Treatment of Spinal Cord Vascular Malformations by Surgical Excision

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Recent developments have now made direct surgical attack the treatment of choice for spinal cord vascular malformations. We are reporting 17 cases treated with surgical excision, the last 11 of which were operated on under the operating microscope.

There is much confusion in the literature concerning the histological nomenclature used to describe varieties of spinal vascular malformations. This confusion is partly the result of the lack of opportunity for adequate microscopic study of the entire lesion. We prefer to follow the classification of Bergstrand, et al., who divided these malformations into: 1) angiolemma cavernosum, 2) angiolemma racemosum, and 3) angiolemma racemose. Some vascular malformations will show characteristics of more than one group, making classification difficult. From the surgical standpoint the extent of the lesion and the amount, if any, of intramedullary involvement are of much greater importance than the specific type of malformation present. The 17 cases we are reporting are primarily of the angiolemma racemose type, some largely venous, others predominantly arterial.

It has been shown that spinal cord vascular malformations are much more likely to occur in certain areas of the cord. In only one of our cases was the lesion confined to the cervical area. The remainder were located in the thoracic or lumbosacral region, with the latter site the most common location. Often the malformation was so extensive as to involve the entire thoracic and lumbar cord with even occasional extension into the cauda equina. Only two of our cases were females, although an exacerbation of symptoms in women during menstruation has been reported, and several authors have called attention to an increase in symptoms during pregnancy with subsidence after delivery. Newman has stated that he believes the increase in symptoms in such cases may be due to "venous congestion" from the distended uterus and interestingly suggests the possibility of some "hormonal factor acting on the vessel walls." Although none of our cases was a child, several authors have reported the occurrence in children and even in infants.

Clinical Picture

History. The clinical history is usually one of three types. There can be 1) a slow progression of neurological symptoms and signs, 2) progression followed with regression or a stationary period, or 3) a sudden apoplectic onset.

Neurological Examination. This may range from an entirely normal neurological examination up to that of a complete transverse myelitis. It is interesting that a rather high percentage of patients have some impairment in bladder control. In many cases, the complaints and neurological findings are such as to suggest the diagnosis of herniated disc, poliomyelitis, spinal cord tumor, multiple sclerosis, or even hysteria. The correct diagnosis is much more apt to be made in those cases having a sudden onset, bloody spinal fluid, and neurological findings indicating some sort of myelopathy. Matthews reports the occasional presence of a spinal bruit as a diagnostic sign of spinal vascular malformation.

Spinal Fluid. Nearly all writers on the subject agree that in the presence of spinal vascular malformations the spinal fluid protein is almost always increased. There may be a slight increase in the spinal fluid white cell count. The Queckenstedt test is usually normal except in the occasional case having a "spinal block" from a very large malformation.

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Radiological Findings

Plain X-Ray Films of the Spine. These will seldom show anything to indicate the vascular nature of the lesion. Rarely there may be widening of the pedicles at the site of a large malformation. Even more rarely an associated vascular involvement of the spinal vertebrae may be seen, but this is more often present in association with an extradural vascular lesion than with an intradural lesion. Peculiarly, a high percentage of patients with spinal cord vascular malformations show considerable osteoarthritic vertebral changes.

Myelography. The very typical myelographic picture of the “worm-like” mass of vessels is well known (Fig. 1). Whenever a complete block is demonstrated on myelography and the cause is obscure, contrast medium should then be instilled from the opposite end of the vertebral column in order to delineate the extent of the block. Occasionally this will demonstrate the cause of the block to be a vascular malformation. Most all vascular malformations of the cord are located on the posterior rather than the ventral surface. It is for this reason that these lesions are better demonstrated myelographically with the patient lying in the supine position. In searching for such vascular lesions it is essential that at least 10 cc of contrast medium be employed. It would seem that the value of air myelography is very limited in diagnosing this particular disease.

Spinal Angiography. Angiographic demonstration of the abnormal vasculature of the spinal cord represents a great advance in not only the diagnostic area but also in planning the surgical attack. In recent years several authors have shown how well these vascular malformations can be demonstrated with one of several angiographic techniques. Retrograde femoral catheterization, brachial catheterization, and vertebral angiography are being utilized. The use of multiple cassette changers and subtraction technique is essential. We wonder if, with further perfection in angiographic technique and the use of stereoscopy in subtraction, it may not even become possible to reveal the presence and extent of any significant intramedullary extension of these vascular lesions? Our own experience with spinal angiography is limited, but we well recognize the value of the procedure (Fig. 2). Detailed preoperative spinal angiographic studies offer the best information as to the extent of the vascular malformation, and postoperative angiographic studies will reveal the “completeness” of removal. In contrast to myelography, angiography can give precise information as to the nature and location of the “feeder” arteries, which can be of great help in the surgical removal.

Treatment

In years past the treatment of these vascular spinal malformations has, for the most part, consisted of decompressive laminectomy and deep x-ray therapy. Decompression is of little or no value and then only in