Original Article

Study of Ventral Horn Cells of Spinal Cord in Different Gestations of Fetuses

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Abstract: Study of the development of the nervous system is not of mere theoretical interest but it also enables to trace homologies through various groups of vertebrates. A metameric arrangement of spinal cord has been described long ago but no satisfactory explanation has been derived for the causes of the position, distribution of cells of origin, and their myotomic distribution. Various interesting changes are incorporated in development of spinal cord. The differentiation of alar and basal lamina in to ependymal, mantle, and marginal zones has been observed at 12 weeks of gestation. Typical nuclear columns were observed at the same time.

Key Words: Greymatter, Multipolar cells, Spinal cord, Ventral horn cells.

Introduction

It is of greatest utility to understand the logical concept of complex nature of the nervous system. Consequent to the development of technology and methodology the detailed outline of cells that descend in the wall of neural tube have been a great boon to all. Somewhat common pattern has been described for all mammals. But differences in the degree of development of the ventral horn cells in various gestation of fetuses has been observed in the present study. According to Anguloy Gonzalez there is no segmental arrangement of motor neurons of the spinal cord in albinorat. The observations of Kapper and Crosby showed that morphological differentiation of musculature is perhaps dependent upon anatomical differentiation of nuclear columns of anterior horn cells. No satisfactory explanation has been derived for the causes of position and distribution of cells of origin and their myotomic distribution of neuraxis. Even though full details are available in as far as adult spinal cord is concerned literature on fetal spinal cord is still inadequate.

Materials and Methods- 50 dead fetuses were collected from different private nursing homes of Vizianagaram and fixed by injecting 10% formalin. Spinal cords were dissected out. Various segments of spinal cords ranging from 10 weeks gestation to full term were dissected. The dissected sections of spinal cord were washed thoroughly with water and then passed through graded alcohols. Next they are cleared in Xylene till the tissue became transparent. After clearing the tissue it was embedded in the paraffin. The paraffin blocks were kept in refrigerator for two to three hours before sectioning. Sections of six to eight microns were taken. They were stained with Haemotoxyline and Eosin. The ventral horn cells were studied with regard to their appearance, shape, size and grouping.

Observations- The grey matter of spinal cord of fetuses of different gestational ages is been described as follows,

10 weeks- The grey matter does not show typical formation of ventral and dorsal horns. Closely packed indistinguishable neuroblasts are seen. The central canal appeared but the lining epithelium was not clearly discernable. (Fig-1)

12 weeks- Differentiation of ependymal, marginal and mantle zones has been observed. Clusters of neurons appeared in the ventral horn in all segments but the preponderance of cells which are multipolar was more in cervical and lumbar segments. This shows the development of limb buds. (Fig-2)

16 weeks- Distinct subgroups having small and medium multipolar cells were found in ventral horn of different segments of spinal cord. (Fig-3)

26 weeks- Ventral horn shows small and medium sized multipolar neurons with occasional large cells.

30 weeks- Ventral horn of cervical end lumbar segments presented small, medium with occasional large multipolar cells.

Full term- The grey matter was typical H shaped. Ventral horn presented small, medium and large multipolar neurons. The large neurons showed coarse granules of nissile substance.(Fig-4)
Discussion and Conclusion - According to G.Rath, G.Gopinath and V.Bijlini\textsuperscript{3} differentiation of alar and basal lamina into ependymal, mantle and marginal zone has been observed at 12 weeks of gestation which coincided with present study. The above authors also observed a pseudostratified lining of the central canal at 10 weeks. In the present study columnar epithelial lining has been observed at 12 weeks. Nuclear columns have been observed much earlier in cervical and lumbar segments. This observation coincides with that of Shaw et al\textsuperscript{4}.

G.S.Rao\textsuperscript{5} studied nuclear pattern of spinal grey matter in buffalo. He stated that the multipolar neurons were small, medium and large with central nucleus situated along the entire length of the spinal cord which was observed at full term in present study. The author described in ventral horn a ventromedial nucleus throughout the cord, dorsomedial nucleus from cervical second segment to sacral first segment. Dorsolateral nucleus is limited to the cervical and lumbar enlargements. In all these groups small and medium sized multipolar neurons intermingled with few large multipolar neurons. The above finding coincided with the present study.

Figure 1: Showing the section of Spinal Cord in 10 Weeks Fetus H & E X100

Figure 2: Showing the section of Spinal Cord in 12 Weeks Fetus H & E X100

Figure 3: Showing the section of Spinal Cord in 16 Weeks Fetus H & E X100
Figure 4: Showing the section of Spinal Cord in Full Term Fetus H & E X400

References-
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