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# P14.10: Variability of measurements of femur length, head circumference, and abdominal circumference using a position tracking system combined to ultrasound

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macrosomic infants. As prediction of excessive fetal growth is important for counseling patients about risks of macrosomia, it was our aim to study accuracy of weight estimates with current ultrasound equipment.

**Methods:** This is an IRB approved retrospective study of patients that had SEFW measurement within 3 weeks of delivery. Biometry of head, abdomen (AC) and femur was done on high-resolution equipment utilizing Hadlock's formula. Difference between SEFW and BW was calculated (wt error) and correlated to BW, large for gestational age (LGA) and macrosomia. Impact of the wt error on overall accuracy of predicting LGA and macrosomia was assessed using correlation, nonparametric and Chi-square statistics.

**Results:** 917 patients met study criteria. SEFW correlation with BW improved from 75–82% as the interval to delivery decreased. The wt error increased with increasing SEFW and BW (Pearson  $r = 0.416$ ,  $P < 0.001$ ). The AC, a critical part of the Hadlock equation, was more highly correlated with SEFW ( $r = 0.954$ ,  $P < 0.001$ ) than the actual BW ( $r = 0.732$ ,  $P < 0.001$ ). The SEFW sensitivity, specificity and positive predictive values for LGA were 29, 99, and 83%, respectively; for macrosomia, 32, 99, and 69% ( $P < 0.001$ ). Considering polyhydramnios did not improve prediction. The increase in wt error with increasing fetal size did not add to prediction of BW category. However, in the week of delivery, prediction of LGA and macrosomia improved in sensitivity (34 & 41%) and negative predictive value (92 & 94%, Chi-square,  $P < 0.001$ ).

**Conclusions:** Although SEFW calculation loses its precision in predicting BW as the fetus gets larger, estimated weights obtained with current ultrasound technology correlate with actual birth weight. Errors are most likely due to overestimation of the AC impact on weight. When obtained within a week of delivery, sonographic estimates effectively exclude LGA and macrosomia and can therefore be used for counseling.

#### P14.08 Teaching basic ultrasound skills at Mulago Hospital, Kampala, Uganda

H. Khorrami<sup>1</sup>, U. Magriples<sup>1</sup>, F. Galerneau<sup>1</sup>, I. Namagembe<sup>2</sup>

<sup>1</sup>Obstetrics, Gynecology and Reproductive Sciences, Yale University School of Medicine, New Haven, CT, USA;

<sup>2</sup>Obstetrics and Gynecology, Mulago Hospital, Kampala, Uganda

**Objectives:** Mulago Hospital is a referral hospital located on the outskirts of the city center that is also a teaching hospital under the Makerere University School of Medicine and Health Sciences. The labor and delivery unit has nearly 31,000 deliveries occurring there in 2009. Basic ultrasound skills are useful in the assessment and management of obstetric patients. The purpose of the study is to assess the effectiveness of a teaching intervention (via pre and post test survey) that will be implemented to teach basic ultrasound skills, such as identification of fetal lie, placental position, amniotic fluid volume assessment and recognition of fetal breathing and motion, to residents, interns and medical students at Mulago Hospital, Kampala, Uganda.

**Methods:** The teaching intervention includes a combination of didactic and demonstration of skills about 1–2 hours in length total. Each participant completed a pre and post survey to assess their knowledge and skills. Data was analyzed in Microsoft Excel and SAS software.

**Results:** On average, scores between the pre and post test improved by 1.6 times for all participants ( $n = 37$ ,  $P = 0.001$ ). Participants included 12 medical students, 21 interns and 4 residents. Scores of medical students and interns improved more significantly, 2.3 times ( $P < 0.001$ ) and 2.0 times ( $P < 0.001$ ), respectively, than scores of residents (1.2 times,  $P = 0.30$ ).

**Conclusions:** This original teaching intervention was an effective method to improve knowledge and skills for medical students and interns at Mulago Hospital in the area of basic obstetric ultrasound.

#### P14.09 A preliminary study of 3-dimensional sonographic estimation of fetal weight

I. Solt<sup>1,3</sup>, N. Haya<sup>2</sup>, U. Ergaz<sup>1</sup>, K. Nizar<sup>1</sup>, I. Goldstein<sup>1,3</sup>,  
Y. Goldberg<sup>2,3</sup>, Z. Weiner<sup>1,3</sup>

<sup>1</sup>Obstetrics & Gynecology, Rambam, Health Care Campus, Haifa, Israel; <sup>2</sup>Obstetrics & Gynecology, Carmel Medical Center, Haifa, Israel; <sup>3</sup>Technion Faculty of Medicine, Haifa, Israel

**Objectives:** Many of the existing prenatal fetal weight estimation formulas were established over two decades ago. Since then and with recent advances in ultrasound technology, they have become increasingly valuable as an obstetric decision making tool, directly affecting the frequency of follow-up care, possible termination of the pregnancy, and labor management. Although the fetal body is a voluminous mass, its weight is typically calculated by only two or three parameters, with a 10–15% deviation. We hypothesized that using 3-dimensional ultrasound, a new fetal weight estimation formula could be established based on head and abdomen volume, that would increase the accuracy of the sonographic estimation as compared to the actual fetal weight, and reduce the conventional 10–15% deviation.

**Methods:** The study population included 57 women presenting at our Prenatal Ultrasound Unit for third-trimester fetal evaluation. Fetal measurements were obtained, including BPD, AC, FL, along with information on fetal gender, gestational age, history and complications, medical status of the patients, obstetric history and previous birth outcomes. Head and abdominal volumes were also obtained using the VOCAL software. Initial sections used for the VOCAL calculations were the conventional head and abdomen circumference measurements.

**Results:** Women's average age was 32 (ranging 23–45) and gestational age averaged 35 weeks (ranging 28–40). High correlations were found between abdominal volume and AC ( $r = 0.87$ ), head volume and HC ( $r = 0.822$ ), and head volume and BPD ( $r = 0.797$ ). Preliminary curves of fetal abdomen and head volumes throughout the third term will be presented.

**Conclusions:** Significant correlations between the 3-dimensional volumes of the head and abdomen, and the two-dimensional HC, BPD, AC and EFW measurements, were demonstrated. Our preliminary results suggests that 3-dimensional volume measurements can be employed for more accurate assessment of fetal weight and size.

#### P14.10 Variability of measurements of femur length, head circumference, and abdominal circumference using a position tracking system combined to ultrasound

J. Nizard<sup>1,2</sup>, M. Vitrani<sup>2,3</sup>, G. Morel<sup>2,3</sup>

<sup>1</sup>Obstetrics and Gynecology, GH Pitié Salpêtrière, Paris, France; <sup>2</sup>UPMC Univ Paris 06, UMR 7222, ISIR, Paris, France; <sup>3</sup>CNRS, UMR 7222, ISIR, Paris, France

**Objectives:** To evaluate the variability of three biometry measurements.

**Methods:** We used a system combining ultrasound with a position tracking device (the LaborPro system) to position in space biometry measurements. All measures were performed during pregnancy in two women, one with fetal akinesia (patient 1) and the other with a pregnancy with complete anamnios (patient 2). Six different operators measured several times femur length (FL), head circumference (HC), and abdominal circumference (AC). The total of three measurements was performed in less than four minutes for each operator. The system is designed to account for maternal movements during measurements. For FL, we compared absolute length, distance between the center of the femur, and angle between the measured FL and an average FL. For both circumferences, we

compared the distances between centers of the measured plane with an average center, and the angle between measured planes and an average plane using their perpendicular vectors.

**Results:** For FL measurements, the mean distance from an average FL center was 5.6 and 18.1 mm for patient 1 and 2 respectively. The mean angle with an average FL was 4 and 12° respectively. For CH, the mean distance from an average HC was 8.6 and 10.9 mm in patient 1 and 2 respectively. Angle difference from an average plane was 37 and 17° respectively. For AC, the distance from an average AC was 10.2 and 17.3 mm in patient 1 and 2 respectively. Angle difference from an average plane was 41 and 16° respectively. For all measurements, intra-operator variability was found scattered below and above the average results.

**Conclusions:** There is variability in biometry measurements when analyzing their position in space in fetuses with a priori no movements. Differences can be explained by fetal movements, operator variability, or manipulation of the fetus to obtain the adequate plane.

#### P14.11

##### Abdominal circumference at 35 weeks: Is it a good screening method for late IUGR and prevention of fetal death in low risk pregnancies?

J. C. Alves, T. Leite, F. Leça, C. Oliveira, L. C. Ferreira, M. Sobral, A. Páramos, I. Lobo

*Gynecology/Obstetrics, Hospital de Faro, EPE, Faro, Portugal*

**Objectives:** Despite all the advances in obstetrical care, stillbirths are still a major cause of perinatal mortality, accounting for nearly 3.2 million cases in the year 2000 (most of them in developing countries). There are many pathological conditions associated to late stillbirths, but IUGR is the more prevalent in developed countries (about 43% according to Gardosi & colleagues, 2005), where programs for promotion of maternal and fetal healthcare are implemented. Despite all the efforts to eradicate this condition, an ideal method of screening and treatment hasn't been implemented yet. In our region, we had a high fetal mortality rate in two consecutive years (7.2/1000 and 5.76/1000) with a high prevalence of stillbirths at 35 weeks gestational age or more, where IUGR was greatly associated. So, we decided to implement an US screening for IUGR at 35 weeks. Objective - to evaluate the efficiency of a screening method for IUGR at 35 weeks and its effect on stillbirths rate.

**Methods:** A prospective observational study was performed and all the low risk pregnancies under surveillance outside the hospital were referenced to our centre at 35 weeks gestational age (between February 2009 and September 2010). We performed an ultrasound with evaluation of the abdominal circumference and/or fetal biometry. Abdominal circumference below the 10<sup>th</sup> centile was diagnosed as IUGR. Clinical data was collected to EXCEL format from clinical files, and analyzed with PasW 18.0 software.

**Results:** Between February 2009 and September 2010, 2059 pregnant women were evaluated, mostly between 34 and 36 weeks (> 90%) with a prevalence of 4% of IUGR, considering the AC less than the 10<sup>th</sup> centile the diagnostic criteria. We managed the pregnancies according to our protocols, and in this group we have no stillbirths to report.

**Conclusions:** The measure of the AC at 35 weeks allowed us to detect and prevent all the major cases of late IUGR and to avoid late stillbirths. Further studies are needed to assess the validity of this study.

#### P14.12

##### The predictive value of nonstress test in decrease of amniotic fluid volume and fetal movement

N. Lorzadeh, S. Kazemirad

*OB-Gyn, Faculty of Medicine, Lorestan University of Medical Sciences, Khoramabad, Islamic Republic of Iran*

**Objectives:** Non stress test (NST) is the most common test before delivery that is done in some cases with probability of fetal distress. Decision for continuation or terminating the pregnancy is based on the result of NST along with some other criteria. The objective of this study was to determine the sensitivity and specificity of NST in cases with complaint of decreased fetal movement or decrease of amniotic fluid volume according to sonography report.

**Methods:** This cross-sectional study was done on 180 women referred to Asali hospital in Khoramabad. It was performed on all pregnant women with gestational age of 38–42 who complained of decrease of fetal movement (84.2%) and a decrease of amniotic fluid volume (61%) was reported in their sonography.

**Results:** The result of NST in 82.2% of patients was non-reactive and in 17.8% was reactive. 62% of cases were with fetal distress during labor or delivery, of which 94.1% had non-reactive NST. The sensitivity and specificity of NST in cases with decrease of amniotic fluid were 90.88% and 72.73%, respectively and in cases with complaint of decreased fetal movement were 67.3% and 36% respectively. sensitivity and specificity of NST in cases with or without fetal distress were 95% and 54% respectively.

**Conclusions:** Exact heart rate monitor in cases with complaint of decreased fetal movement or amniotic fluid volume and also with non-reactive NST is necessary.

#### P14.13

##### MRI may not provide additional information following ultrasound (US) diagnosis of placenta accreta (PA)

J. G. Ilagan<sup>1,2</sup>, J. Kim<sup>3</sup>, M. Grimaldi<sup>2</sup>, M. Rosing<sup>2</sup>

<sup>1</sup>*Obstetrics and Gynecology, Albert Einstein College of Medicine, Bronx, NY, USA;* <sup>2</sup>*Obstetrics & Gynecology, St. Barnabas Hospital, Bronx, NY, USA;* <sup>3</sup>*Radiology, St. Barnabas Hospital, Bronx, NY, USA*

**Objectives:** The frequency of PA rises annually with an increasing repeat Cesarean section (CS) rate. Prior to high resolution US, assessment of possible PA routinely involved MRI.

**Methods:** Here, we discuss 4 cases involving PA or placenta increta (PI) primarily diagnosed by obstetric US. Subsequent findings by MRI, at delivery and specimen review are reported.

**Results:** Cases: Patients with one or more prior cesarean deliveries were sent for placental US at 28–32 wks to rule out PA. Over 2 years, 4 cases of PA or PI were identified using US screening criteria; myometrial thinning, loss of uterine/placental border and presence of pulsatile Doppler flow between myometrium and placenta. One patient had one prior CS with a placenta previa in the recent gestation. Another patient had 2 prior CS with recent marginal placenta previa. Two patients had only a history of 2 prior CS. MRI performed in each case revealed equivocal, similar or worsened findings. All possible PA cases were transferred to a tertiary center for CS with surgical backup. In each case, PA or PI was confirmed at delivery and all patients underwent hysterectomy. Pathology specimens verified US findings with no cases of placenta percreta.

**Conclusions:** Obstetric US is able to diagnose patients at risk of PA or PI. Subsequent MRI studies did not provide additional information or effect patient care. If ultrasound findings suggest PA or PI, MRI may not be of further benefit.

Supporting information can be found in the online version of this abstract.