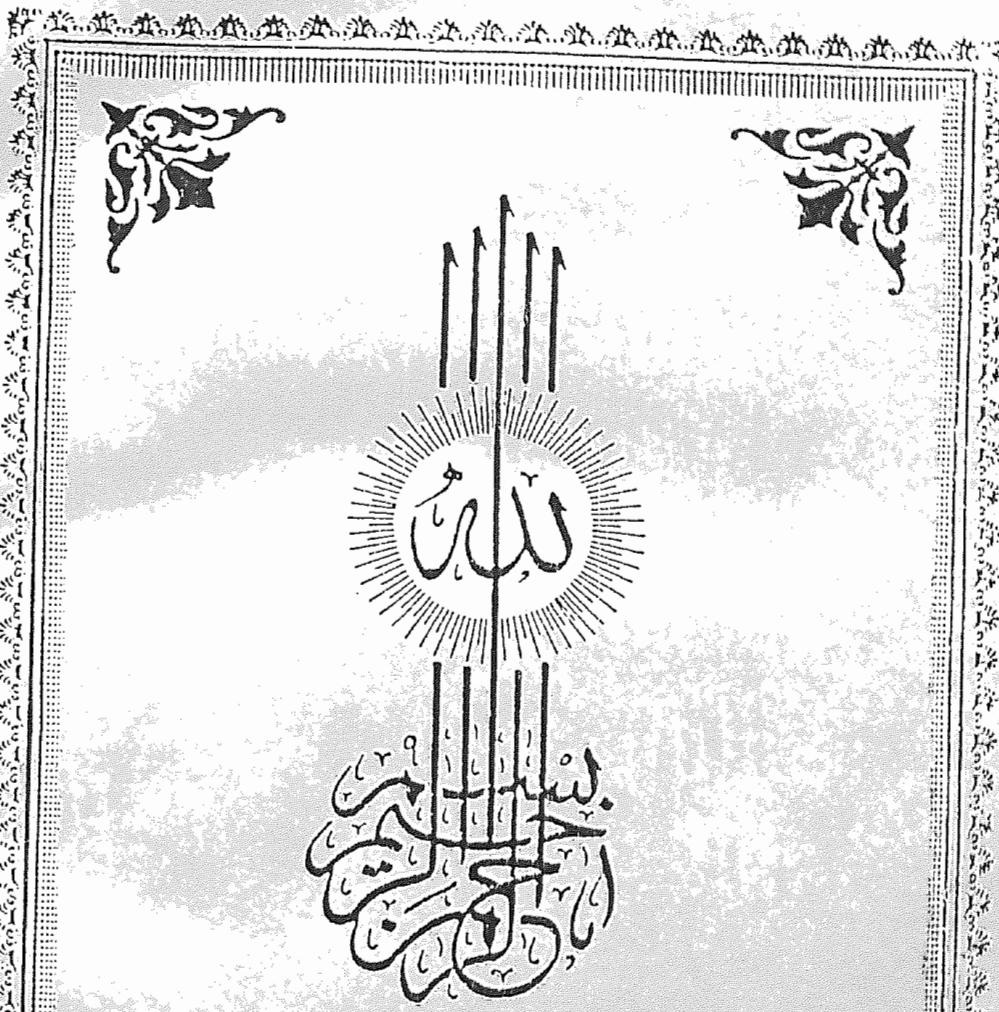

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صدق الله العظيم
البقرة - ٣٢ -

ROLE OF MAGNETIC RESONANCE IMAGING IN DIAGNOSIS OF INTRAMEDULLARY SPINAL SPACE OCCUPYING LESION

Essay
Submitted for Partial Fulfillment
For the Master Degree of
Radiodiagnosis

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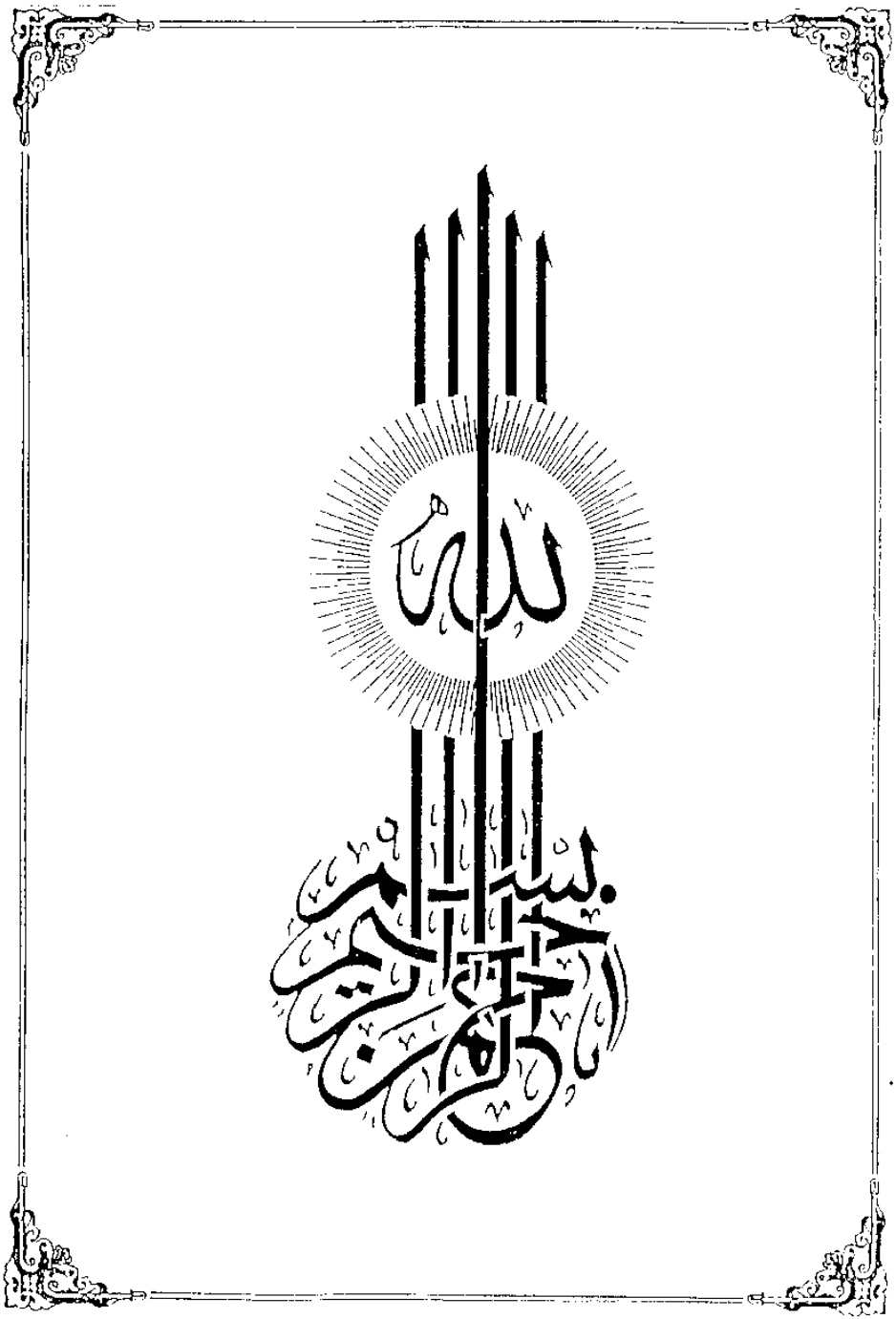

THIS WORK IS DEDICATED TO
MY BELOVED PARENTS AND
MY WONDERFUL BROTHERS
FOR THEIR LOVE, PATIENCE
AND FOREBEARANCE

ACKNOWLEDGMENT

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Magnetic resonance (MR) has proven to be an excellent technique for visualisation of the spinal cord. It is considered the examination of choice for diagnosis of syringomyelia *(Modic et al., 1983 and Spinos et al., 1985)* and has proven valuable in diagnosis of tumours of spinal cord *(Masaryk et al., 1986).*

Magnetic resonance imaging (MRI) has been used increasingly in diagnosis, staging and evaluation of neoplasia of the central nervous system. In classification of glioma, MRI accuracy rate approaches that of pathologic diagnosis *(Dillon wp, 1991).*

MRI is also valuable in diagnosis of metastatic disease of spinal cord with or without associated spinal compression *(Berger et al., 1986).*

MRI has several well recognized advantages over other imaging methods including superior soft tissue discrimination ability to directly image in sagittal and coronal planes and lack of exposure to ionizing radiation. It can also image a varity of

pathologic conditions effictively without intrathecal injection of contrast material. This is significant advantage considering patient discomfort neurological complication associated with intrathecal use of contrast media.

The aim of this work is to focus on the advantages of MRI over the other techniques in the diagnosis and assessment of intramedullary spinal space occupying lesion.

Anatomy of the Spinal Cord

ANATOMY OF THE SPINAL CORD

The spinal cord is a cylinder, somewhat flattened from front to back, whose lower end tapers into a cone.

Ventrally it possesses a deep midline groove the anterior median sulcus, and dorsally it shows a shallow sulcus, from which a posterior median septum of neuroglia extends into its substance. The posterior median septum within the spinal cord is attached to the incomplete posterior median septum of arachnoid in the subarachnoid space.

In foetus the spinal cord extends to the lower limit of the spinal dura mater at the level of the second sacral vertebra. The spinal dura remains attached at this level throughout life but the spinal cord becomes relatively shorter which is to say that the bony spinal column and dura mater grow more rapidly than the spinal cord. Thus at birth the conus medullaris lies opposite the third lumbar vertebra and dose not reach its permanant level opposite L1 or L2 until the age of twenty years. The spinal nerve roots especially those of the lumbar and sacral segments thus come to slope more and more steeply downwards *(Last, 1978).*

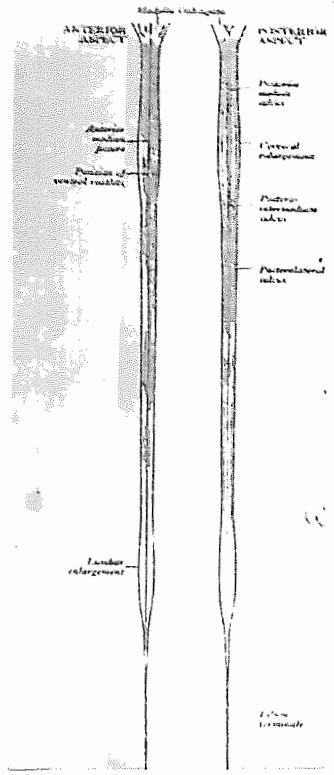

Fig. (I): The main features of the spinal cord.

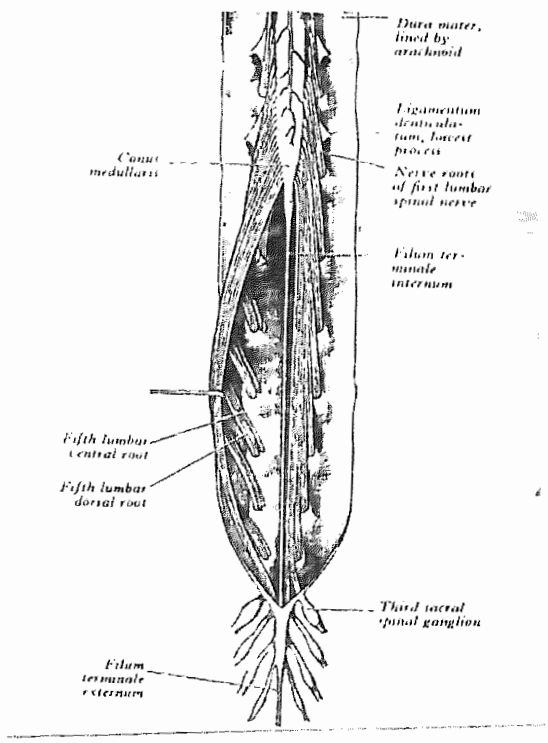

Fig. (2): The lower end of the spinal cord, the filum terminale and the cauda equina exposed from behind. The dura mater and the arachnoid have been opened and speard out.

The spinal cord possesses two symmetrical enlargments which occupy the segments of the limb plexuses. That for the brachial plexus is known as the cervical enlargment and that for lumbosacral plexus as lumbar enlargment (Fig.1). They occupy in the cord the segmental levels of the plexuses concerned (C 5 to Th. 1 for the cervical enlargment anal L 2 to S 3 for the lumbar enlargment) *(Meschan, 1976).*

Thus the cervical enlargment lies roughly corresponding to the vertebrae (C 3 to Th. 1), but the lumbar enlargment extends only from Th 9 to L 1. Both cervical and lumbar enlargments are due to the greatly increased mass of motor cells in the anterior columns of grey matter in these situations *(Last, 1978).*

The filum terminal, a fine filament of connective tissue about 20 cm length descends from the apex of the conus medullaris. Its cranial 15 cm, the filum terminal internum is surrounded by tubular extensions of dural and arachnoid meninges and reaches as far as the lower border of the second sacral vertebra (Fig. 2). Beyond this its final 5 cm, the filum terminal externum, is closely united with the investing sheath of dura mater, descending to an attachment to the dorsum of the first coccygeal vertebral segment. The filum, consisting

mainly of fibrous tissue is continuous at its cranial end with the pia matter of the spinal cord, adherent to the upper part of its surface are a few strands of nerve fibres which probably represent the roots of rudimentary second and third coccygeal spinal nerves. A particularly roomy part of the subarachnoid space surrounds the internal part of the filum, is the site of election for spinal (lumbar) puncture *(Worwick and William, 1973).*

The spinal canal

The spinal canal is a smooth-walled tubular space whose only openings from top to bottom are the line of intervertebral foramina. It contains the spinal cord and the spinal meninges. The spinal cord is narrower than the spinal dura matter and the spinal dura matter is narrower than the spinal canal. Thus each can adapt itself without strain to the movements of the spinal column *(Last, 1978).*

The spinal canal becomes progressively smaller from above downwards. It is closed anteriorly by the vertebral bodies, the intervertebral discs and the posterior longitudinal ligmant and posteriorly by the lamina and ligamenta flava. Laterally it is occupied by the pedicles which are narrower than the height of vertebral bodies *(Meschan, 1976).* Thus a series of

intervertebral foramina is produced between adjacent pedicles. Each intervertebral disc, is bounded behind by the capsul of the synovial joint between adjacent neural arches.

The intervertebral foramina lodge the spinal nerves and posterior root ganglia and give passage to the spinal arteries and veins.

The spinal canal is lined by a layer of extradural fat in which lies the internal vertebral plexus of veins. Spinal meninges and the subarachroid space surrounding the spinal cord are the spinal meninges consisting of dura and arachnoid and extending from cranio-cervical junction to the 2nd sacral vertebra. The dural sac, a thin fibrous membrane is anchored to the coccyx by means of fibrous tissue and may be attached to the vertebral canal only by means of membranous plicae *(Isherwood, 1977)*. The arachnoid is transparent membrane within the dural sac. The subdural space between the two membranes contains a small amount of fluid and numerous fibrinous bands. The width of the dural sac varies from region to region. In the cervical spine where the epidural fat is sparse the dural sac nealy fills the spinal canal. In the thoracic spine the dural sac may vary in size from a sleev slightly larger than the spinal cord and surrounded by ample epidural fat to a sac that