

MEASUREMENTS OF NORMAL SPINAL CORD DIAMETERS AT CERVICAL AND LUMBAR ENLARGEMENT LEVEL IN MRI

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ABSTRACT

Introduction: In the present study we measure antero-posterior and transverse diameter of cervical and lumbar enlargement at their maximum level in 20 spinal cord with Magnetic Resonance Imaging (MRI).

Material and Methods: Study carried out in MRI section of Radiology Department in Mahatma Gandhi's Medical college, Aurangabad. MRI was done on patients referred to MRI for backache. Patients are made to lie down in supine position on MRI table. Given specific coil & MRI performed in sagittal and coronal plane. Antero-posterior diameter measured at sagittal section was transverse diameter measure at coronal views.

Results: In present study we find mean antero-posterior diameter and transverse diameter in 20 subjects, the antero-posterior diameter is less.

Conclusion: This knowledge of comparison antero-posterior and transverse diameter not only assist surgeons to take care during interventions, but also facilitate to plan accordingly during various surgical procedures and management.

KEY WORDS: Antero-posterior, transverse diameter, MRI, surgical interventions.

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Access this Article online

Quick Response code



DOI: 10.16965/ijar.2016.113

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 20 Jan 2016

Accepted: 08 Feb 2016

Peer Review: 20 Jan 2016

Published (O): 29 Feb 2016

Revised: None

Published (P): 29 Feb 2016

INTRODUCTION

Quantitative measures of neuroanatomy of the spinal cord provide the basis of understanding and interpreting clinical implications, such as relationship between vertebral injury level and segment level, the morphological characteristic of severity of spinal cord injury and possible correlation between numbers of injured spinal cord segment [1]. The dimensions of spinal cord are important in condotomy and other operations [1,2]. Although the external and cross sectional features of adult spinal cord have been

documented [1,3]. More recently there has been interest in the anatomical varieties between individual segment [3].

The characterized demyelination/degeneration of spinal pathways in traumatic spinal cord injured (SCI) patients is crucial for assessing the prognosis of functional rehabilitation. Novel technique based on diffusion-weighted (DW) Magnetic Resonance Imaging (MRI) and Magnetization transfer (MT) imaging provide sensitive and specific marker of white matter pathology [4].

In present study we measure the anteroposterior and transverse dimensions of cervical and lumbar enlargement at their maximal level in 20 spinal cord with MRI and compared with previous data.

MATERIALS AND METHODS

Present study was carried out in the Magnetic Resonance Imaging (MRI) section of Radiology Department of our institute during period February 2015 to December 2015.

The study was carried out on Magnetic Resonance Imaging (MRI) supplied by Koninklijke Philips, Electronics, N.V. 2015. MRI of spinal cords were done on patients referred to MRI section for investigation of chronic, mild to moderate backache from outdoor basis patients. Study includes 20 patients. Only patients having normal spinal cord on MRI were chosen for the study. MRI room is air conditioned. Magnet used by machine is superconducting magnet that uses liquid helium. Attached to machine room is console room which has computerized monitor on which images are directly seen. Patient is made to lie down in supine position on the table and given specific coil depending on the need of the region to be scanned. The table is moved vertically and horizontally.

In all patients MRI performed in sagittal and coronal plane. T₂ weighted films were taken with slice thickness of 4 mm. When MRI performed image are transfer to workstation. Anteroposterior diameter measured at sagittal section and transverse diameter measured at coronal views. Both diameters measured at same intervertebral disc levels.

RESULTS

The data was tabulated in the form of age of patient. Antero-posterior diameters is sagittal plane in mm at intervertebral disc between 6th and 7th vertebra and intrevebral disc between 12th and 1st lumbar vertebra.

Transverse diameters in mm at intervertebral disc between 6th and 7th cervical and interventioanal disc between 12th and 1st lumbar vertebra.

The dimensions of spinal cord are important in cordotomy and other spinal operations. External and cross sectional features of adult spinal

cord have been well documented, there have been few studies of variation along the cord weight, length and thickness.

Spinal cord injuries (SCI) remain a devastating condition for both patients and their families so these injuries also have a major impact on health care system and society as a whole.

Fig. 1: Transverse diameter – C5 - C6 level.

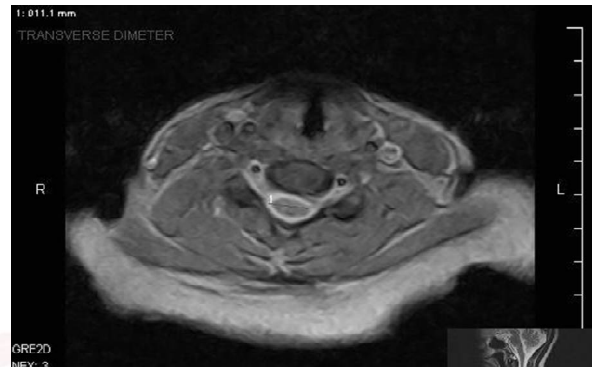


Fig. 2: Antero-posterior diameter at C5-C6 level.

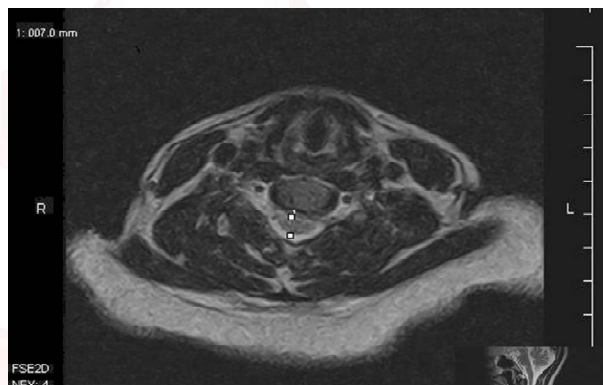


Fig. 3: Antero-posterior – Transverse diameter of lumbar L4 level.



Table 1: Showing descriptive Statistics.

	n	Minimum	Maximum	Mean	S.D.
AP C6-C7	20	4	8	6.7	0.864
AP T12-L1	20	5	10	7.65	1.039
T C6-C7	20	10	14	11	1.025
T T12-L1	20	8	13	9.45	1.234
Valid n (listwise)	20				

DISCUSSION

The ability of magnetic resonance imaging (MRI) technique of displaying both the normal and pathologic spinal cord with great sensitivity and specificity indicates in diagnosis of neoplastic, degenerative and congenital lesions. Axial sections provides good cross sectional representation of spinal cord diameter [2,5]. The purpose of the study was to obtain anteroposterior and transverse diameters of spinal cord at various levels and to compare the corresponding figures given in standard anatomic descriptions.

In the present study antero-posterior and transverse diameters of spinal cord at various levels were measured and compare the corresponding figures given in standard anatomic descriptions. Antero-posterior and transverse diameters are tabulated. Due to small sample size, male and female comparison could not be drawn and this was random selection of patients. For cervical enlargement of spinal cord the diameters mention by Riley H.A. and Tinley F. (1938) are 13X9 mm at the level of sixth cervical vertebrae.[6] In our study intervertebral disc between C₆-C₇, the diameter noted 11X6.70 mm (Trs-Ant Post). The finding is less by 2x2.30 mm.

In present study at the level of intervertebral disc between T12-L1, the maximum transverse diameter of spinal cord noted 9 mm, however the mean diameter at this level is 9.05 mm which is almost 0.05 mm less than maximum transverse diameter noted by Perease and Fracaso (1959).[7] In the present study the Anteroposterior and transverse diameter 9 mm x 12 mm and whih is 0.02 mm x 0.04 mm varies from the diameter given by Scherman J.L, Nassaux PY, Citrin CM. (19—) [8].

Morris (1942), the maximum transverse diameter of cord at cervical enlargement is 12-14 mm [9].

At the level of intervertebral disc T12-L1 diameter of spinal cord in present study was 9.4x7.6 mm. While Tilney F. and Riley H.A. (1938) mentioned diameters of spinal cord at the lumbar enlargement 13x9 mm and in present study the diameter was 3.6x1.4 mm [6].

CONCLUSION

In the present study, if we compare meananteroposterior diameter and transverse diameter in 20 subjects the anteroposterior diameter is less.

Conflicts of Interests: None

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How to cite this article:

Smita B. Shinde, G. A. Shroff, Savita Kadam. MEASUREMENTS OF NORMAL SPINAL CORD DIAMETERS AT CERVICAL AND LUMBAR ENLARGEMENT LEVEL IN MRI. *Int J Anat Res* 2016;4(1):1919-1921. DOI: 10.16965/ijar.2016.113