소아재활

게시일시 및 장소 : 10 월 19 일(토) 08:30-12:30 Room G(3F)

질의응답 일시 및 장소 : 10 월 19 일(토) 11:00-11:30 Room G(3F)

P 3-8

Language assessment according to arcuate fasciculus among developmental delayed children

Sehee Kim[1*], Hae yeon Park[1], Kyung Eun Nam[1], Ah-Ra Cho[2], Joo Hyun Park[1†]

Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea, Department of Rehabilitation Medicine[1], Eunpyeong St. Mary`s Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea, Department of Rehabilitation Medicine[2]

Introduction

In adults, the arcuate fasciculus(AF) is known to play an important role in speech production. However, the role of AF in language development of toddlers is not clear yet. AF has been proposed to play a role in language development and cognitive function. In adults, language is lateralized to the left hemisphere of the cerebrum but the timing of lateralization is not known precisely.

Objective

To investigate the role of AF in clinical development aspect, especially in language status, we elucidate the difference of development and language assessment results according to presence of AF in diffusion tensor tractography (DTT). We also assessed the relationship between the absence of AF and development status depending on hemisphere.

Method

A retrospective chart review was done in 131 developmental delayed children who underwent brain MR imaging and DTT. Among them, 31 patients showed the absence of AF. Patients were divided into 2 groups based on the presence of AF. A Mann-whitney test was done to determine statistical differences of language profile between two groups. A student's t-test was performed to elucidate the difference of Developmental Quotient (DQ) between two groups. Patients with absence of AF then were divided again into 3 groups based on hemisphere. A Kruskal wallis test was conducted to determine statistical differences of Developmental Quotient (DQ) and language profile using Sequenced Language Scale for Infants (SELSI) or Preschool Receptive Expressive Language Scale (PRES) between three groups. DQ was calculated based on the results of the Denver Developmental Screening Test.

Results

Of the total patients, 23.66% showed no AF in DTT. There was no statistically significant difference between the two groups on general demographic data and the DQ (Table1). No statistically significant difference was observed between the two groups on language assessment including SELSI and PRES(Table2). There was no statistically significant difference between the three groups based on side of absent AF on DQ and language assessment in all domains (Table 3).

Conclusion

A few studies suggested the role of AF in cognitive development in children. In this study, there was no significant difference in developmental assessment according to presence or absence of AF among children with developmental and language delay. And also no difference was observed in the language domain according to the side of absent AF. It seems that the unilateral hemisphere of children does not dominate in language function, unlike adults. The limitations of this study is that there was no normal control group and the sample size was small. Further cumulative and prospective data are needed to understand the role and correlation between language development and AF at DTT.

table1.General demographics and Developmental Quotient (DQ) between two groups according to presence of arcuate fasciculus.

		arcuate fasciculus	N	Average	Standard deviation	*p*
General demographics	birth week	presence	93	35.42	4.299	0.928
		absence	30	35.33	5.148	
	birth weight	presence	87	2521.53	926.664	0.800
		absence	29	2469.86	1020.002	
DQ	Personal social	presence	85	64.82%	26.95%	0.986
		absence	29	64.72%	28.39%	
	fine motor	presence	85	69.04%	26.84%	0.830
		absence	29	70.33%	31.24%	
	language	presence	85	64.54%	30.45%	0.681
		absence	29	61.90%	27.71%	
	gross motor	presence	85	65.54%	24.22%	0.847
		absence	29	64.48%	28.76%	

table2.Comparison between the groups classified by arcuate fasciculus in language assessment. * SELSI : Sequenced Language Scale for Infants, PRES : Preschool Receptive Expressive Language Scale, AE : Age Equivalent

		arcuate fasciculus	N	Average	Standard deviation	*p*
SELSI	Receptive score	presence	24	34.88	12.715	0.112
		absence	10	28.1	10.619	
	Receptive age AE score(Months)	presence	24	18.79	6.672	0.095
		absence	10	15.1	5.666	
	percentile of receptive score (%)	presence	13	9.54	16.333	
		absence	9	2.33	2.646	
	Expressive score	presence	24	32.67	10.412	0.012
		absence	10	22.5	8.303	
	Expressive AE score (Months)	presence	24	18.63	5.64	0.009
		absence	10	12.8	4.29	
	percentile of expressive score (%)	presence	14	1		
		absence	9	1		
	Overall score	presence	24	67.67	21.414	0.057
		absence	9	50.89	16.751	
	Overall AE score (Months)	presence	24	18.92	5.763	0.049
		absence	9	14.33	4.69	
	Percentile of overall score (%)	presence	13	1		
		absence	5	1		
	Receptive Language Quotient	presence	24	49.38715	21.6804442	0.636
		absence	10	54.64904	22.9057605	
	Expressive Language Quotient	presence	24	47.86482	14.1984418	0.449
		absence	10	45.29347	14.6298972	
PRES	Receptive score	presence	24	12.96	11.106	0.487
		absence	5	10.2	8.585	
	Receptive age AE score(Months)	presence	23	30.65	11.726	0.344
		absence	6	26.67	8.548	
	percentile of receptive score (%)	presence	22	6.41	9.649	0.980
		absence	6	11.83	10.304	
	Expressive score	presence	21	14.14	11.324	0.414
		absence	4	8.5	8.103	
	Expressive AE score (Months)	presence	22	31.14	11.205	0.834
		absence	3	29.33	7.095	
	percentile of expressive score (%)	presence	21	3	4.171	0.480
		absence	3	5	6.083	
	Receptive Language Quotient	presence	22	61.35406	24.491746	0.313
		absence	6	73.17502	21.5548233	
	Expressive Language Quotient	presence	21	58.44531	16.2632188	0.631
		absence	3	56.7756	25.9991849	

Table 3. Comparison between tree groups classified by side of absent arcuate fasciculus in development and language assessment.

		absent side of AF	N	Average	Standard deviation	*p*
General demographics	Birth week	both	12	34.42	6.374	0.814
		right	11	35.73	4.149	
		left	7	36.29	4.68	
		total	30	35.33	5.148	
	Birth weight	both	11	2089.55	1144.268	0.964
		right	11	2747.09	907.165	
		left	7	2631.86	929.888	
		total	29	2469.86	1020.002	
DQ	Personal social	both	12	70.11%	33.31%	0.413
		right	10	59.95%	25.44%	
		left	7	62.30%	25.58%	
		total	29	64.72%	28.39%	
	Fine motor	both	12	73.22%	35.40%	0.751
		right	10	70.18%	28.79%	
		left	7	65.59%	31.16%	
		total	29	70.33%	31.24%	
	Language	both	12	63.08%	34.07%	0.91
		right	10	58.11%	25.17%	
		left	7	65.29%	21.55%	
		total	29	61.90%	27.71%	
	Gross motor	both	12	69.00%	35.55%	0.721
		right	10	66.85%	26.17%	
		left	7	53.34%	17.88%	
		total	29	64.48%	28.76%	
SELSI	Receptive score	both	2	27	19.799	0.441
		right	7	26.43	8.243	
		left	1	42 .		
		total	10	28.1	10.619	
	Receptive age AE score(Months)	both	2	14.5	10.607	0.361
		right	7	14.14	4.22	
		left	1	23 .		
		total	10	15.1	5.666	
	percentile of receptive score (%)	both	1	1 .		0.288
		right	7	1.86	2.268	
		left	1	7 .		
		total	9	2.33	2.646	
	Expressive score	both	2	25	15.556	0.166
		right	7	20.86	7.128	
		left	1	29 .		
		total	10	22.5	8.303	
	Expressive AE score (Months)	both	2	14	8.485	0.684
		right	7	11.86	3.338	
		left	1	17 .		
		total	10	12.8	4.29	
	percentile of expressive score (%)	both	1	1 .		0.443
		right	7	1	0	
		left	1	1 .		
		total	9	1	0	
	Overall score	both	2	52	35.355	1
		right	6	48.67	12.956	
		left	1	62 .		
		total	9	50.89	16.751	
	Overall AE score (Months)	both	2	14.5	9.192	0.733
		right	6	13.33	3.266	
		left	1	20 .		
		total	9	14.33	4.69	
	Percentile of overall score (%)	both	1	1 .		0.494
		right	3	1	0	
		left	1	1 .		
		total	5	1	0	
PRES	Receptive score	both	1	4 .		1
		right	7	4.14	7.69	
		left	1	18 .		
		total	9	5.67	8.109	
	Receptive age AE score(Months)	both	1	22 .		0.409
		right	4	25.5	9.147	
		left	1	36 .		
		total	6	26.67	8.548	
	percentile of receptive score (%)	both	1	1 .		0.675
		right	5	13.6	10.502	
		left	1	2 .		
		total	7	10.14	10.415	
	Expressive score	both	1	5 .		0.483
		right	5	3.8	8.497	
		left	2	5	7.071	
		total	8	4.25	6.985	
	Expressive AE score (Months)	both	1	23 .		0.646
		right	1	37 .		
		left	1	28 .		
		total	3	29.33	7.095	
	percentile of expressive score (%)	both	1	1 .		0.368
		right	1	12 .		
		left	1	2 .		
		total	3	5	6.083	
	Receptive Language Quotient	both	1	45.8 .		0.317
		right	1	88.6 .		
		left	0 .	.		
		total	2	67.2	30.2642	
	Expressive Language Quotient	both	1	41.7 .		0.317
		right	1	84.1 .		
		left	0 .	.		
		total	2	62.9	29.9813	