I. Surgery for Spinal Cord

I-1. Studies on Compressive and Ischemic Change of the Spinal Cord

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In order to elucidate the causative factors for compressive paralysis of the spinal cord, we made a histopathological comparison of the variation of time in two forms of paralysis experimentally used in adult dogs, paralysis due to local mechanical compression on the spinal cord and paralysis due to disturbance of the blood supply resulting from blockade of the anterior spinal artery and the anterior radicular artery.

The procedure used consisted of local pressure exerted mainly on the thoracic vertebra 12 th by a bulbar silicon 1/4 the size of lumen of the vertebral canal which was inserted in the ventral and dorsal side of the spinal cord following laminectomy, and transperitoneal exposure followed by ligation of each of the arteries referred to above under intravenous pentobarbital sodium anesthesia.

The spinal cord is most injured when it is compressed at the ventral side. The resultant lesion tends to extend from the center of the gray matter toward the posterior fasciculus, with a histopathological change of diffuse hemorrhage progressing to malacia, necrosis and cavitation. Similar findings may be obtained also with compression from the dorsal side, if adequately intensified.

The spinal cord is damaged also by blockade of the anterior spinal artery. The lesion may extend itself from the center of the gray matter to lateral fasciculus along the area supplied by the central artery, presenting a picture of ischemic malacia replaced by necrosis and then cavitation.

The mechanism of pathogenesis of compression paralysis of the spinal cord, explained by the results of this study, may involve both circulatory disturbance in arteries controlled by the anterior spinal artery and indirect circulatory disturbance of the intraspinal arterioles due to pressure on the spinal cord.

Occlusion of anterior radicular artery may occur spinal paralysis. However, the lesion in the spinal cord may reasonably be considered to be manifested through the anterior spinal artery.