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GROWTH PATTERN OF MAXIMUM TRANSVERSE DIAMETER OF CERVICAL ENLARGEMENT OF SPINAL CORD WITH THE GESTATIONAL AGE IN INDIAN HUMAN FOETUSES

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ABSTRACT

Introduction: Foetal anatomy has become very special now a days due to application of surgery before birth for the treatment of lethal disorders (1). Detailed information about the pattern of growth of spinal cord and parameters of spinal cord in foetuses were lacking in literature. Readings of Maximum Transverse Diameter of Cervical Enlargement of Spinal Cord in different Gestational Age will help for the assesment of growth pattern of spinal cord in Indian Human Foetuses. **Materials and Methods:** The foetuses under consideration were taken after permission from ethical committee for the specific study. ***Laminectomy*** was performed to open vertebral canal from behind and spinal cords were removed for the measurement of Maximum transverse diameter of Cervical Enlargement with the help of Vernier calipers under standard conditions. **Result and Conclusion:** There was significant increment of Maximum Transverse Diameter of Cervical Enlargement of Spinal Cord from Group III onward in Indian Human Foetuses.

KEYWORDS: Human foetuses, Spinal cord, Cervical enlargement.

INTRODUCTION

Foetal anatomy has become very special now a days due to application of surgery before birth for the treatment of lethal disorder.[1] Using callipers Joris et al (2010) performed comparative anatomy of whole spine of porcine and human by computer tomography method.[2] Multiple manual readings were taken from the spinal cords of different foetuses of different gestational groups to minimize the error and increment of accuracy. Readings of Maximum transverse diameter of Cervical Enlargement will be helpful for knowing the growth pattern of spinal cord in Indian Human Foetuses that may be implicated medicolegally.

MATERIALS AND METHODS

Ethical committee approved Formalin fixed Foetuses without any congenital cranio-vertebral anomalies were selected for this study. The parameters used for determination of gestational age was foetal foot length. Fair correlation between foot length and gestational age was documented (Streeter, 1920). For the purpose of analysis and evaluation, foetuses were divided into 5 groups as follows.

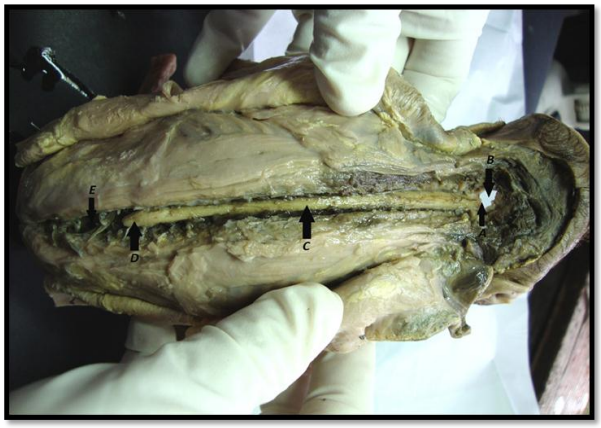
Table 1:

Groups	Age (wks)	No. of Males	No. of Females	Total
I	< 17	3	3	6
II	17-20	3	3	6
III	21-25	3	3	6
IV	26-30	3	3	6
V	> 30	3	3	6

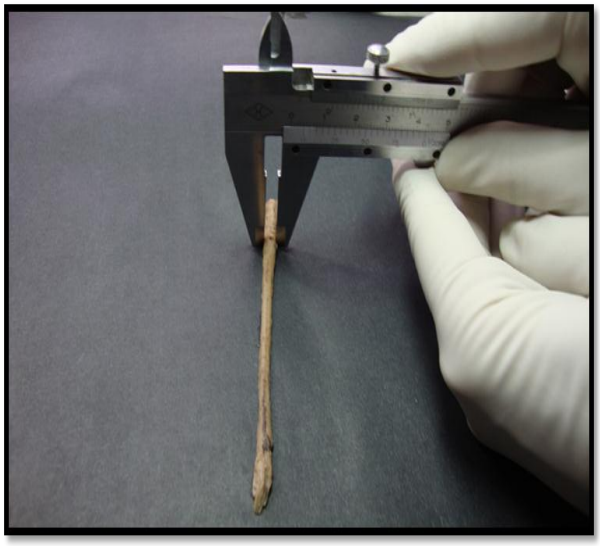
Laminectomy was performed to open vertebral canal from behind. The method was popularly used by surgeons to approach structures inside the canal.[3]

1. A midline vertical cutaneous incision was made on the back of foetus extending from external occipital protuberance to natal cleft.
2. Two horizontal incisions, one each at upper and lower ends of aforementioned vertical incision on skin were given.
3. Skin flaps, underlying fasciae and muscles were removed, were raised on both the sides of midline.
4. Vertebral canal was exposed by laminectomy performed by putting the scissor in sacral hiatus on either side and continuing it upwards.
5. Spinal cord with its meningeal coverings were cleaned by removing soft tissue in viscinity.
6. Spinal cord was exposed by reflectingdura,arachnoid together laterally from aforementioned midline incision. (“Fig.1”)

7. All the nerve roots were cut on both sides.
8. The spinal cord was removed after making cross section in it at the level of the upper border of atlas vertebra.
9. Maximum transverse diameter of cervical enlargement of different spinal cords was measured under standard conditions ("Fig.2")
10. All the findings were analysed by Student's 't' test.



"Fig. 1": Making an incision at junction of spinal cord and medulla oblongata (A); B- Foramen magnum; C- Spinal cord; D- Conusmedullaris; E- Lumbosacral canal.



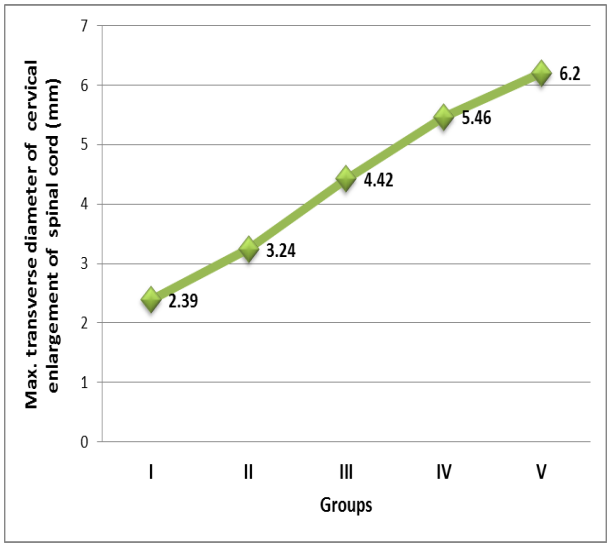
"Fig. 2": Measuring the maximum transverse diameter of cervical enlargement.

RESULTS AND DISCUSSION

Table 2: Maximum transverse diameter of Cervical enlargement of spinal cord (mm)

Groups	No. of Foetuses	Mean ± S.D.	Per cent change	T value	P value
I	6	2.39 ± 0.43	–	–	–
II	6	3.24 ± 0.19	+36	0.001	Insignificant
III	6	4.42 ± 0.35	+36	3.01	Significant*
IV	6	5.46± 0.16	+25	6.41	Significant*
V	6	6.20 ± 0.14	+15	9.2	Significant*

***P value < 0.001**



"Fig. 3": Graph showing pattern in transverse diameter of cervical enlargement of spinal cord with gestational age.

Suzuki (1994) used magnetic resonance imaging technique for the morphologal study of cervical spinal cord. (4) Bayer and Altman (2004) measured total cross-sectional area of cervical enlargement and interpreted that most of the variations in size difference at 14th gestational week were similar to those adult spinal cord. (5) Parallel report was lacking in literature. We found that **maximum transverse diameter of cervical enlargement** of spinal cord (Table- 2) was 2.39 mm in group I which increased to 3.24 mm in group II foetuses but this change was not significant statistically. Significant increases were observed from group II to group III, group III to group IV and group IV to group V, which were 36%,23%, 15% respectively. It showed significant growth of upper limbs in late gestational age foetuses.

CONCLUSION

Maximum growth of cervical enlargement of spinal cord in terms of maximum transverse diameter occur after 17 weeks of gestation in Indian Human foetuses. Significant

growth of upper limbs occur between 17-25 weeks of gestational age Indian Human Foetuses.

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