

presentation in the x, y and z-axis, removing visual cues and changing surrounding “amniotic fluid” volumes, complexity was added to the anatomic survey. Goals of our model were to address the components of a routine fetal anatomic survey as described by The American Institute of Ultrasound in Medicine.

RESULTS: Our model can be used to obtain fetal orientation, placental location, routine biometry measurements, and accurately identify fetal orbits, lip, spine, stomach, lungs, cardiac axis, diaphragm, kidneys, bowel, cord insertion, bladder and long bones in a realistic manner. Abnormal sonographic findings can be seen including but not limited to pleural effusion, abdominal ascites, and megacystis. Excepting intracranial and cardiac anatomy, this model can be used as an adjunct to an actual anatomic survey performed on a patient.



Sagittal image of fetal piglet thoracic spine.



Transverse image of the fetal piglet kidneys.

CONCLUSION: No inexpensive teaching model exists to assist the Maternal-Fetal Medicine fellow with the skill and confidence needed to perform a normal fetal anatomic survey. Our model is a workable, low-cost, challenging and a realistic resource that can enhance and accelerate fellow learning of sonography. Reliance on a willing patient and time constraints of a busy ultrasound unit are absent.

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380 Periumbilical blood sampling and intravascular transfusion model to teach maternal-fetal medicine fellows

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OBJECTIVE: With the decline in frequency and indication for invasive needle procedures, a realistic model is essential to obtain and maintain proficiency. We sought to design a realistic periumbilical blood sampling (PUBS) and intravascular transfusion (IVT) model and curriculum to teach proper technique to Maternal-Fetal Medicine fellows. **STUDY DESIGN:** A human placenta (term or preterm) with attached umbilical cord was obtained. The umbilical arteries and vein were cannulated with an appropriate sized catheter, attached to the Model 700 Doppler Flow Controller/ Pumping System (Cole-Parmer Instrument Company, Vernon Hills, Illinois) and a separate infusion pump, respectively, creating two closed circuit vascular systems. ATS Doppler Test fluid (blood-mimicking fluid) was circulated through both systems. The placental unit was placed in an uncovered plastic container and submerged in water. A sonographic gel filled freezer bag was placed atop the fluid and container to simulate an abdominal-uterine wall. Under ultrasound guidance a needle was used to perform PUBS followed by IVT. The removal of fluid was confirmed and the infusion of fluid visualized sonographically as turbulent flow. Varying placental location within the unit allows for different levels of difficulty and experience.

RESULTS: Our periumbilical blood sampling and intravascular transfusion teaching model and curriculum was used to train Maternal-Fetal Medicine fellows in correct equipment set up, sonographic identification of umbilical vessels, procedural approach and proper technique for transfusion. Areas of procedural difficulties can be identified and practiced prior to the performance in clinical practice. Pre-procedure practice can also be performed by placing the placenta in a position to mimic the actual orientation in a patient.

CONCLUSION: This is the first description of a placental model with functioning umbilical circulation to simulate PUBS and IVT procedures. Our model can be used to assist the Maternal-Fetal Medicine fellow with the skill and confidence needed to perform PUBS and IVT. 0002-9378/\$ – see front matter • doi:10.1016/j.ajog.2009.10.395

381 Karyotype and outcome of fetuses with cystic hygroma diagnosed in the first trimester

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OBJECTIVE: The aim of this study was to determine the karyotyping results and course of pregnancy of fetuses with cystic hygroma (CH) diagnosed at routine first trimester ultrasound examination.

STUDY DESIGN: A computerized ultrasonography database identified fetuses with CH at 11+013+6 weeks of gestation from January 2005 through December 2008 in Cheil General Hospital. Among them, only cases with known pregnancy outcome were included in this study. We reviewed the medical records of these pregnant women and infants. Spontaneous abortion, intrauterine fetal death, abnormal karyotypes or finding of one or more major structural defects were assigned as an adverse fetal outcome.

RESULTS: During the study period, total 24,565 fetuses underwent routine 1st trimester ultrasonographic examination for NT measurement in our institute. Among them, 57 fetuses (0.23%) were diagnosed with CH. Excluding 7 cases of follow-up loss, 50 fetuses were included study population. Forty-two fetuses were undergone karyotyping study. Chromosomal abnormalities were present in 30.9% of

cases (13/42) of these: 4 cases of 45, XO, 4 cases of trisomy 18, 4 cases of trisomy 21, and 1 case of trisomy 13. Among fetuses with normal karyotype (n= 29), intrauterine fetal death occurred in two fetuses before 20 weeks of gestation. Major structural fetal malformations detected in 20-weeks level II sonogram were diagnosed in 11 of the remaining 27 cases (40.7%). A total of 29 chromosomally normal pregnancies gave rise to 16 live births (55.2%), with no structural abnormalities.

CONCLUSION: These data suggest that the prognosis of fetus with CH diagnosed in the first trimester is poor. Therefore, fetuses with CH requires more careful assessment of the fetus, with regard to both karyotyping and follow-up level II scan for detecting structural anomaly.

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382 Customized vs population-based approach to evaluate fetal overgrowth

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OBJECTIVE: To evaluate a customized method to estimate fetal overgrowth in mild gestational diabetes mellitus (mGDM) and normal pregnancies

STUDY DESIGN: Secondary analysis of a study with 4 cohorts: treated mGDM, untreated mGDM, positive GLT screen but normal OGTT, and normal. The 1° neonatal outcome was a composite of hypoglycemia, hyperbilirubinemia, hyperinsulinemia, trauma, or perinatal death. LGA>90th%ile was evaluated using ethnicity & gender-specific population (pop) norms (Alexander), and customized (cust) birth weight (BW) centile based also on maternal height, weight, and parity (Gardosi et al). LGAcust and LGApop were compared for their association with outcome. LGAcust was correlated with neonatal fat mass.

RESULTS: 642 (32.1%) infants developed the 1° outcome. Mean custBW centile was higher in those who developed the 1° outcome compared with those who did not (59.5±29.6 vs. 50.0±29.3, p<0.0001). Of those who had the 1° outcome 19.3% and 13.2% were LGAcust and LGApop, vs. 11.3% and 8.2% for those who did not (difference 6.1 vs. 3.1%, P=.03). Among normal women, 9.9% were LGAcust, close to expected 10%, vs. 6.8% LGA pop (p=0.03). Cust BW centile was also significantly correlated with neonatal fat mass (r=0.70, p<.0001).

CONCLUSION: A customized approach for assessment of fetal growth, instead of current population-based norms, better identifies neonates at risk for adverse outcomes related to overgrowth.

Cohort (N)	Norm	% LGA with 1° outcome	% LGA without 1° outcome
treated GDM (422)	pop	8.0	6.0
	cust	12.4	11.2
Untreated GDM (400)	pop	19.7	11.9
	cust	32.7	16.6
Pos GLT (798)	pop	13.1	9.1
	cust	15.8	11.0
Normal (381)	pop	11.2	5.7
	cust	18.4	7.4

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383 Physiological basis of the Quintero staging system

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OBJECTIVE: Twin-twin transfusion syndrome (TTTS) is thought to result from a net flow of blood from the donor to the recipient twin. The Quintero staging system (QSS) is used to classify the heterogeneity and gauge the severity of TTTS and assumes increased severity with advancing Stage. The purpose of this study was to assess the relationship between the flow in the umbilical vein (UV) of the donor twin and Stage.

STUDY DESIGN: UV flow (cc/min) was calculated as: $Q_{uv} = A_u \times V_u \times 60$, where A_u and V_u are the area and the blood flow velocity of the UV, respectively. The diameter of the UV was obtained by ultrasound in a perpendicular view of the vein, where as the velocity was obtained in a parallel view. Pulsatile V_u was assessed as the time-average velocity by trace. Measurements were obtained prior to laser surgery in all cases. Logistic regression controlled for Stage, gestational age and estimated fetal weight. Surgeries were approved by the Institutional Review Board and all patients signed informed consent.

RESULTS: Three hundred and thirty-two patients underwent pre-operative assessment. Table I shows the median UV flow values by QSS. There was a significant inverse correlation between UV flow and QSS, with a decrease in UV flow from Stage I-III and increased flow in Stage IV. The estimated fetal weight was also significantly correlated, but did not differentiate Stages I-II.

CONCLUSION: Umbilical venous flow assessment in the donor twin correlates inversely with disease severity as gauged by the QSS from Stages I-III, differentiating one Stage from another. Improved blood flow to the donor in Stage IV may be associated with increased venous pressure in the recipient twin from congestive heart failure. These hemodynamic findings support the basis of the Quintero Staging system.

Table I. Pre-operative umbilical venous flow in the donor twin by Quintero Stage

Stage (N)	UV flow (cc/min)	P value
I (64)	65	
II (95)	51	.007
III (149)	32	.0001
IV (24)	80	.0001

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384 Does fetal echocardiogram perform better than standard fetal ultrasound in obese women?

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OBJECTIVE: Only 20-35% of major congenital cardiac anomalies are detected by routine ultrasound screening. It is often suggested that patients at risk should therefore undergo a fetal echocardiogram. We examined the accuracy of fetal echocardiogram when compared to standard fetal ultrasound in detecting cardiac anomalies, stratified by maternal BMI.

STUDY DESIGN: Retrospective chart review. Neonates with discharge diagnosis of any congenital cardiac anomaly between 2003 and 2008 were included. Maternal charts were reviewed for gestational age at ultrasound, ultrasound diagnosis, echocardiogram diagnosis, and maternal BMI. Subjects were classified into BMI categories by CDC criteria: underweight and normal (control): 18.5-24.9 kg/m², overweight: 25.0-29.9 kg/m², and obese: 30 kg/m² and above. Detection rates between the two modalities were calculated and compared. Accuracy of the ultrasound and echocardiogram diagnoses defined as