THE INTERSEGMENTAL ANASTOMOSES OF POSTERIOR SPINAL ROOTLETS AND THEIR SIGNIFICANCE

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Variability in the pattern of plexus formation and in the distribution of peripheral nerves are well recognized factors responsible for producing deviations from the form representing the “idealised” or “normal” dermatome pattern of innervation of the skin. Schwartz has recently described the presence of anastomoses between the cervical posterior rootlets of the spinal cord and considers them to be a further potential factor in causing deviations from the “normal” dermatome pattern in the areas innervated by the cervical posterior roots. Moreover, he has shown clinical evidence that such anastomotic connections which he found in the cervical region were of surgical significance in the operation of posterior rhizotomy for the relief of pain.

Schwartz confined his observations to the cervical region and proposed that there is embryological predilection for the production of such rootlet anastomoses there. It appears desirable, however, to extend the study of rootlet anastomoses to include the other regions of the spinal cord as well.

Fifty human spinal cords, obtained post mortem, were carefully dissected and searched throughout their length for posterior rootlet anastomoses. A dissecting microscope was employed to facilitate the search. In 10 instances the anastomotic connections found were excised and prepared for examination alternatively by Flemming’s method for myelinated nerves and the Romanes silver method for axons.

OBSERVATIONS

The specific observations may be presented with reference to the central, thoracic and lumbosacral regions.

Cervical Region. If we exclude the comparatively small and sometimes absent posterior roots of the first cervical segment and include the first thoracic roots, there is a total of 14 possible anastomoses or sets of anastomoses between adjacent rootlets of homolateral segments of the spinal cord in this region. The frequency with which such connections were found in this series ranged from 3 at a minimum to a maximum of 8 in any single case. These “transsegmental” rootlet anastomoses are sometimes single filaments connecting the neighboring rootlets of adjacent segments (Figs. 1 and 2). Connections are found in positions near the attachment of the rootlets to the cord, or more peripherally, where the spinal rootlets dived into their
exit “sleeves” of dura mater. Some of these interconnections are branched or forked (Fig. 3).

Simple interconnections such as those described above appear to be common in the lower segments of the cervical spinal cord. In the upper cervical segments more complex interconnecting patterns appear. Thus, a rootlet may be attached to the spinal cord between two neighboring cervical roots and in continuing more peripherally begin to divide up into branches that pass, some into the adjacent rootlet above and others into the nearest rootlet of the next segment below (Figs. 4 and 5).

Mixed and more complex forms of simple interconnecting branch and “shared” rootlets between neighboring cervical roots are also met with in the upper cervical region (Fig. 6).

No interconnections of any form are found extending across the breadth of more than one segment. There is no evident over-all pattern to which the connections appeared to conform and asymmetry was the rule in each individual case. In addition to connections bridging one segment with another, interconnections are also present between rootlets of the same individual segments (what may be termed “intrassegmental” rootlet anastomoses).