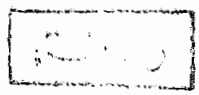
ROLE OF DIFFERENT IMAGING MODALITIES IN THE DIAGNOSIS OF SYRINGOMYELIA

Essay



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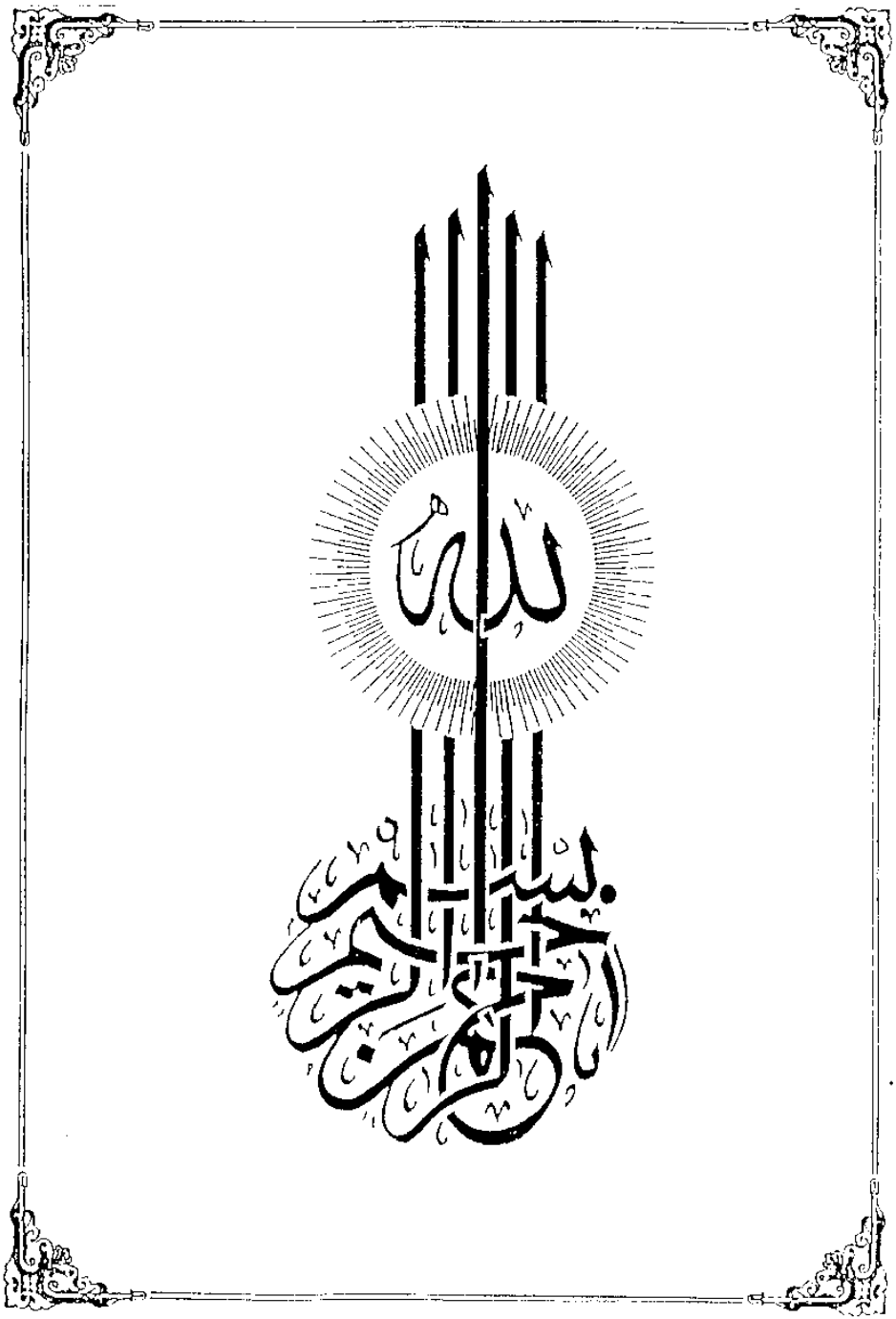

My work is offered to my parents, my brother

and my sister whom I love and admire.

My wonderful little son.

To the person who offered me facilities to fulfil

my work "My precious husband" whom I own my

success.

ACKNOWLEDGEMENT

I would like to present my work to Dr. Saad Aly Abd Rabouh as an appreciation for his help, patience, experience and time, that established my work in an honorable way.

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Syringomyelia is an chronic, progressive myelopathy presenting in the second or 3rd decade. It is defined as a cavity in the spinal cord which has a wall largely composed of glial tissue. This definition avoids the confusion that accompanies the attempts to limit the use of syringomyelia to define specific few lesions of different pathogenesis which ultimately lead to cord cavitation.

Conventionally, positive contrast myelography has been used as the primary investigative modality in attempting to define expanding lesions of the cervical or less commonly thoracolumbar cord.

MRI is considered now the modality of choice in the evaluation of suspected intramedullary lesions including syringomyelia because of its superior ability to evaluate and characterize lesions of spinal cord.

MRI is capable of providing anatomic information and specificity with high spacial and contrast resolution in any imaging plane.

The aim of the work is to evaluate the role of different imaging modalities in diagnosing a case of syringomyelia.

ANATOMY OF THE SPINAL CORD

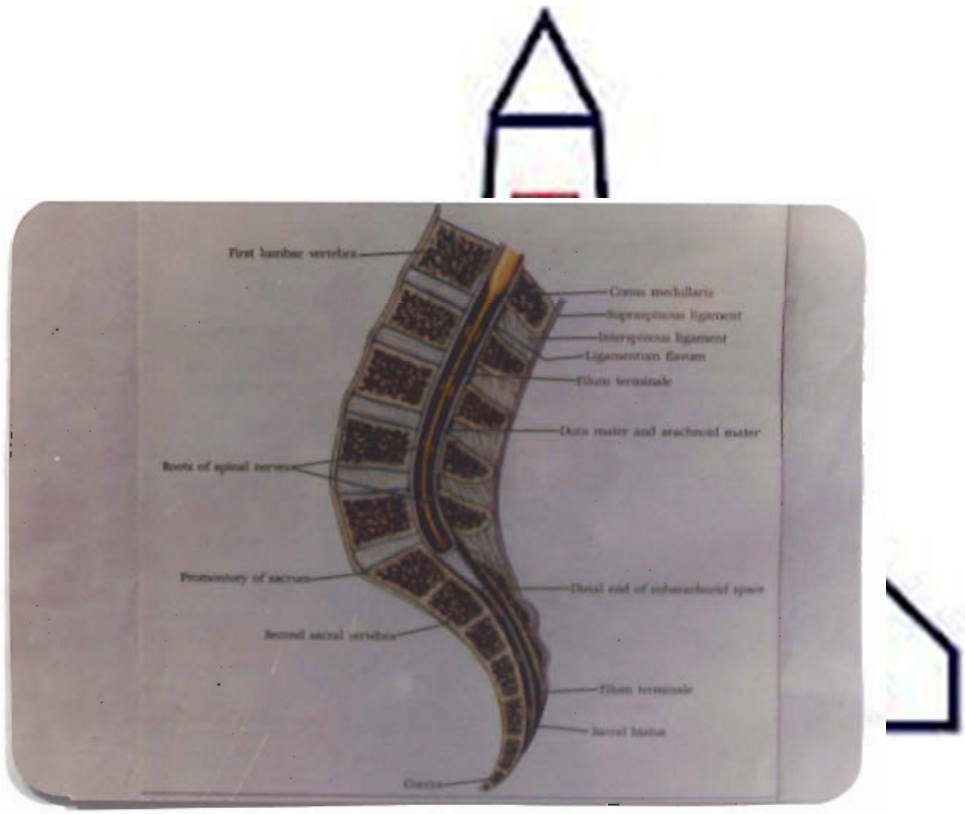

Fig. 1

Median sagittal section through lumbosacral region showing conus medullaris, filum terminal and lower limits of subarachnoid space.

ANATOMY OF SYRINGOMYELIA

Spinal Cord :

The spinal cord is an elongated cylinder, occupying the superior two-thirds of the vertebral canal. Its average length is about 45cm. It extends between the levels of the upper border of the atlas and the junction between the first and second lumbar vertebrae. The later level varying, with some correlation with the length of trunk, especially in females.

Its termination may be as high as the 12th thoracic vertebra's caudal third or as low as the disc between the 2nd and 3rd lumbar vertebra. Its position rises slightly in vertebral flexion.

The spinal cord is continuous usually with medulla oblongata, then it narrows caudally to the conus medullaris. From whose apex descends the filum terminal, to the dorsum of the first coccygeal segment. The filum terminal is a filament of connective tissue about (20cm) long.

It's upper (15cm), filum terminal internum, is surrounded by extensions of the dural and arachnoid meninges and reaches the second sacral vertebra at its lower border. Its final (5cm), the filum terminal externum, fuses with the investing dura mater, descending to the dorsum of the first coccygeal vertebral segment. The filum is continuous above with the pia mater of the spinal cord, and adherent to

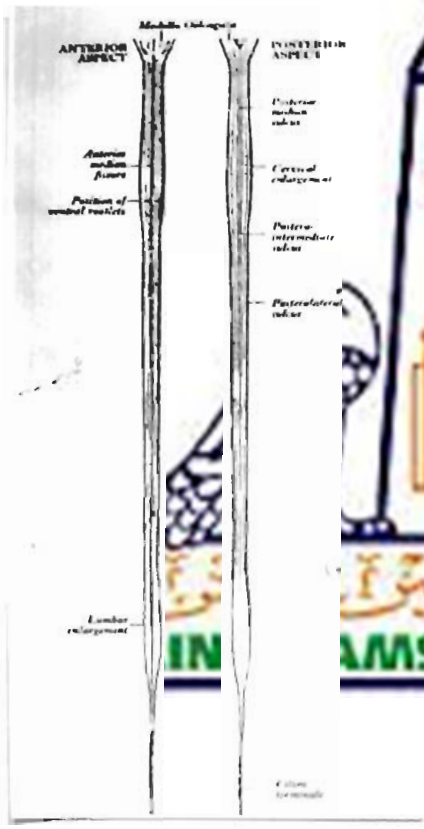

Fig. 2

The main features of the spinal cord.

the upper part of its surface are a few strands of nerve fibers which probably reprewent the roots of rudimentary second and third coccygeal spinal nerves.

[Worwick & William 1973]

The spinal cord processes two symmetrical enlargements which occupy the segments of the limb plexuses. That for the brachial plexus is known as the cervical enlargements and that for the lumbo sacral plexus as the lumbar enlargement. They occupy in the cord the segmental levels of the plexuses concerned (C_5 to D_1 for the cervical enlargement and L_2 to S_3 for the lumbar enlargement).

[Meshan, 1976]

The cervical enlargement is more pronounced, being the source of large spinal nerves supplying the upper limbs and its maximum circumference is about (38mm) being in the sixth cervical. It lies roughly corresponding the vertebrae (C_4 to D_1) But the lumbar enlargement extends only from (D_9 to L_1) and its maximum circumference is about (35mm). Both cervical and lumbar enlargements are due to the greatly increased mass of motor cells in the anterior columns of grey matter in these situations.

[Last, 1978]

Fissures and sulci extend along most of the external surface; an anterior median fissure and a posterior median sulcus and septum almost completely

separate the symmetrical right and left halves but these are joined by a commissural band of nervous tissue containing a central canal. The anterior median fissure along the whole ventral surface has an average depth of (3mm), deeper than this at caudal levels. It contains a reticulum of pia mater. Dorsal to it is the anterior white commissure. The posterior median suleus is shallower, from it a posterior median septum of neuroglia penetrates more than halfway into the cord, almost to the central canal, varying in anteroposterior extent from (4 - 6 mm) and diminishing caudally as the canal becomes more dorsal and the cord contracts.

A posterolateral sulcus exists from (1.5 - 2.5 mm) lateral to each side of the posterior median sulcus; along it, dorsal roots (strictly rootlets) of spinal nerves enter the cord.

Continuous with the cord is a series of paired dorsal and ventral roots of spinal nerves. These cross the subarachnoid space and traverse the dura matter separately, uniting in or close to their intervertebral foramina to form the (mixed) spinal nerves.

Since the spinal cord is shorter than the vertebral column, more caudal spinal roots descend for varying distances around and even beyond the cord to reach the corresponding foramina, thus forming, largely distal to the cord, a divergent sheaf of spinal nerve roots, the cauda equina, which is gathered around the filum terminal.

The central canal traverses the whole spinal cord and caudal half of the medulla oblongata, opens above into the fourth ventricle. At the cervical and thoracic levels the central canal is slightly ventral, but central in the lumbar enlargement and more dorsal in the conus medullaris. In the conus medullaris, the central canal expands as a fusiform terminal ventricle, triangular in section with ventral base, (8 -10 mm) in length, obliterating at about 40 years.

[Davies D.F., 1967]