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ON THE DISTRIBUTION OF SENSORY DISTURBANCES, WITH ESPECIAL REFERENCE TO THE PAIN OF VISCERAL DISEASE.¹

BY HENRY HEAD, M.A., M.D. (UNIVERSITY COLLEGE HOSPITAL).

In the paper to be read before the Neurological Society, I hope to prove the following points:—

1. The pain caused by visceral disease is distributed over certain definite regions, and is frequently associated with cutaneous tenderness.

2. This tenderness maps out certain areas on the surface of the body, which are characterised by the following points:—

(a) They do not overlap.

(b) The reflexes obtained from them are exaggerated.

3. The distribution of herpes zoster marks out the same areas as those which are tender in visceral disease.

4. Each of these areas represent the distribution of the pain fibres which come off from one segment of the spinal cord in one posterior root. Thus each area can be called by the number of the spinal root it represents.

5. Each organ causes pain and tenderness along one or more root areas, and I shall take the various organs one by one, showing the root areas with which each is particularly associated.

6. If all the areas which are ever found to be tender, in consequence of visceral disease, are placed together on a chart of the body, two gaps are seen—one on the arm, the other on the front of the thigh or leg.

7. Affections of the pleura and peritoneum cause local, but not referred, pain. The tenderness is not truly cutaneous

¹ Read at Cambridge as a thesis for the Degree of M.D., June 9th, 1892.

as in affections of the organs contained within the serous cavity, but is subcutaneous. It, therefore, is never present over bony points, such as the vertebral spines and the crests of the ilia, where pressure does not affect the serous cavity itself. On the other hand, the tenderness produced by visceral disease extends as a band round the body; and is therefore present over points where pressure cannot affect the diseased organ.

8. By tracing these tender areas produced by visceral disease to their origin in the cord, we can tell from what segment of the cord the organ affected receives its sensory supply. Thus we can map out the course of the sensory fibres of the sympathetic to the organs they supply.

9. It is then found that sensory sympathetic fibres come off from the first dorsal to the first lumbar roots, both inclusive. Then there is a gap, comprising the second, third, and fourth lumbar roots, from which no visceral fibres are given off. Then again we come to a fresh outburst of sensory fibres to the viscera in the fifth lumbar, and first, second, third, and fourth sacral. The fifth sacral and the coccygeal nerves give no visceral fibres.

10. Certain conditions alter the resistance of the central nervous system to such an extent that what was originally a definite referred pain with localised tenderness, becomes "generalised," and appears over other root areas than those which correspond to the organs primarily affected. These influences are—

- (a) Anæmia.
- (b) Pyrexia.
- (c) Long-continued pain over one visceral area.
- (d) Shock.

11. The sensory disturbances in so-called "hysteria" are of two types :—

(a) They follow a cerebro-spinal distribution, and correspond to the distribution of nerve roots, specially those affected in visceral disease. Thus, the "tender zones" of this type correspond to the "maxima" of the areas affected in visceral disease. In this type, the sensation of pain is al-

ways most affected ; and if there is loss of sensation of touch the distribution of the loss of touch and loss of pain is different ; moreover, in this type the reflexes are abolished over the analgesic area.

(b) The psychical type ; in which the disturbance of sensation follows "natural" lines, *e.g.*, extending completely round a limb or affecting the abdomen and not the back, &c.

In this type, the reflexes are retained over the area within which sensation is lost, and pain, touch, heat, and cold are affected within the same limits.

12. I shall then discuss the following problems :—

- (a) Why is pain referred ?
- (b) Why is the skin tender in visceral disease ?
- (c) What are the central relations in the spinal cord of the various forms of sensation ?

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