

6 Society for Gynecologic Investigation

8

10:15 a.m.

THE USE OF ULTRASONIC THREE-DIMENSIONAL VOLUME MEASUREMENTS IN THE ESTIMATION OF FETAL WEIGHT. J.F. Brinkley*, W.D. McCallum*, S.K. Muramatsu*, D.K. Liu*, Dept. Gyn-Ob, Stanford Medical School, Stanford, Calif. 94025. (SPON:W.L. Heinrichs).

The theoretical usefulness of volume as a predictor of fetal weight was assessed on 25 dead neonates (weight range 364-3650 g, mean 1274 g). The correlation between weight and volume, measured by water displacement, was $r=.999$, standard error (SE) 37 g. Ultrasonic head and trunk volume measurements were obtained on 41 live term fetuses within 48 hours prior to delivery (weight range 1985-4734 g, mean 3421 g). A three-dimensional (3D) position locator attached to the ultrasound scan head allowed arbitrarily oriented real time scans to be related to each other in 3D. The distances between the 3D locations of fetal landmarks were used to establish a longitudinal and 2 transverse axes for the trunk, from which a volume model was derived. A similar model was derived for the head. Trunk volume was also calculated from a 3D reconstruction defined by a series of arbitrarily oriented "slices" throughout the trunk. This reconstruction volume utilized information from the entire trunk; therefore, it could reflect irregularities in shape due to differing degrees of flexion. The correlation between the combination of these 3 volume measurements and \log_e of birthweight was $r=.949$, SE 59 g/kg. We conclude that 3D volume measurements, because of the close linear relationship between volume and weight, are useful predictors of fetal weight.

9

10:30 a.m.

ACUTE EFFECTS OF EMBOLIZATION OF THE UTERO-PLACENTAL CIRCULATION IN SHEEP. William B. Boyle*, Fred K. Lotgering*, Barry B. Billington* and Lawrence D. Longo. Div. of Perinatal Biol. Loma Linda Univ. Sch. Med., Loma Linda, CA., 92350.

In an effort to determine whether fetal growth retardation in association with embolization results from decreased placental diffusing capacity or from decreased uterine blood flow (UBF), we injected microspheres into the uterine circulation of the pregnant ewe. We measured total UBF continuously and sampled fetal blood gases in 5 chronically instrumented ewes following repeated injections of 1 million 25 μ microspheres into the common uterine artery at 30 min intervals. Embolization resulted in an immediate 10 to 30% drop in UBF. Ten min after injection, P_{O_2} , and O_2 content ($[O_2]$) decreased 5 to 20%, while P_{CO_2} and $[H^+]$ increased. Blood flows and gases partially recovered within 30 min after injection, recovery being less with subsequent injections. A linear relation existed between the number of microspheres injected and UBF, and between UBF and fetal P_{O_2} and $[O_2]$. A rapid increase in P_{CO_2} and $[H^+]$ was seen when UBF decreased below 125 ml/min/kg. Placental diffusing capacity for CO did not change after repeated embolization despite a severe decrease in fetal P_{O_2} . This suggests that embolization of the placental vascular bed does not affect the exchange area per se. It also suggests that fetal growth retardation with limitation of O_2 and/or other substrates, results from restricted uterine blood flow rather than from decreased placental diffusing capacity. (Supported by USPHS HD 03807.)