Normal Level of the Conus Medullaris in Neonates:A Retrospective Multimodal Radiographic Analysis

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Introduction

The level of the conus medullaris considered "normal" is a controversial topic in pediatric neurosurgery. Determination of normal level remains extremely relevant in deciding to perform prophylactic detethering on infants with abnormally low-lying conus.

Methods

We reviewed radiographic images of 219 infants born with concerns for low-lying conus medullaris. The level of the conus was assigned a numerical value (e.g. L1 = 1, L2 = 2, etc.) In patients where the conus was located opposite to the disk space at the junction of two vertebral bodies, the numerical value was averaged.

Results

The average gestational age at birth in all 219 patients was 38±3.3 weeks (range 26 -41). All 219 patients had an initial ultrasound of the lumbosacral spine. Of all 219 patients, 193 (88%) had an MRI of the lumbosacral spine. In these 193 patients, the average gestational age at which the initial ultrasound was obtained was 43±8.4 weeks (range 27-82), and the average level of the conus medullaris at the time of the first ultrasound was 2.8±0.8 (range L1 to S1). The average age at which the MRI was obtained in these 193 patients was 73±41.8 weeks of gestation (range 35-324), and the average level of conus medullaris at the time of the MRI in these 193 patients was 2.6±0.9 (range L1 to S1). At the time of MRI, white patients, patients with syrinx, and patients with spinal and vertebral anomalies had a statistically significant lower conus level.

Table 1

Level of Conus Medullaris	Number of Patients (US1)	Number of Patients (US2 or MRI)
L1	4	9
L1-L2	6	17
L2	42	63
L2-L3	48	48
L3	82	50
L3-L4	15	9
L4	16	15
L4-L5	2	3
L5	3	2
L5-S1	0	2
S1	1	1

Figure 1

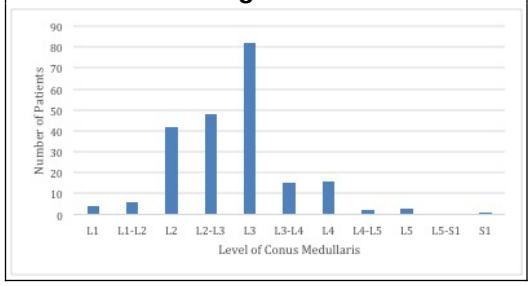
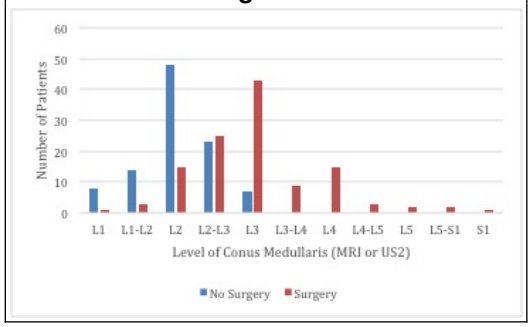


Table 2

Level of Conus Medullaris	Total No. Patients	No. Patients Undergoing Surgery	No. Patients Not Undergoing Surgery
L1	9	1 (11%)	8 (89%)
L1-L2	17	3 (18%)	14 (82%)
L2	63	15 (24%)	48 (76%)
L2-L3	48	25 (52%)	23 (48%)
L3	50	43 (86%)	7 (14%)
L3-L4	9	9 (100%)	0 (0%)
L4	15	15 (100%)	0 (0%)
L4-L5	3	3 (100%)	0 (0%)
L5	2	2 (100%)	0 (0%)
L5-S1	2	2 (100%)	0 (0%)
S1	1	1 (100%)	0 (0%)

Figure 2



Conclusions

Our findings demonstrate average levels of the conus medullaris based on gestational age in a large patient sample. Further, we identify a number of demographic and clinical features associated with a lower average conus level.

References

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