

Fetal growth velocity: which method can best identify stillbirth risk?

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Objective

Fetal growth surveillance includes assessment of size as well as growth rate. Five standards for growth velocity have recently been adopted into clinical practice¹⁻⁵. We set out to evaluate their effectiveness in identifying slow growth in fetuses that were not SGA according to their last estimated fetal weight (EFW).

Methods

- The cohort consisted of 164,718 singleton pregnancies that had two or more third trimester EFW measurements, which were mostly indicated following early pregnancy risk assessment.
- Small for gestational age (SGA) was defined as <10th customised centile, and slow growth was defined by one of the following models:
 - fixed velocity limit of 20g per day (FVL₂₀)¹
 - fixed 50 centile drop (FCD₅₀)² over an unspecified scan interval
 - fixed 30 centile drop (FCD₃₀)³ over an unspecified scan interval
 - growth trajectory slower than the 3rd centile line (GCL₃)⁴ on a customised chart, over the interval of sequential scans
 - second EFW below the projected optimal weight range (POWR)⁵, adjusted for the interval between scans.
- We compared each method with SGA at last scan in terms of their ability to determine stillbirth risk. Significance was determined using relative risk with 95% confidence intervals.

Table 1 Stillbirth risk according to SGA at last scan vs five growth velocity methods (N=164,718)

	All N	Stillbirth n	RR	95% CI
FVL vs SGA at last scan (total n = 25,731; SB n = 59)				
FVL ¹ (20g/day) only	12873	20	1.06	0.67 - 1.68
Overlap (FVL and SGA)	8087	28	2.37	1.60 - 3.52
SGA at last scan only	4771	11	1.58	0.86 - 2.89
FCD₅₀ vs SGA at last scan (total n = 13,756; SB n = 42)				
FCD ₅₀ ² (50 centile) only	898	3	2.29	0.74 - 7.15
Overlap (FCD ₅₀ and SGA)	227	1	3.02	0.43 - 21.46
SGA at last scan only	12631	38	2.06	1.46 - 2.91
FCD₃₀ vs SGA at last scan (total n = 19,367; SB n = 51)				
FCD ₃₀ ³ (30 centile) only	6509	12	1.27	0.71 - 2.27
Overlap (FCD ₃₀ and SGA)	1020	4	2.70	1.01 - 7.25
SGA at last scan only	11838	35	2.04	1.42 - 2.91
GCL₃ vs SGA at last scan (total n = 35,108; SB n = 75)				
GCL ₃ (3rd centile) only	22250	36	1.12	0.79 - 1.60
Overlap (GCL ₃ and SGA)	10438	31	2.06	1.41 - 3.01
SGA at last scan only	2420	8	2.29	1.13 - 4.64
POWR vs SGA at last scan (total n = 24,095; SB n = 64)				
POWR ⁴ only	11237	25	1.58	1.04 - 2.39
Overlap (POWR and SGA)	5434	16	2.09	1.26 - 3.48
SGA at last scan only	7424	23	2.20	1.43 - 3.39

* Scans performed at average gestational ages of weeks 33+5 and 37+1.

Results

- The study cohort (N=164,718) had a total of 480,592 third trimester scans (mean 2.9, SD 0.9) and included 262 stillbirths (rate 1.59/1000).
- The rate of 'slow growth' varied substantially between the different models (FVL₂₀: 12.7%, FCD₅₀: 0.7%, FCD₃₀: 4.6%, GCL₃: 19.8%, POWR: 10.1%) and there was also varying overlap with SGA at last scan, as shown in Table 1.
- After excluding fetuses that were SGA at last scan, only the POWR method identified additional cases of slow growth (11,237/16,671, 67.4%) that were associated with increased stillbirth risk (RR 1.58, CI 1.04-2.39).
- The pregnancies with slow growth but not SGA at last scan and ending with stillbirth had an average centile at delivery of 27.3.
- Further analysis identified a problem with the fixed velocity model (FVL20) because it ignores normal variation in growth rate during the 3rd trimester.
- There is also a methodological problem with fixed centile drop methods (FCD50 and FCD30) because centile distributions are expanded at the extremes and fail to represent actual differences in weight gain.

Conclusion

Comparative analysis of five methods to define slow fetal growth has shown that only the measurement-interval specific projection model of optimal weight gain⁵ identified non-SGA fetuses that had a significant risk of stillbirth.

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