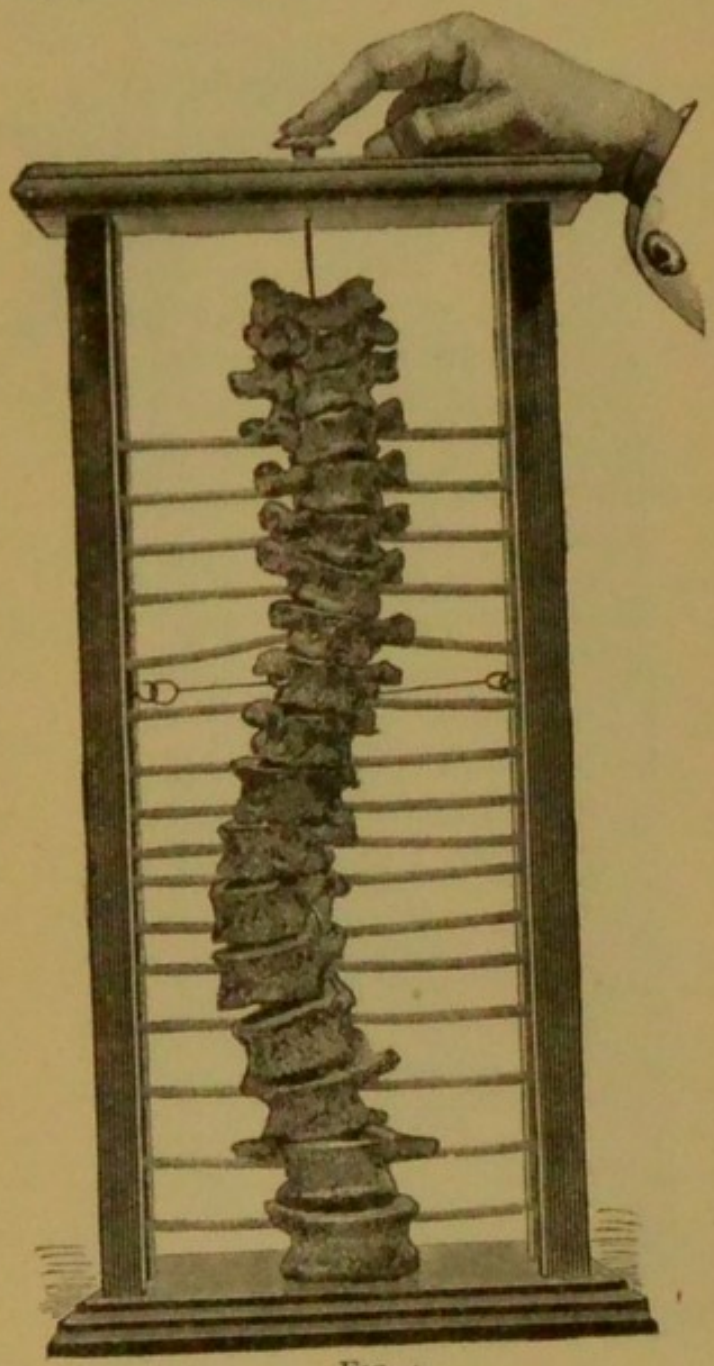

FIG. 4.

while the process may move one-fourth of an inch; and this constitutes rotation. The vertebra does not have rotation on a central axis, as shown in Fig. 5, neither does

it have rotation on a peripheral axis, as in Fig. 6; but it performs its rotation on an eccentric axis, one remote from the periphery, and still further removed from the centre, as is shown in Fig. 7.

The lateral curvature is less in the processes than in the bodies, a very important point in an effort to appreciate the extent of the deformity, the gravity of the case. It follows logically, and is also true in practice, that an earlier diagnosis can be made by looking for rotation than for curvature.

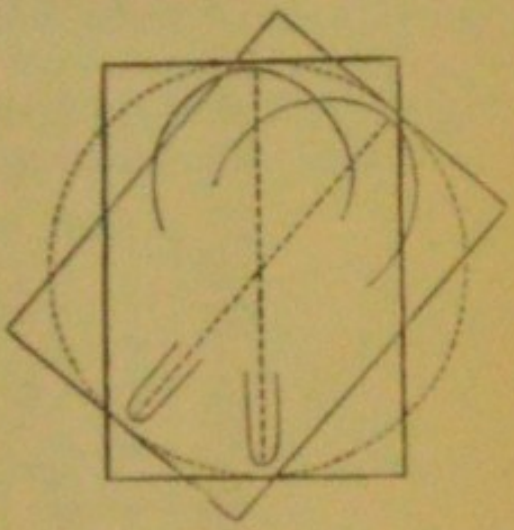

Fig. 5.

It will be found that this theory of the production of rotation agrees with all the phenomena which are observed in lateral curvature. For instance, the rotation is greater or less according as the curvature is greater or less; in the compensating curve the rotation as well as the curvature is reversed; and in the cervical region there is no rotation, because there is no cervical cavity corresponding to the thoracic and abdominal cavities.

It is an interesting fact that rotation is physiological as well as pathological, that is, it occurs in health as well as in disease. It is one of the functions of the normal spine. Lateral curving of the spine cannot occur without it. It adds a sinuous grace, which is difficult to describe, to attitude and action, as may be observed by close attention in the gymnasium. It may be easily demonstrated in a thin person by observing the prominence caused by the transverse processes on the side of the convexity of the curve, a prominence which has not infrequently, in patients affected by extreme lateral curvature, been mistaken for a morbid tumor.

It is probable that the apparent deflection of the track of the bullet in the case of President Garfield, was caused

by the rotation of the spinal column accompanying strong lateral curvature. The track of the ball was found post mortem to traverse the vertebral body from right to left, and from behind forward, as shown by the direction of the arrow in Fig. 7. It will be remembered that the assailant was behind and to the right. I suppose the first shot was harmless, and caused the President to look over his right shoulder. Seeing the murderer preparing to fire again, he leaned strongly forward and toward the left, instinctively making the outline of his figure as small as possible, doubtless quickening his steps at the same time. This lateral curve of the spine threw the vertebral bodies

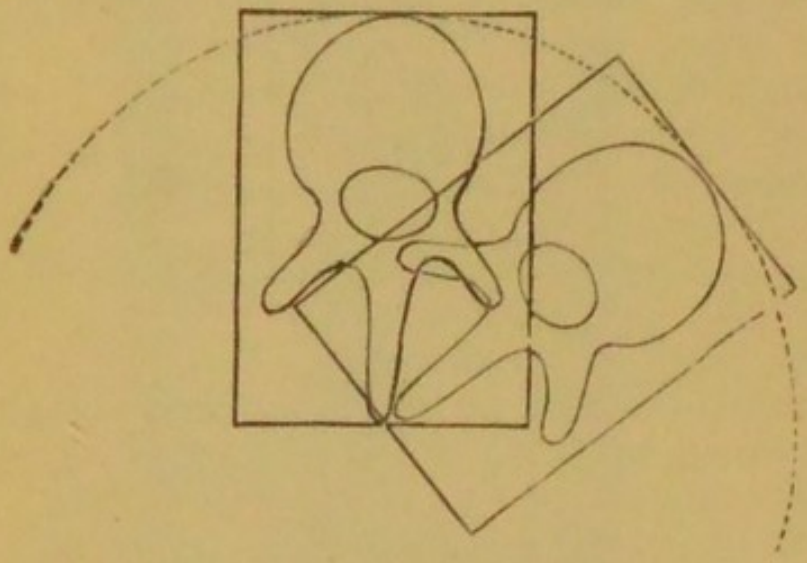

Fig. 6.

far to the right, and they received the missile coming directly from behind. The concussion of the cord produced temporary paralysis, the victim fell, and the spinal column in straightening gave to the track of the ball the appearance of deflection.

The presence of rotation seriously complicates the question of treatment, because when lateral pressure is applied to the ribs for the purpose of straightening or supporting the column, a portion of the pressure, at least, reaches the column so far back, by reason of the articulation of the ribs with the transverse processes that it may

even promote rotation, or at least prevent its reduction. If we could invade the cavity of the trunk and make direct lateral pressure on the bodies of the vertebræ, we might happily oppose at once the rotation and the lateral curvature.

An early diagnosis may generally be made by looking for rotation, which may be recognized by asymmetry of the scapulæ and by palpation of the chest between the two palms, which will reveal a difference in the diagonal diameters of the chest when curvature is slight or overlooked in the line of the spinous processes. If, for in-

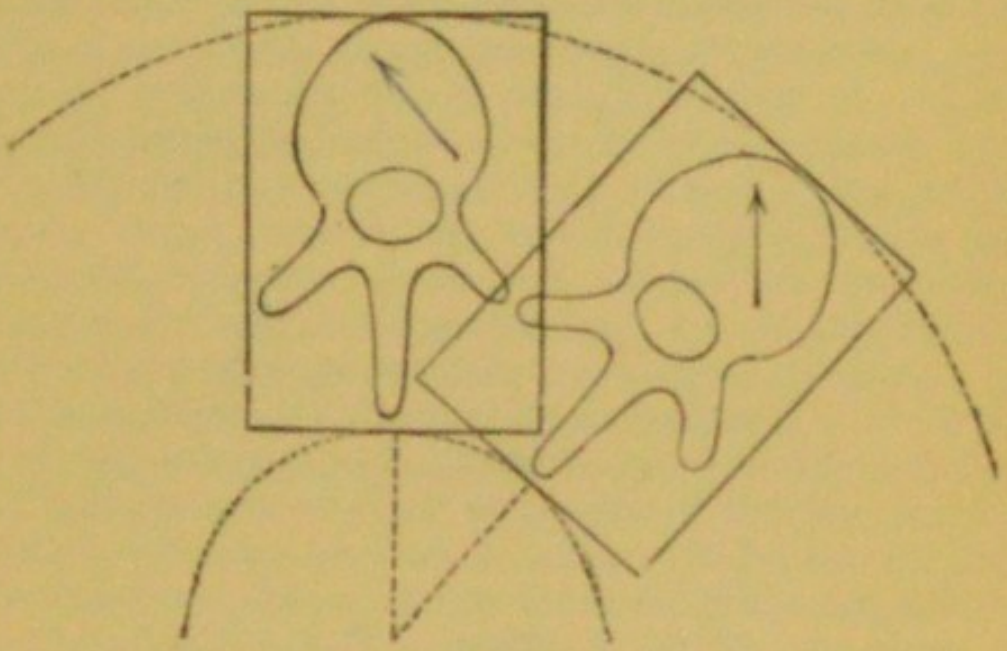

FIG. 7.

stance, there is rotation of the bodies to the right in the dorsal region, the diameter of the chest from the angles of the right ribs to the left mammary line will exceed the diameter taken from the angles of the left ribs to the right mammary line.

In the absence of accepted views of the etiology of lateral curvature, I assume that the deformity is an expression of inability on the part of the muscles (very likely of nervous origin) to hold the trunk erect. I am led, therefore, to advise the patient, in the first place, to give

up tasks of all kinds, to practise reasonable methods of improving the health, to avoid treatment which involves muscular fatigue, and, instead of trying to hold the spine erect, to take and keep the recumbent position at will. In the next place, I advise the patient to adopt persistently, as many hours in the twenty-four as is possible, those attitudes in which the spinal column is as nearly symmetrical as may be, assuming that the increment then taking place will be on the right side of the dividing line between deformity and symmetry. The supine position, in which perfect repose is maintained with the nearest approach to symmetry, should be taken during the hours of sleep, and as much of the time during the day as is practicable. In the third place, I seek to produce lordosis of the dorsal and lumbar regions, on the theory that the patient is thus led to remove the imposed weight, or a part of it, from the bodies of the vertebræ which deviate widely from the median line to the articular processes, which, in virtue of rotation, remain comparatively near the median line. This may be done by suspension on the curved back-board, and also by using an air-pillow, about ten by eighteen inches (No. 2), placed under the back when the patient is supine, in such a manner that the shoulders may fall into the space between the air-pillow and the pillow for the head, and the pelvis may hang over the lower edge of the air-pillow. This position is to be assumed whenever the patient is recumbent, day or night.

In passing, I would say that suspension by the upper extremities, in any of the forms in which it is practised, is to be encouraged up to, but not beyond, the point at which it causes fatigue. In this way we can forcibly and directly separate the chest-walls for the purpose, first, of opposing the deformity, which lessens the capacity of the chest, and, second, of fortifying the health and strength, which depend largely on unimpeded respiration.

I am unable to express confidence in the use of braces applied for the forcible arrest or reduction of curvature. I can understand the application of force to straighten

the knee, with pressure from before backward in the neighborhood of the joint, and counter-pressure from behind forward at points remote from the joint, on the bony levers which compose this joint; but am at a loss when I try to straighten by pressure a column composed of a score of short, jointed bones thrown into a double or triple curvature, with the added complication of rotation in two or three directions.

Here, as on many other occasions in practice, one cannot help wishing that it were possible to do by the use of apparatus what we can do manually. Pressure made by a brace has the disadvantage that it is directed toward the centre of the body, with counter-pressure from the opposite side, also directed toward the centre. Force thus applied is useless as opposed to the rotation of the spinal column. But with the hands applied to the ribs the body may be rolled between the two palms and the pressure thus applied is not directed toward the centre and may possibly act against rotation. This can hardly be done by the use of a brace. Even if the apparatus is designed to make pressure not directed toward the centre, with a fixed point at the pelvis, with the purpose of untwisting the rotated column, it is to be feared that the force applied to reduce the rotation of one of the curves would do harm by promoting the rotation of the other curve, which is in the opposite direction, and an apparatus designed to act in both directions, with a common base at the pelvis, would probably prove to be too complicated to be useful in practice.

The only way in which I could hope to produce a favorable effect by direct force is to apply pressure by means of a steel brace from behind forward in such a way as to favor lordosis of the whole column. In this way it is quite conceivable that when the patient is erect both the primary and the compensating curves, and the rotation accompanying them, may be mitigated by a transference, as in the mechanical treatment of Pott's disease, of a part of the weight from the bodies, which deviate

widely from the median line, to the processes which, by virtue of their anatomical connection, are held comparatively near the median line. Force thus applied would also affect the lateral processes on the convex side of the curve, which are rotated backward, before it reaches those on the concave side, which are rotated forward, and in this way it is conceivable that in a favorable case rotation may be forcibly and directly opposed in both the primary and secondary curves.

A general clinical view of the subject leads to the opinion that lateral curvature is not always a serious affection. It is certainly true that many persons lead happy and laborious lives with a marked deformity which is recognized by the dressmaker, and almost no one else. In view of this we can better reconcile ourselves to the admission that it is impossible to reduce a curvature which has passed the incipient stage. On the other hand, it is also true that in cases of exceptional severity, the kyphotic deformity is extreme, rivalling the worst results of spinal caries. Treatment should therefore be thorough and persistent in the case of a growing patient. We may thus reasonably expect to avert serious deformity, and approximate symmetry as closely as the nature of the case will admit.