

Intertwin discordance in AC and EFW in the prediction of fetal loss in monochorionic diamniotic twin pregnancies

Satyam L, Acharya V, Shettikeri A, Sahana, R, Radhakrishnan P
Bangalore fetal medicine centre, Bangalore, India

Objective

The purpose of our study was to determine the role of discordant Abdominal Circumference (dAC) measurement and discordant Estimated Fetal Weight (dEFW) measurement in isolation and in combination at 2 gestational age groups, i. e. , 16 – 19 weeks and 20 – 24 weeks in predicting the postnatal outcomes in terms of double live birth, single live birth, double fetal loss, and miscarriage.

Methods

This is a retrospective study of prospectively collected data in Monochorionic Diamniotic (MCDA) twin pregnancies with euploid, structurally normal and both alive fetuses at 16 – 24 weeks. The pregnancy outcomes were obtained by telephonic interviews of the parents and from hospital records. The study period was from Jan 2005 to May 2020 and conducted at a tertiary referral Centre in South India. All scans were performed by FMF certified operators. For abdominal circumference (AC), axial section of the fetal abdomen was taken at the level of stomach bubble and bifurcation of main portal vein into right and left branches. The transverse abdominal diameter and anteroposterior abdominal diameter were measured, and AC was calculated from the formula $(3.14 \times (\text{APAD} + \text{TAD})/2)$. The EFW was calculated using Warsof and Hadlock formulae for gestation less than and beyond 20 weeks, respectively. Discordance of AC & EFW of more than or equal to 10% was correlated with the postnatal outcomes in terms of double live birth, single live birth, double fetal loss, and miscarriage before 24 weeks in the 2 gestational age groups. Examinations done at 16-19 weeks and 20-24 weeks of gestation were compared to assess which of the two performed better at predicting the outcomes.

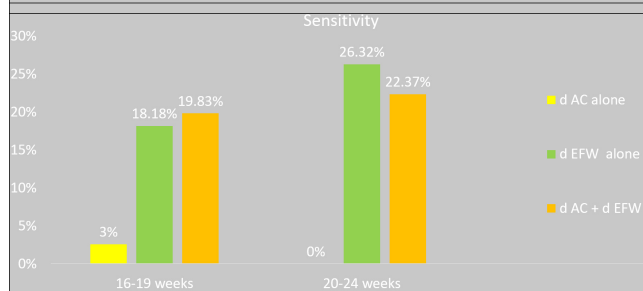
Results

326 MCDA twin pregnancies were identified from the database, from which 24 terminations and lost to follow up pregnancies were excluded. 154 and 213 examinations at 16-19 weeks and 20 – 24 weeks respectively from 302 pregnancies with known outcomes were analyzed for intertwin discordancy in AC and EFW. At 16 – 19 weeks, discordant AC (dAC) alone was seen in 4/154 (2.59%), of which 3/4 (75%) had double live birth, 1/4 (25%) had double fetal loss. Discordant EFW alone was seen in 28/154 (18.18%) of which 25/28 (89.28%), 1/28 (3.58%) and 2/28 (7.14%) had double live birth, double fetal loss, and miscarriage respectively. Double discordancy in AC and EFW was seen in 51/154 (33.11%) of which 23/51 (45.10%) had double live birth, 12/51 (23.53%) had single live birth, 10/51 (19.6%) had double fetal loss and 6/51 (11.77%) had miscarriage. For prediction of double live birth, the sensitivity for dAC, dEFW and combination of both was 2.59%, 18.18% and 19.83% respectively; the specificity was 97.37%, 81.82% and 26.32% respectively and OR was 0.98 (CI-0.09-9.73, $p=0.98$, NS), 3.2 (CI-0.90-11.29, $p=0.06$, NS) and 0.08 (CI-0.03-0.20, $p<0.0001$) respectively. For prediction of single live birth, the sensitivity for dAC, dEFW and combination of both was 0%, 0% and 80% respectively; the specificity was 97.14%, 80% and 71.94% respectively and OR was 1.04 (CI-0.05-20.4, $p=0.97$), 0.13 (CI-0.007-2.35, $p=0.17$) and 10.25 (CI-2.74-38.32, $p=0.0005$) respectively. For prediction of double fetal loss, the sensitivity for dAC, dEFW and combination of both was 7.69%, 21.55% and 76.92% respectively; the specificity was 97.87%, 92.11% and 70.92% respectively and OR was 3.83 (CI-0.36-39.74, $p=0.26$), 0.35 (CI-0.04-2.82, $p=0.32$) and 8.13 (CI-2.12-31.06, $p=0.0022$) respectively. For prediction of miscarriage < 24 weeks, the sensitivity for dAC, dEFW and combination of both was 0.00%, 7.69% and 54.55% respectively; the specificity was 97.20%, 80.85% and 68.53% respectively and OR was 1.34 (CI-0.06-26.61, $p=0.844$), 1 (CI-0.20-4.90, $p=1$) and 2.6 (CI-0.75-9.01, $p<0.12$) respectively. At 20 - 24 weeks, there were no cases with discordant AC alone. Discordant EFW alone was seen in 52/213 (24.41%), of which 40/52 (76.92%) had double live birth, 2/52 (3.84%) had single live birth, 5/52 (9.62%) had double fetal loss and 5/52 (9.62%) had miscarriage. Double discordancy in AC and EFW was seen in 74/213 (34.74%) of which 34/74 (45.94%) had double live birth, 20/74 (27.02%) had single live birth, 12/74 (16.21%) had double fetal loss and 8/74 (10.81%) had miscarriage. For prediction of double live birth, single live birth, double fetal loss, miscarriage the sensitivity for dAC was 0%, specificity was 100% and OR was 0.40 (CI-0.007-20.55, $p=0.65$), 7.07 (CI-0.13-364.19, $p=0.33$), 8.95 (CI-0.17-462.8, $p=0.27$) and 8.4 (CI-0.16-441.2, $p=0.29$) respectively. For prediction of double live birth, the sensitivity for dEFW and combination of both dAC and dEFW was 26.32% and 22.37% respectively; the specificity was 80.33% and 34.43% respectively and OR was 1.45 (CI-0.70-3.01, $p=0.30$) and 0.15 (CI-0.07-0.29, $p<0.0001$) respectively. For prediction of single live birth, the sensitivity dEFW and combination of both dAC and dEFW was 7.69% and 76.92% respectively; the specificity was 73.26% and 71.12% respectively and OR was 0.22 (CI-0.05-1.001, $p=0.05$) and 8.2 (CI-3.12-21.56, $p<0.0001$) respectively. For prediction of double fetal loss, the sensitivity for dEFW and combination of both dAC and dEFW was 23.81% and 57.14% respectively; the specificity was 75.52% and 67.71% respectively and OR was 0.96 (CI-0.33-2.77, $p=0.94$) and 2.79 (CI-1.11-6.980, $p=0.02$) respectively. For prediction of miscarriage < 24 weeks the sensitivity for dEFW and combination of both dAC and dEFW was 35.71% and 57.14% respectively; the specificity was 76.38% and 66.83% respectively and OR was 1.79 (CI-0.57-5.62, $p=0.31$) and 2.68 (CI-0.89-8.06, $p=0.07$) respectively.

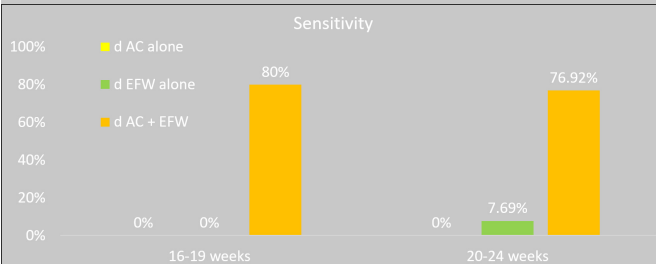
Conclusion

Discordancy in MCDA twins can present as early as in the first trimester of the pregnancy. Various studies have been performed to predict the possibility of developing complications. One of the most challenging complications is single or double loss, both of which can superimpose on any of the monochorionic specific complications ie TTTS/ sFGR/ TAPS. In addition, single fetal loss can be unpredictable. In our study we aimed to predict possibility of single and double fetal loss and double live births before 24 weeks. We assessed discordancy in fetal AC and EFW to predict the postnatal outcomes as these parameters show promising results in predicting antenatal complications. We found that dAC and dEFW as isolated markers did not show much value. However, when there is a double discordancy in AC and EFW, this had a reasonable prediction for double live and single live births at both gestational ages. Double fetal loss was better predicted by double discordance of AC and EFW at 16 – 19 weeks.

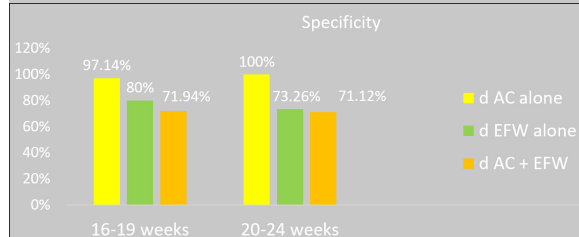
Graph 1 : Gestational age dependent sensitivity for prediction of Double live birth at 16-19 weeks and 20-24 weeks



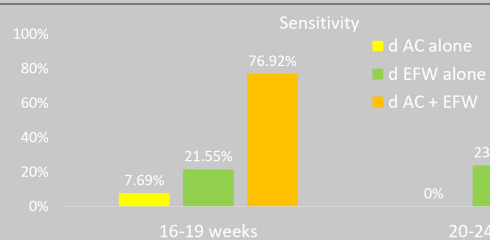
Graph 3 : Gestational age dependent sensitivity for prediction of single live birth at 16-19 weeks and 20-24 weeks



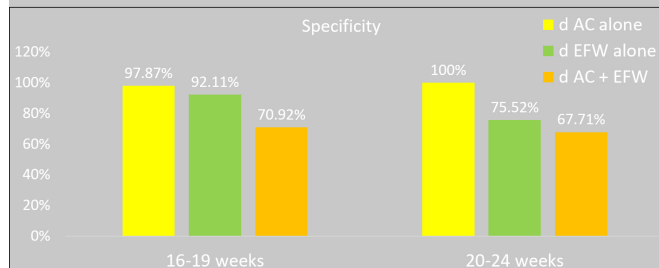
Graph 4 : Gestational age dependent specificity for prediction of single live birth at 16-19 weeks and 20-24 weeks



Graph 5 : Gestational age dependent sensitivity for prediction of double fetal loss at 16-19 weeks and 20-24 weeks



Graph 6 : Gestational age dependent specificity for prediction of double fetal loss at 16-19 weeks and 20-24 weeks



Graph 8 : Gestational age dependent specificity for prediction of miscarriage < 24 weeks at 16-19 weeks and 20-24 weeks



Table 1 : Total number of MCDA pregnancies

Total number of MCDA pregnancies	326
No. of MCDA pregnancies terminations + lost to follow up	24
No. of MCDA pregnancies included in the study	302

Table 2 : Total number of examinations at two different gestational age groups

Total number of MCDA pregnancies	367
Total no. of examinations at 16-19 weeks	154
Total no. of examinations at 20-24 weeks	213