## formalin fixation. *Results and conculusions* (1) Anatomic findings.

The anterior radicular arteries entered the spinal canal through each intervertebral foramen, and joined the anterior spinal artery near the midline. The diameter of  $C_3$  anterior radicular artery was about six times larger than those of  $C_2$  and  $C_4$  to  $C_7$  radicular arteries. The average diameter of the anterior spinal artery rostral to  $C_3$  radicular artery was 1.2 mm and, caudal to  $C_3$  radicular artery was 0.2 mm.

Miniature anastomotic diamond was noted in about 50% of anastomoses between anterior radicular arteries and anterior spinal arteries.

(2) Direction of blood flow.

Dye entered the anterior spinal artery via bilateral anterior radicular arteries at each segment.

There were two types of blood flow at each segmental level, one was "upward type" blood flow of which ascended from caudal anterior radicular arteries to rostral ones, the other was defined as "mixed type", forming water-shed between descending and ascending blood flow from rostral and caudal anterior radicular arteries respectively.

All cases belonged to upward type at high cervical segments, and mixed type was frequently observed at lower cervical segments.

The angle between the anterior radicular artery and the anterior spinal artery was an important factor in determining blood flow. When the angle was more than 90, blood flow from the anterior radicular artery proceeded downward through the anterior spinal artery.

## B-74. Cervical Venography via the Body of Axis

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In the treatment of cervical spinal lesions, it is required to estimate adequately the pathogenesis of cervical spinal cord and nerve roots lesions and the condition of the spinal canal and foramen. And also it is very important to evaluate the condition of the spinal cord and cervical nerve roots by the neck positionings in flexion, neutral and extension. We believe that the most sensitive system to reflect the condition of the spinal canal containing the compressive lesions of the spinal cord and nerve roots is the venous system of the cervical spine which contain these nervous system.

We have performed "Cervical Venography via the Body of Axis" 35 times to the 26 cases of various cervical lesions pre- and postoperatively to evalute the venous system of the cervical spinal canal

In this paper we would like to mention the details of Cervical Venography (CVG) and the results of this method comparing with the findings of Myelography and Cisterno-Lumbar Electro Manometric Queckenstedt' test (C-LEMQ test).\*

### Technique and method;

Pt is placed on spine position with mouth open in neutral neck position under fluoloscopy of T.V. to make sure the orientation of odontoid process of axis and  $C_2$  body. No.16 needle with mandrin is punctured at the right mandibular angle medially to the margin of sternocleidomastoid muscle and inserted between carotid sheath and thracheooesophagial complex until to reach just lateral to the mid-sagittal portion of  $C_2$  body. After having reached the cortex of  $C_2$  body, needle is advanced about 5 to 10 mm in the bone marrow from the cortex mid-sagittally.

Continuous series of X-ray films (1 films/second) are taken with 5kg/cm<sup>3</sup> pressure for 15 to 20 seconds by injecting 12 ml of 65% angiographin. Routinely A-P and R-L view are taken to each patient in neutral neck positioning, however in flexion and extension neck positioning are taken as occasional demands.

This procedure can be performed safely without pain using procaine injection.

All the levels of cervical spinal venous system from  $C_1$  to  $C_2$  can be demonstrated.

\*Minoru TsuNoda, Hiroshi Такадı: Cisterno-Lumbar Electro Manometric Queckenstedt test (C-LEMQ test) Using Cuff Manometer and Its Model Experiment. Brain and Nerve, 24: 73-80, 1972

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#### Results;

1) Cervical Venography (CVG) shows disturbances of cervical venous system, even in cases that shows a little abnormal findings of myelography and no or slightly blockage of C-LEMQ test.

2) Retrograde arterial phase can not be demonstrated.

3) The upper margin of the edema of the cervical spinal cord can be demonstrated in the cases of acute traumatic cervical cord injury.

4) In the cases of chronic compressive lesions of the cervical spine such as cervical spondylosis, the irreversible changes of cervical venous flow may be existed. Because postoperative CVG shows narrowing, defects and interruption of internal vertebral venous plexus at the same level in the preoperative findings, however C-LEMQ test shows no blockage postoperatively.

5) In the cases of cervical disc lesions, if C-L EMQ test shows increasing of blockage in more extensioning neck position, C V G shows more prominent local engorgement and reticulation of external vertebral venous plexus. This indicates neck positionings have great importance to the cervical venous systems.

### Conclusion;

Cervical Venography produces significant informations to estimate the pathological process of cervical spinal lesions by demonstrating the dinamic changes of cervical venous system.

## B-75. How and How Much to Operate in the Cervical Spinal Lesion

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Our discographic studies have indicated that the term of "cervical disc hernia" should be used only in the soft disc. The anterior cervical spinal fusion may be the first choice if the lesion is localized in one or two levels.

Laminectomy should be indicated in the treatment of spinal cord tumor, spinal canal

stenosis and cervical spondylosis of multiple levels. However, one should minimize the extent to be laminectomized, since this procedure might cause instability of the spine, occasionally leading to abnormal spinal curvature or less resistance to acute external force.

Even in anterior spinal fusion, an air drill has made it possible to decompress safely the nerve tissue from the front through excision of the vertebral body. But it should be appreciated that anterior fusion may cause excessive mobility of the adjacent to the fused level and this may cause another problem. Then, multiple fusions in cervical spine should be avoided as possible.

Successful operation on benign cervical spinal tumors depends on how completely the tumor was excised, preserving the spinal function. One sometimes has to use simultaneous approach anteriorly, laterally and posteriorly. After tumor is removed the spinal column should be stabilized by bone graft and internal fixation. Above procedure might cure the lesion by the low malignant tumor e.g. malignant struma, and even in salvage procedure give more effective decompression than the simple laminectomy does.

Recently Halo traction has gained its popularity in spinal surgery, but in cervical spine it is difficult to expect bothfu nctions of "correction" and "immobilization" at once. One should not forget the use of traditional immobilization by casting in cervical spinal surgery.

Authors want to stress the fact that the operative procedure on the cervical spine should be done after careful evaluation of how and how much the procedure be carried out.

# B-76. Cervical Laminectomy using Air Instruments

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Cervical laminectomy is generally performed to the spinal cord lesions, particularly to the compressive lesion to the spinal cord. However there are a few problems or points

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