

TYPES AND LOCATIONS OF CONUS MEDULLARIS IN EGYPTIAN POPULATION

Essam El karif, Tarek Al Fiki, Mahmoud Elsayed Ali Nafady, Suleiman Yunusa

Orthopedic and Traumatology Department, Faculty of Medicine, Alexandria University, Alexandria, Egypt.

INTRODUCTION

The specific location where the spinal cord ended (conus medullaris) in the vertebral canal has been well studied in the adult population through the use of cadaveric studies. Many cadaveric and MRI studies were previously carried out with the primary goal to determine the precise level of conus medullaris termination, however, only a few studies conducted characterized both termination and the shape of conus medullaris.

AIM OF THE WORK

The aim and objectives of this prospective study is to determine the types and locations of conus medullaris in Egyptian patients.

SUBJECTS AND METHODS

This prospective study evaluated MRI findings of 1000 patients aged 5-100 years (445 male and 555 female) with complaints of low back pain at El-Hadra University Hospital, Alexandria. Patients with spinal deformity were excluded. Only those patients with good, readable MRI results were included. All patients were assessed using T1-weighted, midline, sagittal, spino-echo magnetic resonance imaging studies which was performed at 1.5 Tesla strength. Slice thickness for sagittal sequences 4mm. Axial sequences from pedicle to pedicle and angled to the disc space, and confirmed with T2-sagittal cuts. The method proposed by Arai et al was used to determine the shape and position of the conus medullaris.

RESULTS

The CM terminated at variable levels in the vertebral canal ranging between T12, L1, L2 and L3 vertebral discs. L1 was the most common termination level in the study population in both genders (Table1-5). The CM terminated at T12 in 25 patients (2.5%) and L1 lower vertebral segment in 836 patients (83.60%), and at L2 upper vertebral segment in 130 patients (13.0%) and lastly L3 upper vertebral segment was the least termination level in only 2 patients (0.2). 4 patients (0.4%) terminated at disk level between T12/L1 in 2 patients (0.2%) and L1/L2 in 2 patients (0.2%). Pertaining to the CM types, we found type B, as the most common in 525 (52.50%) of patients, followed by type C, in 382 (38.20%) of patients, and lastly type A, in 93 (9.30%) patients. (Table 4).

Table 1: Frequency distribution of the TLCM at L1 vertebral body and L1/L2 disk space.

Age (years)	Total	Sex		L1 vertebral body			
		Female	Male	L1 vertebral body segments			L1/L2 Disk space
				Upper	Middle	Lower	
No.	No.	No.	No.	No.	No.	No.	
5 – <20	29 (3.5)	14 (3.8)	15 (3.2)	10 (4.3)	9 (3.5)	10 (2.9)	0 (0.0)
20 – 39	281 (33.6)	140(38.3)	141(30.0)	75 (32.6)	95 (36.7)	109 (31.8)	2 (50.0)
40 – 59	449 (53.7)	174(47.5)	275(58.5)	121 (52.6)	135 (52.1)	191 (55.7)	2 (50.0)
60 – 79	72 (8.6%)	36(9.8)	36(7.7)	22 (9.6)	19 (7.3)	31 (9.0)	0 (0.0)
80 – 100	5 (0.6)	2 (0.5)	3 (0.6)	2 (0.9)	1 (0.4)	2 (0.6)	0 (0.0)
Total	836	366	470	230	259	343	4

Table 2: Frequency distribution of the TLCM at T12 vertebral body and T12-L1 disk space

Age (years)	Total	Sex		T12 vertebral body			
		Female	Male	T12 vertebral body segment			T12/L1 Disk space
				Upper	Middle	Lower	
No.	No.	No.	No.	No.	No.	No.	
5 – <20	1 (4.2)	0 (0.0)	1 (7.1)	0 (0)	0 (0)	1 (11.1)	–
20 – 39	7 (28.0)	3 (30.0)	4 (16.0)	0 (0)	3 (33.3)	3 (33.3)	1 (0.1)
40 – 59	15 (62.5)	7 (70.0)	8 (57.1)	5 (83.3)	6 (66.7)	4 (44.4)	–
60 – 79	2 (8.3)	0 (0.0)	2 (14.3)	1 (16.7)	0 (0)	1 (11.1)	–
80-100	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	25	10	15	6	9	9	1

Table 3: Frequency distribution of the TLCM at L2 and L3 vertebral disk space

Age (years)	Total	Sex		L2 and L3 vertebral body			
		Female	Male	L2 (n=130)			L3 Upper
				Upper	Middle	Lower	
No.	No.	No.	No.	No.	No.	No.	
5 – <19	9 (6.81)	4 (6.3)	5 (3.787)	3 (4.8)	2 (6.1)	2 (5.9)	1 (50.0)
20 – 39	48 (36.8)	28 (43.8)	20 (29.41)	22 (34.9)	12 (36.4)	14 (41.5)	1 (50.0)
40 – 59	62 (47.6)	29 (45.3)	33 (48.53)	33 (52.4)	16 (48.5)	13 (38.2)	0 (0.0)
60 – 79	13 (9.85)	3 (4.7)	10 (14.7)	5 (7.9)	3 (9.1)	5 (14.7)	0 (0.0)
80 – 100	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	132	64	68	63	33	34	2

Table 4: Distribution of the CM according to type

Age (years)	Total	Sex		Mean Age	Type		
		Female	Male		A	B	C
		No.	No.	No.	Mean ± SD.	No.	No.
5 – <20	38 (3.8)	18 (4.1)	20 (3.6)	15.21 ± 4.41	6 (6.5)	21 (4.0)	11 (2.9)
20 – 39	342 (34.2)	174 (39.2)	168 (30.2)	31.16 ± 5.52	31 (33.3)	177 (33.7)	134 (35.1)
40 – 59	527 (52.7)	211 (47.5)	316 (56.8)	48.05 ± 5.50	47 (50.5)	276 (52.6)	204 (53.4)
60 – 79	88 (8.8)	39 (8.8)	49 (8.8)	64.95 ± 4.41	8 (8.6)	48 (9.1)	32 (8.4)
80 – 100	5 (0.5)	2 (0.5)	3 (0.5)	88.80 ± 6.53	1 (1.1)	3 (0.6)	1 (0.3)
Total	1000	444	556	42.72 ± 13.14	93	525	382

Table 5: Distribution of studied cases according to sex.

Gender	N	%	Total
Male	556	55.6%	556
Female	444	44.4%	444
Cumulative Total	1000	100.0%	1000

Table 6: Distribution of studied cases according to age.

Age (years)	- n
- n	1000
- Min-Max	5.00 - 100
- Mean ± S.D.	42.75 ± 13.12
- Standard error of the mean	0.41
- 95% CI for mean	41.93– 43.56

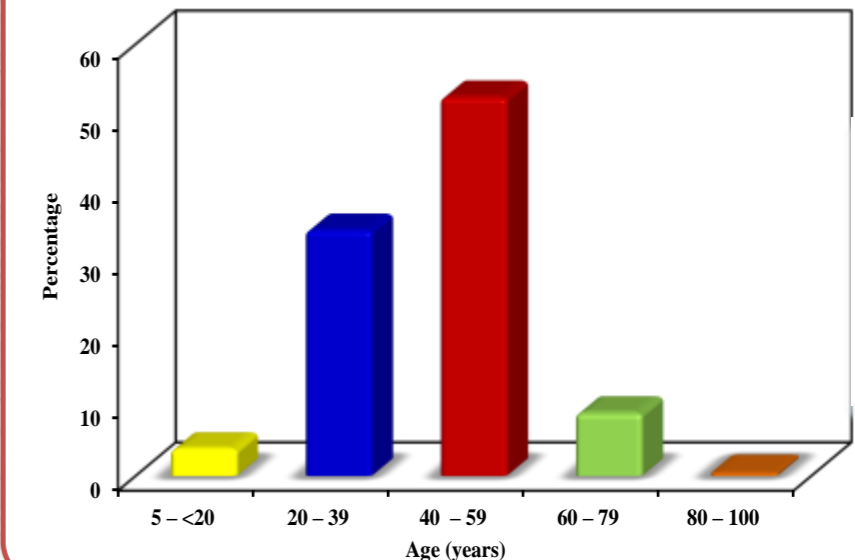


Figure: Age distribution of the studied cases according to total number in each age group.

CONCLUSION

The conus medullaris was located mostly in the middle one-third of L1, followed by L2 and least L3 upper third, Type A conus was least and type B was most common followed by type C.