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Authors

Zaki, Mary N
Overcash, Rachael T
Lusk, Leslie A
[et al.](#)

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560 Predicting birth weight in fetuses with gastroschisis within the University of California Fetal Consortium (UCfC)

Mary N. Zaki¹, Rachael T. Overcash², Leslie A. Lusk³, Yen N. Truong⁴, Rashmi Rao⁵, Jacqueline Parchem³, Andrew D. Hull², Robert R. Resnik², Manuel Porto¹

¹University of California, Irvine, Orange, CA, ²University of California, San Diego, San Diego, CA, ³University of California, San Francisco, San Francisco, CA, ⁴University of California, Davis, Sacramento, CA, ⁵University of California, Los Angeles, Los Angeles, CA

OBJECTIVE: To determine accuracy of commonly used ultrasound (US) formulas for estimating birth weight (BW) in fetuses with gastroschisis.

STUDY DESIGN: A retrospective review was conducted of all inborn pregnancies with gastroschisis within the five institutions of the UCfC (2007-2012). Infants delivered at =28 weeks who had an US within 21 days prior to delivery were included. Variables collected included maternal age, gestational age (GA) at last US and delivery, BW, and US biometry (BPD, HC, AC, FL). The occipitofrontal diameter (OFD) was calculated (OFD=0.6369*HC-BPD). We corrected for interval fetal growth between time from US to birth by adding a standard expected weight of 30 grams/day. Prediction of BW was assessed for each of the five US formulas: Hadlock 1 and 2 (BPD, HC, FL), Shepard (BPD, AC), Honarvar (FL), Siemer (BPD, FL) using Pearson's correlation, mean percent error with standard deviation as well as a Bland Altman analysis for 95% limits of agreement.

RESULTS: We identified 191 neonates born with gastroschisis within the UCfC and excluded 47 for missing US data and 33 for having the last US >21 days prior to delivery. We included 111 neonates with a mean GA of 36.3±1.7 weeks and a mean BW of 2,448±460 grams (Table 1). Hadlock 1 formula was found to have the best correlation (r=0.81), and the lowest mean difference so was used as the referent. The Honarvar formula performed most poorly as compared to Hadlock 1 with a 13.7% difference (p<0.001) between estimated and actual BW, followed by the Siemer formula (Table 2). There was no statistically significant difference between the Hadlock 1 and Hadlock 2 or Shepard formulas (p=0.7 and 0.4, respectively).

CONCLUSION: The most widely used formulas of Hadlock 1, Hadlock 2 and Shepard provided the best estimated BW in infants with gastroschisis. While the Siemer et al. formula was designed to better estimate BW in fetuses with abdominal wall defects, we found less accuracy with this formula than others.

Table 1. Characteristics of Neonates With Gastroschisis

	All N=111	0-7 days N=49	8-14 days N=31	15-21 days N=31	P value
GA (weeks), ultrasound	34.8 ± 1.9	35.2 ± 1.5	34.4 ± 2.2	33.9 ± 1.8	0.06
GA (weeks), birth	36.3 ± 1.7	36.2 ± 1.5	36.2 ± 2	36.7 ± 1.7	0.2
Time from US to birth (days)	9.7 ± 7	3.2 ± 2	10.6 ± 1.8	18.4 ± 1.9	0.8
Birth weight (grams)	2448 ± 460	2306 ± 405	2445 ± 575	2674 ± 524	0.08
Estimated fetal weight (grams)*					
Hadlock(1)	2456 ± 477	2334 ± 470	2471 ± 475	2633 ± 446	0.9
Hadlock(2)	2457 ± 481	2334 ± 471	2478 ± 482	2631 ± 450	0.9
Shepard	2468 ± 497	2333 ± 478	2491 ± 523	2660 ± 444	0.7
Honarvar	2598 ± 349	2598 ± 349	2727 ± 344	2901 ± 404	0.6
Siemer	2502 ± 414	2384 ± 394	2489 ± 399	2689 ± 404	0.9

Data expressed as mean ± standard deviation. P values obtained using analysis of variance.

* Corrected for time from ultrasound to birth by adding 30 grams per day.

Table 2. Correlation, Accuracy and Precision of Birth Weight as Predicted by Various Ultrasound Formulas

	Pearson's Correlation		Percent Error			Bland Altman Method		
	r	P	Mean % error	SD	P	Mean difference	SD	95% limits of agreement
Hadlock(1)	0.81	<0.001	1.4%	13.3	reference	8	306	-604 to 620
Hadlock(2)	0.81	<0.001	1.4%	13.3	0.7	10	306	-602 to 622
Shepard	0.79	<0.001	1.8%	14.3	0.4	21	326	-631 to 673
Honarvar	0.72	<0.001	13.7%	16.8	<0.001	271	352	-433 to 975
Siemer	0.77	<0.001	3.9%	14.0	0.003	54	328	-602 to 710