A PLEA FOR THE ADOPTION OF A MORE ACCURATE AND SCIENTIFIC METHOD IN THE INVESTIGATION AND TREAT- MENT OF LATERAL CURVATURE OF THE SPINE,

WITH DESCRIPTION OF A SIMPLE FORM OF GAUGE.

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In December, 1901, I brought before the Glasgow Medico-Chirurgical Society "a simple gauge for investigation of spinal and other variations in symmetry; specially useful in registering amplitude of variation of the curves in cases of lateral curvatures, with alterations in position and posture of body." Especially, I pleaded for the adoption of a more rational and scientific investigation of cases of scoliosis than is customary in this country, particularly that large class of cases which, in the classification of Henle and Drehmann in the recent *Handbuch der praktischen Chirurgie*, is entitled *Die habituelle Skoliose*.¹

The necessity for some radical change in our methods was brought home to me during the summer semester of 1899 by a most brilliant and instructive demonstration on the subject of scoliosis which I witnessed in the surgical clinic of von Mikulicz at Breslau. He laid great stress on the value of careful measurements and the advantage of having a reliable skoliometer. He demonstrated the use of the instrument designed by himself,² and though I was not satisfied with its special recording arrangement, it fully convinced me of the value of some such instrument. My instrument, formed to some extent on the plan of von Mikulicz's skoliometer but without his special recording arrangement, was made for me in November, 1899, by Messrs. Dobie, Glasgow. It consists

Fig. 1.—Skoliometer—central frame, and width of transverse and vertical limbs, actual size; thickness of brass central frame 2.5 mm.

of two limbs graduated on the metrical scale, and fixed by an accurately adjusted central frame exactly at right angles to each other. Both limbs slide freely in the central frame, and each is graduated in both directions from zero at its mid-point. One I have had graduated up to 30 cm., the other up to 50 cm., in both directions, the shorter limb being, as a rule employed for horizontal or transverse readings, the

longer for vertical ones. If required they can be transposed, not by turning the whole instrument through an angle of 90°, but by withdrawing the limbs from the grooves and transposing them. The lower edge of the central frame is graduated for a special object, and it is found more convenient to keep it horizontal. The frame is of brass, light but strong, composed of two thin* skeleton pieces firmly rivetted together, and grooved for the reception of the two limbs of the instrument. The limbs are of thin, flexible, but resilient steel 1 cm. in width, and can be easily adapted to the contour of the body.

In von Mikulicz's skoliometer there is, in addition to the equivalent of the instrument just described, an arrangement at the lower end of the vertical limb for attaching an indicator working through 180 degrees, the graduated plate being of semicircular form. When in use this plate is fixed by a strap around the pelvis, midway between the iliac crests and trochanters. The idea is so to apply it that it shall correspond as accurately as possible with the position and axis of the sacrum. The indicator is pivotted on this so as to move freely to either side. The readings obtained are expressed in + or - numbers, according as the digression is to right or left.

To this arrangement my great objection is that the fixation of the sacral plate cannot be accomplished accurately with any constancy, and any error is, considering the smallness of the arc, by no means negligible. Besides, a mere number conveys to my mind by no means all that I want. I prefer to have a permanent record of the actual curve outline for primary as well as future guidance.

Dispensing with the special dial and indicator I choose two points, which, for the individual at least, are fixed—namely, the highest palpable cervical spinous process, usually that of the axis† or of the third cervical vertebra and the third or fourth sacral spine. The vertical limb is laid along a line joining these two. This may be taken as a constant, no matter what the variations of the primary and compensatory curves, and it seems to me that it is preferable to choose this, disregarding at once its digression from the vertical—instead of attempting, as in von Mikulicz's original instrument, to obtain an arbitrary vertical.

The tips of the spinous processes having been outlined in ink or pencil on the skin, readings + or -, that is, right or left, may be taken at different levels on the horizontal or transverse limb, and recorded, in diagram form, on paper, the + or - distances being properly correlated to their respective levels. For this purpose it is convenient to employ ruled "sectional" paper, marked in centimetre and millimetre squares, the actual recording being thereby much facilitated.

What is actually done then is to draw to scale, in the simplest and most primitive manner, the actual outline of the curves. Where the amplitude of the curve is less than half the width of the vertical limb from the ideal vertical, where therefore the convexity of the curve would be covered by the vertical limb, the reading should be taken from the graduated lower margin of the central frame.

The first record, so as to obtain for the particular case the nearest approach to the normal physiological relation, would be taken with the patient suspended, and all factors likely to affect the spinal condition as far as possible eliminated; this would form the starting point. The next record would be taken with the patient standing squarely on both feet. Variations would be noted also with altered position of feet; also in standing on one foot, alternately right and left.

Then the changes induced by various sitting or semi-recumbent postures should be recorded, and particularly the effects of adoption of special habitual postures or attitudes connected with occupations—for example, sewing, writing, carrying various loads, and so on—all these, or those of importance at least, ought to be noted.

Finally, and this is of paramount importance, the variations induced by bringing into play different muscles or groups of muscles, both resisted and unresisted, in lifting weights, raising and extending limbs, bending or straighten-

* The central brass frame is so thin that it does not appreciably interfere with close application of the apparatus to the surface of the skin. Its thickness is only 2.5 mm.

† Although the spine of the axis is bifid, this is not appreciable from the skin surface, and can be neglected.

ing the back, etc., ought to be carefully studied and recorded. Those especially having any clear etiological bearing on the particular case, or giving any aid in suggestion of suitable treatment—indicating, say, the muscles or groups of muscles calling for special attention by massage or resisted exercises—should be preserved for future reference and comparison in estimating the progress of the case, and the effect, beneficial or otherwise, of the line of treatment adopted.

In his original paper von Mikulicz expresses very clearly the object before his mind in devising and applying the skoliosometer; they may well be quoted here.

I have the conviction that, in regard to the treatment of skoliosis, we shall first be able to arrive at a clear determination of reliable and generally applicable rules, when we have the means of making clear the value of any method we recommend by numerical proofs.

His object was

to devise and construct an apparatus for measurement which should be able to express in figures the most important alterations in form in skoliosis, and should make known to the surgeon himself any minute changes for the better or for the worse.

The main difference between his method and that I suggest is that, where he was satisfied with figures expressing the deviation from the normal—figures, as I have shown, not always reliable, and in my view unsatisfactory, as failing to give a clear picture of affairs—I prefer to adopt the simple plan of a readily made drawing to scale (or actual life-size if preferred) of the actual curve outlines.

This gauge can be employed, also, in estimating and recording rapidly other forms of asymmetry as well as spinal. It will be found of service in the investigation of fractures and dislocations, in comparative measurements of opposite sides of the thorax or abdomen, as in cases of thoracic or abdominal tumours, or any unilateral thoracic bulgings, from pleural collections, contraction changes following these, unequal muscular development, etc.

One of the most important of the uses to which such an instrument might be put would be in obtaining a reliable register of chest measurement and expansion for recruit examination and insurance work. Regarding the former, it is freely admitted that present methods are very imperfect, and certainly highly unsatisfactory. In some future paper I hope to take occasion to amplify this. Meanwhile, I merely mention that such an instrument as this would be found of considerable service. Lastly, the instrument I have described is of use in craniometric work.

REFERENCES.

- ¹ *Handbuch der prak. Chir.*, Lieferung 19 (II, Bogen 6). ² *Centralbl. für Chir.* May 19th, 1883.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

TWO CASES OF BUBONIC PLAGUE OCCURRING ON BOARD SHIP.

CASE I.—A coal trimmer, reported ill on July 7th, 1901, complaining of swelling in the groin. I found an enlarged gland on the left side, about the size of a marble, hard, but with no surrounding induration, and little pain. The temperature and pulse were normal. There was no history of venereal disease, and I examined the foot and leg but found no sore. No severe constitutional symptoms appeared up to July 12th, when I found the gland had increased to about the size of a hen's egg, was uniformly hard, but without induration. On the right side were two enlarged inguinal glands. The temperature was 101°, and the pulse good, but rather frequent. I now concluded that I was dealing with a mild case of plague and had the man isolated, confined to bed, and put on strychnine. On July 14th, the conjunctivae were suffused. On July 16th a femoral gland on the left side was enlarged. On arriving at Marseilles I had a consultation with the health authorities, who confirmed the diagnosis of plague. On July 17th, the glands first affected were reduced in size, while a gland in the right popliteal space was enlarged. The temperature was 100°. On July 18th the temperature was 100.4° to 101°. The femoral gland had increased in size. From July 19th to the 22nd, the patient gradually

improved. On arrival at Plymouth the diagnosis was again confirmed.

CASE II.—An assistant baker, reported ill on July 17th (five days after the isolation of the first case). I found the conjunctivae suffused and slight swelling of the axillary glands on both sides, and of the submaxillary of the left side. There was a healed burn on the right hand. The pulse and temperature were normal, though the cutaneous surface was intensely hot. He was isolated and confined to bed as a second case of plague. On July 18th the femoral glands of both sides were enlarged, but without pain or induration. From July 19th to 22nd the patient's condition gradually improved. On arrival at Plymouth, after consultation with the health authorities, who confirmed the diagnosis, he, with the first patient, was removed to the hulk.

Tissue from glands of Case I was submitted for bacteriological examination at Plymouth with a positive result; a later examination, however, by Dr. Klein gave a negative one. I concluded from this that Dr. Klein's examination had been made at too late a date, for it must be remembered that both cases were convalescent on arrival at Plymouth, and that the bacillus disappears from the blood and later from the gland tissue during convalescence.

The ship was, I believe, infected at Fremantle, as plague was existent within 20 miles when we called on June 18th. The man reporting ill on July 7th gives an incubation period of nineteen days, or allowing 24 hours before I saw him, eighteen, which is the period the French recognize. From my experience of examining for plague in India, however, I believe most cases do occur within a ten days' incubation period. The second patient probably contracted the disease from the first (although the communication between the two was very slight) as we were twenty-four days out from Fremantle when he became ill. No dead rats were found on board the ship. The primary infection of the inguinal followed by enlargement of the femoral and popliteal glands in the first case was unusual. No rise of temperature was recorded during the second patient's illness, though the skin was most abnormally hot. Both cases were of the type *pestis ambulans*.

Effective isolation was difficult to procure on board. I put my patients in the afterpart of the ship, and prevented any communication by means of a barrier on contiguous part of deck, at which a sentry was placed, who also removed used utensils from the disinfectant and kept blankets, covering, doors and ventilation inlets damp with carbolic lotion. No further cases occurred among the ship's company.

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SUSPECTED RUPTURE OF THE LUNG FROM VIOLENCE WITHOUT FURTHER INJURY.

I was called to see a child, aged 8, by its father, who explained that the child had been playing with a relative, who had placed his hands under her arms and had suddenly raised her from the ground. The child immediately cried out, complaining of "something having given way" and of great pain in the right side. She had been in perfect health up to the time of the accident. I found her lying more or less collapsed, pale, and with a small, rapid pulse. The temperature, two hours after the accident, was a little over 100°. She was sweating and appeared very frightened, and complained of severe pain in the right side. I could detect nothing abnormal in the chest, though the breathing was very rapid and rather shallow. There was no fracture of any of the ribs, but the pain appeared to be localized around the sixth and seventh ribs in the axillary line on the right side.

On the next day the temperature had risen to 103°; the pulse was still small and rapid; the pain in the side continued, being worse during inspiration, and she had developed a slight, harsh cough. I thought I detected over the site of pain a small area of slightly increased resonance. There had been no bloody expectoration, nor was there any dullness between the posterior wall and the diaphragm to suggest hæmorrhage having taken place. During the next few days slight friction developed at the site of the pain, which had much decreased. The temperature ranged between 102° and 103°; after the first week it gradually fell to normal, the fric-