

two upper vertebræ. The exact nature of the lesion may be in doubt, but we have by strictly scientific methods located the disease; it is so placed as to irritate the first and second cervical nerves.

(2) Disease of the lower cervical vertebræ is very rare. In such a case the pain would be in the lower part of the neck, or in one arm or hand according to the exact location of the lesion. The spasm would be in the lower cervical muscles and in those of the arm.

(3) The most common location of these lesions is in the dorsal region, between the fifth and the twelfth dorsal vertebræ. Many and many a child is treated for months for "colic" because he complains of a pain in one side of the abdomen. The too frequent neglect of thorough objective examination here leads to the erroneous diagnosis of intercostal or abdominal neuralgia, or of colic; even of "hepatalgia," according to the exact seat of pain. The muscular symptoms are present here also, but not in as striking a shape as in spondylitis colli. They must be sought for by careful examination. This reveals one of several conditions or several combined. The respiratory thoracic or abdominal movements on one side (rarely on both) are hindered, and the muscles appear to palpation hard or rigid. The various movements of the spinal column are not normally free. Turning the head about as if to look for something is done by a turning of the whole body, flexion and extension (latero-flexion more especially) of the spine are checked by pain, or directly hindered by rigidity of the erector spinæ muscles. A segment of dorsal spinal column is rigid during all attempts at movement. The tenderness of the dorsal nerves cannot be demonstrated by direct testing with finger pressure, but it is strikingly revealed by what I call the heel-jar test. This consists in placing the patient standing in the military position of "attention," on a hard floor. Then tell him to rise on his toes, and then suddenly to drop his whole weight on his heels. If there is vertebral disease, decided or excruciating pain is caused by this jar, not in the spine but in the location of the "neuralgia" for which the patient consults you. This heel-jar test is useful in any location of the vertebral disease. The origin of the nerve which is the seat of pain, the range of the muscular rigidity will enable us to localize the lesion to the exact vertebra or vertebræ.

(4) The lumbar vertebræ are sometimes diseased. In such a case the pain would be in the groin and anterior and inner parts of the thigh; the spasm in the same parts; especially in the psoæ and iliac muscles.

(5) Caries of the sacrum gives rise to pains in the perineum, posterior part of the thigh, and in the leg and foot. Cramps or spasms would occur in the same parts (seldom present).

The general diagnostic law may be formulated as follows: The seat of neuralgia and of spasm, though occasionally not in corresponding parts, clearly refer to irritation (compression) of one or more spinal nerves on one side. A knowledge of the distribution of spinal nerves enables us to state with great accuracy which vertebræ are diseased.

(b) With reference to paralytic symptoms.

Occasionally they appear before actual destruction of bone brings about angular curvature; the spinal cord being compressed by inflammatory or caseous masses originating in pachymeningitis; or by a tumor. When the disease affects the two upper cervical vertebræ, the paralysis may be hemiplegic, face not affected. This is because the caseous masses have formed on one side of the canal and exerted pressure on one side of the spinal cord, where the large crossed pyramidal fasciculi run downward; hence hemiplegia. Below the level of the second vertebræ the masses which compress the cord are formed anteriorly as a rule, and cause pressure almost equally on both sides of the median line; hence paraplegia; of the type "cervical paraplegia," where the whole body below the neck is paralyzed, or "common paraplegia," when the lower limbs and a varying extent of the trunk are paralyzed. It is important to determine the uppermost limit line of the paralysis, as this usually indicates the limit of intra-vertebral lesion.

When caries exists in the mid-dorsal region, vesical paralysis (retention) is, in my experience, a very early symptom; sometimes existing without other paralysis. With disease of the upper cervical vertebræ we also observe paralysis of the small, deep muscles connecting the head with the spine ("loose head").

When the lumbar vertebræ below the second, or the sacrum is the seat of caries (or cancer), a very peculiar paralysis results. As there is no spinal cord below the level of the first lumbar vertebræ, pressure below this point will affect only nerve-bundles: the constituents of the *cauda equina*.

Physiologically, therefore, the resultant paralysis is a peripheral or neural paralysis (precisely the same as when an outside nerve-trunk is injured), characterized by a flaccid atrophic paralysis, with degenerative reactions; co-extensive anesthesia; absence of all reflexes; relaxation of the sphincter ani and vesical paralysis. The paralysis is nearly all below the knees, as some of the thigh-muscles are supplied by the crural plexus.

We can thus—I hope to have made it clear and easily understood—readily make a diagnosis of a vertebral bony lesion or of an intra-spinal tumor at a very early period; months before angular curvature (kyphosis) or external tumor shows itself. In my opinion there is no justification for waiting till kyphosis appears before reaching a diagnosis. The exact seat of the lesion we can, also, by the