EP01.08

Fetal Choroid Plexus at 11-14 Weeks: A Predictor of Handedness?

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Objective

To assess whether the size of the choroid plexus at 11-14 weeks may predict handedness.

Methods

Prospective study on 66 toddlers whose choroid plexus (CP) measurements at 11-14 weeks were available. The study included a questionnaire of 15 unimanual and 15 bimanual activities. Handedness Index (HI) scores were calculated for each child for unimanual and bimanual items where HI=(R-L)/(R+L). Different types of transformations were applied and parametric/nonparametric approaches used to compare right-handed (RH) vs left-handed (LH) groups with respect to CP measurements. $P < 0.05$ was considered significant.

Results

59 RH and 7 LH toddlers were included. Mean maternal BMI, CRL, BPD, CP length, area and circumference (right and left) were available on all. The mean ± SD age of the toddlers was 2.74 ± 0.16 years. There was a significant positive correlation between unimanual and bimanual preferences (Figure 1). As such, the unimanual HI was utilized in the final analysis. Different statistical approaches were used but failed to show a significant difference. The subgroup analysis, where the RH group was analyzed alone and similarly the LH group, resulted in different yet significant results (Table 1). For the RH toddlers, the left side CP measurements were significantly greater. On the other hand, for the LH toddlers, there was no significant difference (Table 2).

Conclusion

Despite the difference between the right and left CP in the right-handed fetuses, our study is underpowered with only 7 left-handed fetuses. As such, our data is not in support of a predictive role of the fetal CP on handedness. Further prospective studies are indicated.

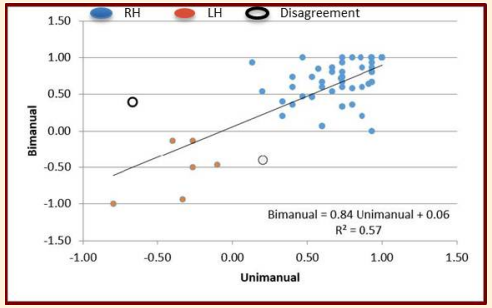

Figure 1

Table 1. Right and left choroid plexus measurements standards according to unimanual (left and right handed)

Parameter	Right-handed			Left-handed			P
	n	Mean	SD	n	Mean	SD	
Maternal body mass index, kg/m²	59	24.77	4.39	7	28.04	6.13	0.079
Crown-rump length, mm	59	70.80	8.62	7	66.17	10.82	0.196
Biparietal diameter, mm	59	23.36	3.11	7	22.41	3.44	0.455
Choroid plexus length, mm							
Right side	59	14.41	1.72	7	13.43	1.53	0.152
Left side	59	14.89	1.84	7	14.51	1.28	0.601
Left/Right*100	59	103.58	7.89	7	109.20	14.60	0.113
(Left-Right)/Left*100	59	2.90	7.54	7	7.07	11.86	0.199
Choroid plexus area,cm²							
Right side	59	0.75	0.16	7	0.66	0.09	0.141
Left side	59	0.81	0.19	7	0.72	0.17	0.260
Left/Right*100	59	108.75	20.90	7	110.26	25.27	0.860
(Left-Right)/Left*100	59	4.56	18.88	7	5.60	19.61	0.892
Choroid plexus circumference, mm							
Right side	59	37.81	4.11	7	35.07	2.20	0.089
Left side	59	39.25	4.91	7	38.21	4.28	0.596
Left/Right*100	59	104.13	10.67	7	109.17	12.26	0.249
(Left-Right)/Left*100	59	3.02	9.47	7	7.49	9.53	0.243

Table 1

Table 2. Differences between right and left choroid plexus measurements standards for right handed and left handed

Choroid plexus	n	Mean	SD	95% CI of difference Lower	Upper	P
Right-handed						
length, mm						
Right side	59	14.41	1.72	-0.78	-0.18	0.002
Left side		14.89	1.84	-0.09	-0.02	
area,cm²						
Right side	59	0.75	0.16	-2.47	-0.40	0.004
Left side		0.81	0.19	-0.78	-0.18	
circumference, mm						
Right side	59	37.81	4.11	-0.09	-0.02	0.007
Left side		39.25	4.91	-2.47	-0.40	
Left-handed						
length, mm						
Right side	7	13.43	1.53	-2.49	0.52	0.149
Left side		14.51	1.28			
area,cm²						
Right side	7	0.66	.087	-0.22	0.09	0.355
Left side		0.72	.173			
circumference, mm						
Right side	7	35.07	2.19	-7.12	0.84	0.102
Left side		38.21	4.28			

Table 2

EP04.45

First Trimester Learning Curve and Feasibility of MCA Assessment in an Unselected Lebanese Population

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Objective

To assess the learning curve and feasibility of visualizing the middle cerebral artery (MCA) in the first trimester and determining its normogram.

Methods

This was a prospective study, approved by our Institutional Review Board, on 200 gravidas with spontaneous conception of singleton gestations, presenting for NT assessment between 12w0d and 13w6d at 2 centers in Lebanon. Maternal BMI, fetal CRL, BPD and NT were measured (Table 1). At our centers, a full anatomic scan is carried out at the time of NT assessment. Fetuses with an NT >95th centile, any structural abnormalities or multiple gestations were excluded from the analysis. All exams were carried out transabdominally by 2 experienced sonologists using 4-8 MHz convex high resolution probes with 2D-3D capabilities (GE Voluson E8 ultrasound systems, Kretz, Zimpf, Austria). For the identification of the MCA, the plane of BPD, caudal to the thalamus was obtained and first trimester cardiac presents, using color Doppler with high definition flow were utilized. Subsequently, the MCA's PI and PSV were measured at the proximal 1/3 of the MCA with an angle of insonation of < 10 degrees.

Results

MCA was successfully visualized in 190/200 (95%). The MCA PI and PSV were obtained on 160/200 (80%) and 157/200 (78.5%) respectively. Using sets of 25, the learning curve was constructed (Figure 1) and linear regression line's best fit defined as (R^2=0.9584) with %MCA seen=47+8*the order of the set. There was no significant difference (P=0.090) between the 2 sonologists. There was no significant effect of BMI, CRL or BPD on successful visualization of the MCA (Table 2). The normogram for the MCA PI revealed no significant relation between MCA PI and CRL (Figure 2) or BPD (Figure 3) and a best fitted linear regression modeling yield of: MCA PI=2.96–0.007CRL (R^2=0.005) and MCA PI=2.57–0.0065BPD (R^2=0.0003) respectively. The normogram for the MCA PI was established (Table 3), and that for the the MCA PSV as well, which was comparable to what has been established by Tongsong et al in 2007 (Figure 4).

Conclusion

MCA evaluation is feasible at the time of NT assessment with gained sonographer experience as the most important factor. A reference range for first trimester MCA PI and PSV has been established. Our results encourage the incorporation of MCA evaluation at the time of NT assessment, when indicated.

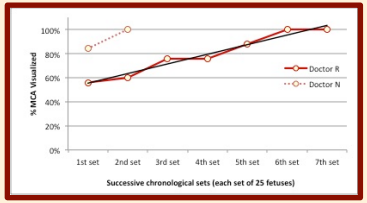

Figure 1

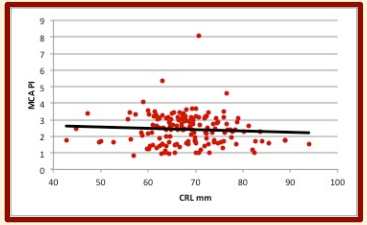

Figure 2

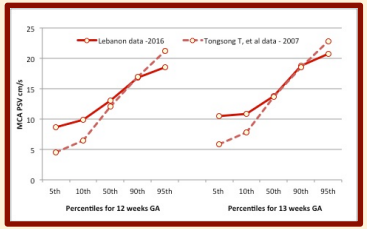

Figure 4

Table 1. Maternal & Fetal characteristics

	N	Minimum	Maximum	Mean	Std. Deviation
Maternal parameters					
BMI (kg/m²)	198	17.00	42.10	24.50	4.35
Fetal parameters					
GA (days)	200	78.00	108.00	90.39	3.79
CRL (mm)	200	42.70	93.90	67.96	7.84
BPD (mm)	198	15.40	31.60	22.07	2.61
NT (mm)	199	0.50	4.40	1.72	0.49

Abbreviations: Biparietal Diameter (BPD); Body Mass Index (BMI); Crown-rump length (CRL); Gestational Age (GA) and Nuchal translucency (NT).

Table 1

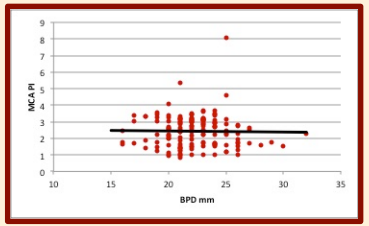

Figure 3

Table 2. Successful visualization of MCA by maternal and fetal parameters

	MCA not seen			MCA seen			
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	P-value
Maternal BMI	40	24.68	4.76	158	24.45	4.26	0.767
Fetal CRL (mm)	40	67.61	7.32	160	68.05	7.98	0.753
Fetal BPD (mm)	40	21.64	2.59	158	22.18	2.61	0.242

Abbreviations: Biparietal Diameter (BPD); Body Mass Index (BMI); Crown-rump length (CRL); Gestational Age (GA) and Middle Cerebral Artery (MCA).

Table 2

Table 3. Nomogram of calculated MCA PI at the 5th, 10th, 50th, 90th, and 95th percentiles for each gestational age (GA)

	MCA PI				
GA (weeks)	5th	10th	50th	90th	95th
12	1.00	1.23	2.34	3.39	3.53
13	1.00	1.46	2.39	3.23	3.53
CRL Categories					
< 65 mm	0.97	1.09	2.40	3.40	3.59
[65-70[mm	1.39	1.52	2.74	3.40	3.54
[70-75[mm	1.00	1.00	2.47	3.42	5.86
>= 75 mm	1.07	1.28	2.22	3.24	4.16

Abbreviations: Crown-rump length (CRL); Gestational Age (GA); Middle Cerebral Artery (MCA); and Pulsatility Index (PI).

Table 3

EP04.46

First Trimester CPR Assessment and Normogram in an Unselected Lebanese Population

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Objective

To assess the feasibility of determining the cerebroplacental resistance (CPR) at the time nuchal translucency (NT) measurement and to establish a normogram for the CPR in an unselected Lebanese population.

Methods

This was a prospective study, approved by our Institutional Review Board, on 200 gravidas with spontaneous conception of singleton gestations, presenting for NT assessment between 12w0d and 13w6d at 2 centers in Lebanon. Maternal BMI, fetal CRL, BPD and NT were measured (Table 1). At our centers, a full anatomic scan is carried out at the time of NT assessment. Fetuses with an NT >95th centile, any structural abnormalities or multiple gestations were excluded from the analysis. All exams were carried out transabdominally by 2 experienced sonologists using 4-8 MHz convex high resolution probes with 2D-3D capabilities (GE Voluson E8 ultrasound systems, Kretz, Zimpf, Austria). For the identification of the MCA, the plane of BPD, caudal to the thalamus was obtained and first trimester cardiac presents, using color Doppler with high definition flow were utilized. Subsequently, the MCA's PI and PSV were measured at the proximal 1/3 of the MCA with an angle of insonation of < 10 degrees. The umbilical artery (UA) was then identified using the same presets, with high definition flow, and the PI was measured in a free loop of cord at an angle of insonation of < 10°. The CPR was calculated as the ratio of the PI of the MCA to the PI of the UA. The normogram for the MCA PI (EP04.45) and CPR were constructed. Regression analysis was used to study the reference range of the CPR according to CRL and BPD. Chi-square and T-test were utilized. $P < 0.05$ was considered significant.

Results

The PI of the MCA (EP04.45) and UA were successfully measured and CPR calculated in 142/200 (71%) of cases. The normogram for the CPR in our population was established (Table 2). There was no significant relation between CPR and CRL (Figure 1) or CPR with BPD (Figure 2), with best fitted linear regression modeling yield: CPR =0.70 +0.004 CRL (R^2 =0.003) and CPR =0.31 +0.029 BPD (R^2 =0.0194) respectively. There was no effect of maternal BMI, fetal CRL or BPD on successful visualization (Table 3).

Conclusion

It is feasible to measure CPR in 71% of fetuses at the time of NT assessment. This may prove helpful in early assessment of fetuses with growth restriction, anemia or congenital heart defects.

Table 1. Maternal & Fetal characteristics

	N	Minimum	Maximum	Mean	Std. Deviation
Maternal parameters					
BMI (kg/m²)	198	17.00	42.10	24.50	4.35
Fetal parameters					
GA (days)	200	78.00	108.00	90.39	3.79
CRL (mm)	200	42.70	93.90	67.96	7.84
BPD (mm)	198	15.40	31.60	22.07	2.61
NT (mm)	199	0.50	4.40	1.72	0.49

Abbreviations: Biparietal Diameter (BPD); Body Mass Index (BMI); Crown-rump length (CRL); Gestational Age (GA) and Nuchal translucency (NT).

Table 1

Table 2. Nomogram of calculated CPR at the 5th, 10th, 50th, 90th, and 95th percentiles for each gestational age (GA) and CRL categories.

GA (week)	CPR				
	5th	10th	50th	90th	95th
12	0.16	0.27	0.81	1.71	1.99
13	0.23	0.36	0.99	1.92	2.22
CRL Categories					
< 65 mm	0.15	0.35	0.80	1.76	2.18
[65-70[mm	0.17	0.23	0.91	1.94	2.28
[70-75[mm	0.29	0.36	0.73	1.92	2.01
>= 75 mm	0.41	0.50	0.99	1.68	2.53

Abbreviations: Cerebroplacental Ratio (CPR); Crown-rump length (CRL) and Gestational Age (GA).

Table 2

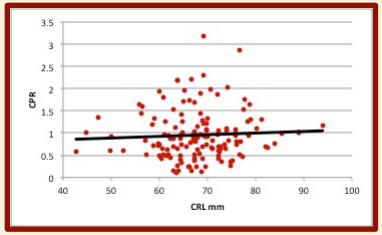

Figure 1

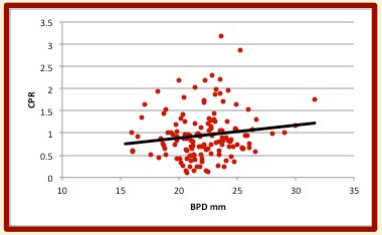

Figure 2

Table 3. Successful Calculation of CPR by Maternal and Fetal parameters

	CPR not calculated			CPR calculated			
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	P-value
Maternal BMI (kg/m²)	56	24.50	4.53	142	24.50	4.30	0.995
Fetal CRL mm	56	67.94	7.10	144	67.97	8.13	0.978
Fetal BPD mm	55	21.95	2.55	143	22.12	2.63	0.681

Abbreviations: Biparietal Diameter (BPD); Body Mass Index (BMI); Cerebroplacental Ratio (CPR) and Crown-rump length (CRL).

Table 3

EP23.02

The Impact of Simulation-Based Training in the Lebanese Outreach Setting

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Objective

To assess the impact of simulation-based training on obstetrical trainees' progress in the Lebanese Outreach Setting.

Methods

Prospective study comparing trainee progress pre- and post- the incorporation of simulation-based training in obstetrical sonograhy. SANA Medical NGO utilizes Abuhamad et al's 6-Step Approach to obstetrical sonography in the Lebanese Outreach Setting. The number of scans needed per trainee to attain the required practical skill was compared pre- and post- the introduction of SonoSim simulation-based training. Data was compared using the Mann-Whitney nonparametric test. $P < 0.05$ was considered significant.

Results

There were a total of 3 trainees in the pre-simulation control group and 7 trainees in the post-simulation study group. A drastic improvement in trainees' progress post simulation was noted where the mean of the number of scans needed for competence significantly decreased: a total of 64 live scans were required pre-simulation versus 24 live scans post-simulation based training (P=0.016). In addition, there was a notable improvement in trainee comfort in the clinical setting and in the proper identification of the required anatomic/biometric planes post simulation-based training.

Conclusion

Simulation-based training in obstetrical sonography significantly enhances trainees' learning curve in gaining competence in the the 6-Step Approach to obstetrical sonography.

Group	N	Mean	SD	[max-min]	P-value*
Pre-simulator	3	64.67	4.16	[60-68]	0.016
Post-simulator	7	24.00	9.06	[9-34]	

*Based on Mann-Whitney nonparametric test