A Critical Evaluation of Fetal Weight Assessment in Late Pregnancy

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Abstract

The time has come to understand that even the most technologically advanced equipement with improper scales can cause more harm than benefits. Charts or tables of fetal size and its evaluation of growth can be constructed only in a manner that data of pre-natal fetal values are divided into 6 seperate entities corresponding to a pregnancy resolution in the 37th, 38th, 39th, 40th, 41st and beyond 41st week of pregnancy duration, respectively.

The pregnancies that develop most quickly are those with the 37th week on the delivery week while those to deliver in the 43rd week have the slowest rate of development. This trait is so predictable that thanks to it, by performing two measurements in late pregnancy one can establish the term of delivery and newborn's state without taking into account when conception actually occurred.

The paper presents a fetal weight at different post menstrual calendar weeks from 28.–44. taking into account their particular birth week. The data was taken from 1724 natural birth which were labelled with newborn's average ± 1 SD values and birth weeks from the 37th until 44th as well as ultrasonographic measurement of fetal weight $1100\,g \pm 300\,g$ at the 28th week. According to the fast (37.–38. birth week), average (39.–40. birth week) and slow (more than 40 weeks) fetal growth rates the fetal weights in particular gestational calendar weeks are provided with mean value ± 1 SD. The last column provides the average weight values and SD in particular weeks of the calendar pregnancy scale taking into account actual number and body weights of fetuses to be born in different birth weeks.

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Zusammenfassung

Eine technische Ausrüstung kann noch so modern sein, wenn die Skalierung unrichtig ist, kann sie mehr schaden als nutzen. Tabellen der fötalen Größe können nur auf der Basis konstruiert werden, daß man eine Einteilung in sechs unterschiedliche Gruppen vornimmt, entsprechend den unterschiedlichen zu erwartenden Geburtsterminen der 37., 38., 39., 40., 41. oder jenseits der 41. Woche.

Bei Schwangerschaften mit dem größten Entwicklungstempo liegt der Geburtstermin in der 37. Woche, während die Entbindungen bei Schwangerschaften mit dem langsamsten Entwicklungstempo in der 43. Woche liegen. Diese Zusammenhänge sind so regelhaft, daß auf der basis von zwei Messungen in der fortgeschrittenen Schwangerschaft der Geburtstermin und die Neugeborenenparameter vorhergesagt werden können, und zwar ohne Bezug auf einen erschlossenen Konzeptionstermin.

In der Arbeit wird das fötale Gewicht von der 28. bis 44. Woche dargestellt, wobei jeweils die Woche der Geburt in Rechnung gestellt ist. Die Daten wurden durch eine Untersuchung von 1724 natürlichen Geburten gewonnen, bei denen die üblichen Neugeborenenparameter bestimmt wurden. Der Geburtstermin streute zwischen der 37. bis zur 44. Woche. In der 28. Woche wurde das fötale Gewicht mit $1100\,\mathrm{g} \pm 300\,\mathrm{g}$ bestimmt. Je nachdem, ob die Entwicklungsgeschwindigkeit schnell war (Geburtswoche in der 37. und 38. Woche), durchschnittlich (Geburtswoche in der 39. und 40. Woche) oder langsam (Geburtswoche jenseits der 40. Woche) wurde das Gewicht in Mittelwerten bestimmt. Die letzte Spalte gibt das durchschnittliche Gewicht mit Standardabweichung in den einzelnen Wochen der Schwangerschaft, wobei die unterschiedlichen Geburtswochen in Rechnung gestellt werden.

Introduction

The main urgent need in contemporary obstetrics should be to monitor pregnancies and not simply recording them with ultrasound equipement. This requires a simultaneous knowledge of physiology and pathology of pregnancy as well as of medical technology. The time has come to understand that even the most technologicaly advanced equipement with improper scales can cause more harm than benefits. Conversely a simple equipement with the proper scales is more clinically efficient.

Due to the primary goal of pregnancy. i. e. the birth of mature fetus, its final week is therefore the most important. It can be one of 6 birth weeks beginning with the 37th week of the calendar postmenstrual gestational scale. It is in fact from this last week that values of parameters measured of pregnancy development on the calendar scale of pregnancy are dependent on.

The pregnancies that develop most quickly are those with the 37th week on the delivery week while those to deliver in the 43rd week have the slowest rate of

development. This trait is so predictable that thanks to it, by performing two measurements in late pregnancy one can estabilish the term of delivery and newborns' state without taking into account when conception actually occurred.[1,2]

The most representative data in fetal natural distribution occurs in the population of the 39th birth week. In earlier weeks nearly 30% of newborns will deliver with a birth weight less than mean ± 1 SD (standard deviation) and conversely babies bornlater will achive a mass of 25% greater than mean $+ 1$ SD. This explains why newborns already mature at the 37th week have a mass of 200 g less than babies born later will achieve a mass up to 200 g more.

Charts or tables of fetal size and its evaluation of growth can be constructed only in a manner that data of pre-natal fetal values are divided into 6 seperate entities corresponding to a pregnancy resolution in the 37th, 38th, 39th, 40th, 41st and beyond 41st week of pregnancy duration, respectively. These seperate populations do not form any continuum and therefore creating it through cross-sectional studies is inappropriate and from a clinical point of view represents iatrogenic consequences for both mother and child.

For example, average values of any USG parameters in particular calendar weeks beyond 36 weeks of pregnancy are a result of fetal numbers which as mature are to be born in that particular week as well as those fetuses to be born in the remaining weeks of birth occurrence. Therefore, not only dimensions of those babies are important, but also their absolute number which are to deliver in following weeks. Most of them will deliver during the 39th and 40th week with lovering number delivering in either direction from these weeks. To illustrate the difference of old and new pregnancy dating, the new table of fetal weight was constructed.

Table of Fetal Weight According to the Maturation Rate

Table 1 shows a fetal weight at different post menstrual calendar weeks from 28.–44. taking into account their particular birth week. The data was taken from 1724 natural birth which were labeled with newborn's average ± 1 SD values and birth weeks from the 37th until 44th as well as ultrasonographic measurement of fetal weight 1100 ± 300 g at the 28th week. According to the fast (37.–38. birth week), average (39.–40. birth week) and slow (more than 40 weeks) fetal growth rates the fetal weights in particular gestational calendar weeks are provided with mean value ± 1 SD. The last column provides the average weight values and SD in particular weeks of the calendar pregnancy scale taking into account acutal number and body weights of fetuses to be born in different birth weeks.

General practiconer having a computer-programed ultrasonograph with a three-dimensional color image in real-time, capable of being upgraded to set the trend for new innovations in technological development, has no reason to suspect that his equipement might possess improper programs for clinical use. This represents a clear case of technologies superiority over humanistic medicine in contemporary civilization.

In spite of the above the results obtained by the computer aided method concern an individual fetus, taking into account its dynamic development in the latter weeks of pregnancy. It is sufficient to measure at least twice any ultrasound as well

Table 1. Weight (g) of fast (F), average (A) and slow (S) growing fetuses

Week of scale	Birth weeks (mean ± SD)						mean ± SD
	F		A		S		
	37	38	39	40	41	≥42	
≥42						3590 ±400	3590 ±400
41					3554 ±400	3412 ±393	3483 ±396
40				3516 ±400	3365 ±392	3234 ±385	3371 ±392
39			3373 ±400	3315 ±391	3176 ±384	3056 ±379	3230 ±388
38		3210 ±400	3166 ±391	3113 ±383	2988 ±380	2879 ±371	3071 ±385
37	3180 ±400	2999 ±390	2959 ±382	2912 ±375	2799 ±369	2701 ±364	2925 ±380
36	2949 ±389	2788 ±380	2753 ±372	2711 ±366	2610 ±361	2523 ±357	2722 ±370
35	2718 ±378	2577 ±370	2546 ±363	2509 ±358	2421 ±354	2345 ±350	2519 362±
34	2487 ±367	2366 ±360	2340 ±354	2308 ±350	2233 ±346	2167 ±343	2316 ±353
33	2255 ±356	2155 ±350	2133 ±345	2107 ±341	2044 ±338	1989 ±336	2113 ±344
32	2024 ±344	1944 ±340	1926 ±336	1905 ±333	1855 ±330	1811 ±328	1910 ±335
31	1793 ±333	1733 ±330	1720 ±327	1704 ±325	1666 ±323	1634 ±321	1708 ±326
30	1562 ±322	1522 ±320	1513 ±318	1503 ±317	1477 ±315	1456 ±314	1505 ±317
29	1331 ±311	1311 ±310	1307 ±309	1301 ±308	1289 ±307	1278 ±307	1302 ±308
28	1100 ±300	1100 ±300	1100 ±300	1100 ±300	1100 ±300	1100 ±300	1100 ±300

asother clinical parameter, e.g. oxytocinase, at approximately 2–3 week intervals. Making two or several exams computer analyses of the data give us automatical prognosis of birth date and newborns state.

Table 2 presents data and their computer analysis related to patient I.L. age 29. who delivered on December 25th a son (3300 g, 53 cm, B-K maturity 40 points) after spontaneus onset of delivery. Birth date was predicted within one week period (21–28 December) with mean birth-weight 3437 ± 61 g and maturity 39.5 ± 0.5, and only value of abdominal circumference was signaled as suspicious between 1st and 2nd exam.

Table 2. Data and computer-results of all exams of J.L. (29 years old), Gravida II, Para I. Spontaneous vaginal delivery on December 25, 1993 (newborn 3300 g, 53 cm, B-K 40). Cortrosyntherapies – May 31, August 11.

Exam		FL	HC	BPD	AC *	CAP	Days
1	1 X	57	279	75	270	3.6	
2	3 XI	63	304	85	293	5.7	33
3	6 XII	71	327	93	344	-	33
4	20 XII	74	338	97	361	8.8	14
Predicted total				25 XII	39.5 ±0.5	3437 ±61	

Analysis Exams	Weeks		Birth date	Growth	B-K actual at B	Mass g actual at B	Signal
	P	to B					
12	35.0	7.9	28 XII	S	24.0 40.0	2221 3495	AC
123	39.7	2.5	24 XII	S	34.0 39.3	3018 3440	AC
1234	41.7	0.5	24 XII	S	38.2 39.2	3357 3434	AC
1 34	42.0	0.1	21 XII	S	38.4 38.6	3365 3383	
12 4	41.7	0.2	21 XII	R/S	38.5 38.9	3381 3413	AC
34	41.4	0.7	25 XII	S	38.4 40.0	3369 3494	
2 4	41.1	0.8	26 XII	R/S	38.0 39.8	3315 3450	
1 4	41.7	0.8	26 XII	S	38.5 40.1	3387 3519	
234	41.4	0.7	25 XII	S	37.6 39.2	3223 3347	
23	39.4	2.8	26 XII	S	33.4 39.2	2884 3341	
1 3	40.0	2.9	26 XII	S	34.1 39.9	3026 3489	

B-K - Ballard-Klimek scale, CAP - oxytocinase, P - pregnancy,
B - birth, F/R - fast/average, R - average

Thus, one should not abandon, but rather encourage the performance of ultrasonic computer assisted monitoring of the management and outcome of late pregnancy with the accuracy of days, and not as earlier advocated, weeks.

Conclusion

It is not only gain of fetal mass, length, but even maturity that can be used as an indirect measure of biological fetal age. Therefore, their scales have to serve

for practical clinical assessement of biological gestational age. This fact is disregarded by other methods which are based on scales derived from ultrasound cross-sectional studies, or what is worse, from tables that lack data beyond the 40th or 41st week of pregnancy. In the assessment of third trimester fetal weight a technical diagnosis alone does not change outcome of individual observed pregnancy, it can be done by simultaneous personal prognosis.

References

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