

OP18.09: Table

	GA (wks)	CTR	UA PI	MCA PI	RV MPI	LV MPI	# Pts with PE	# Pts with TR	# Pts with MR
Pre	19.6	0.29	1.52	1.74	0.44	0.43	0	4	2
Post	21.2	0.33	1.41	1.63	0.56	0.40	12	24	6
P Value		< 0.001	< 0.001	0.1	0.1	NS	< 0.001	< 0.001	< 0.01

(1/7, 14%) survived in the abnormal group. Pre- and post-operative Doppler changes were significantly related with prognosis in donors ( $p < 0.001$ ).

**Conclusions:** AREDV in UA before laser therapy in the donor was not necessary related to prognosis. Post-operative Doppler assessment, addition to pre-operative assessment, predict fetal outcome more precisely following laser therapy for TTTS.

### OP18.09

#### Cardiovascular changes in the donor twin after laser photocoagulation therapy for twin-twin transfusion syndrome (TTTS)

J. Rychik<sup>2</sup>, M. Bebbington<sup>1</sup>, Z. Tian<sup>2</sup>, S. Zhao<sup>2</sup>, M. Johnson<sup>1</sup>

<sup>1</sup>Center for Fetal Diagnosis and Treatment, Children's Hospital of Philadelphia, Philadelphia, PA, USA; <sup>2</sup>Fetal Heart Program, The Children's Hospital of Philadelphia, Philadelphia, PA, USA

**Background:** Cardiovascular abnormalities are common in the recipient twin in TTTS. In the donor, except for altered umbilical arterial flow, no gross cardiovascular changes are typically seen. Selective laser photocoagulation therapy (SLPT) improves outcome and can reverse many of the cardiovascular abnormalities noted in the recipient, however its impact on the donor twin heart has not been extensively studied.

**Objective:** To investigate the effects of SLPT for TTTS on the cardiovascular status of the donor twin.

**Methods:** Pre and post-operative fetal echos from 54 patients who underwent SLPT for TTTS Stage 2 or higher from June 2007 to February 2009 were reviewed. Cardiothoracic ratio (CTR), Doppler tricuspid and mitral E and A peak inflow velocities, umbilical artery (UA) and middle cerebral artery (MCA) pulsatility indices (PI), and myocardial performance indices (MPI) of the donor twin, were compared before and after SLPT. Presence or absence of pericardial effusion (PE) and tricuspid or mitral regurgitation were also noted.

**Results:** CTR increased significantly as did mitral and tricuspid valve velocities, suggesting an increase in volume load. UA PI increased, but MCA PI remained unchanged. In select donors RV MPI increased substantially, however there was no difference for the group as a whole. Postoperatively, over 20% of donors developed a significant PE; nearly 50% developed tricuspid or mitral regurgitation.

**Conclusions:** Important cardiovascular abnormalities develop in the donor twin following SLPT. The origin of these findings are unclear, but may be related to the insult of acute, rapid volume load in a previously volume depleted fetus. Serial fetal echo follow up of both donor and recipient for cardiovascular abnormalities after SLPT is warranted.

### OP18.10

#### Is CHOP Score predictive of the outcome of twin-to-twin transfusion syndrome?

B. Nasr, J. Stirnemann, F. Proulx, M. Essaoui, Y. Ville

*Fetal Medicine, GHU Necker Enfants Malades, Paris, France*

**Objective:** Our objective is to prospectively evaluate the CHOP score in a cohort of monochorionic pregnancies complicated with

twin-to-twin transfusion syndrome (TTTS) treated by percutaneous fetoscopic laser coagulation.

**Methods:** 182 monochorionic diamniotic twins were reviewed based on the CHOP score. Each one of the variables including ventricular hypertrophy, dilation, function, valve regurgitation, great artery size, and diastolic properties in the recipient and umbilical artery Doppler velocimetry in the donor were counted. Twin survival was correlated with Quintero staging and CHOP score.

**Results:** There was a small agreement between Quintero staging and CHOP score. Quintero staging was not correlated with survival. Twin survival was not correlated with the severity of CHOP score (Fisher exact test  $p = 0,6821$ )

**Conclusion:** Cardiac dysfunction of the recipient is not to be the most predictive criteria in the outcome of TTTS.

### OP18.11

#### Assessment of the Ductus Venosus in TTTS before laser therapy

B. Nasr, J. Stirnemann, F. Proulx, D. Nowakowska, M. Essaoui, G. Chalouhi, Y. Ville

*Fetal Medicine, GHU Necker Enfants Malades, Paris, France*

**Objective:** To evaluate the systolo-diastolic spectrum on the ductus venosus (DV) waveform in twin to twin transfusion syndrome (TTTS) in comparison with myocardial performance index (MPI) of both ventricles.

**Methods:** 164 donors and recipients in 82 twin monochorionic twin pregnancies complicated by TTTS were studied before laser therapy on the DV using total time of the ductus (TT); time in systole (TS), time in diastole (TD), early filling time of the diastole (EFTD), velocity time integral (VTI) of the systole, early diastole and atrial contraction time and MPI of both ventricles.

**Results:** The TD and EFTD were significantly shorter in the recipient and this is the reflection of the diastolic dysfunction. The stroke volume (VTI) and systolic time in the recipient were higher due to volume overload. There was no correlation for any of the variables with MPI of both ventricles.

**Conclusion:** Complete Doppler evaluation of systole and diastole could provide a complete reflection of the pathophysiology and help in the assessment of TTTS.

## OP19: FETAL DOPPLER

### OP19.01

#### Atosiban, magnesium sulfate and ritodrine therapy for preterm labor: effects on uterine, fetal umbilical and middle cerebral artery Doppler parameters in the first 24 hours

J. W. Kim, Y. H. Kim, H. Y. Cho, C. H. Kim, M. K. Cho, T. B. Song

*Obstetrics and Gynecology, Chonnam National University Medical School, Gwangju, South Korea*

**Objective:** To assess the effect and difference of atosiban, magnesium sulfate and ritodrine tocolysis on Doppler parameters of uterine, umbilical and fetal middle cerebral arteries in the first 24h of therapy.

**Methods:** Ultrasound examinations were performed on the ACCUVIX XQ (Medison, Seoul, Korea). Doppler waveforms of uterine, umbilical and middle cerebral arteries were measured from 89 pregnant women and fetuses prior to therapy, 1h and 24h during atosiban (n = 40), magnesium sulfate (n = 29) and ritodrine (n = 20) therapy for preterm labor. Doppler S/D ratio of uterine and umbilical artery and Doppler pulsatility index (PI) of middle cerebral artery were measured. A p value of < 0.05 was considered significant.

**Results:** Atosiban maintenance was associated with a significant decline in the uterine artery S/D ratio at 24h (p < 0.05), while the umbilical artery S/D ratio and the middle cerebral artery PI were unaffected. Ritodrine maintenance was associated with a significant decline in the uterine and umbilical artery S/D ratio at 24hr (p < 0.05), while the middle cerebral artery PI were unaffected. Magnesium sulfate maintenance did not show any changes in each Doppler study.

**Conclusion:** We suggest that atosiban affects uterine arterial blood flow. Although the physiological basis of this effect is currently unclear, it could be related to the local regulation of uteroplacental and intracerebral blood flow. Further studies are necessary to show long-term effects of tocolytic therapy and may help to refine choice of tocolytic agents.

#### OP19.02

##### Doppler reference values of the fetal posterior cerebral artery between 20 to 40 weeks of gestation

E. Hernandez<sup>1,2</sup>, A. Benavides-Serralde<sup>1,2</sup>, F. Figueras<sup>2</sup>, D. Oros<sup>2</sup>, E. Gratacos<sup>2</sup>

<sup>1</sup>Maternal Fetal Medicine, National Institute of Perinatal Medicine, Nueva Santa Maria, Mexico; <sup>2</sup>Maternal Fetal Medicine, Hospital Clinic, Barcelona, Spain

**Objective:** To construct normal reference values of pulsatility index (PI, peak systolic velocity (PSV) and time average maximum velocity (TAMXV) of the fetal posterior cerebral artery (PCA) between 20 to 40 weeks of gestation.

**Methods:** PCA was evaluated using pulsed Doppler ultrasound in its first 2 segments (of 4 anatomically described segments): S1 just after its origin from the basilar artery, and segment 2 (S2) after the junction with the posterior communicating artery. Recordings were performed in 252 healthy fetuses between 20–40 weeks of gestational age (GA). Normal reference curves were constructed and reproducibility evaluated.

**Results:** All Doppler parameters behaved similarly in the 2 segments. PI showed a biphasic pattern increasing until 30 weeks of gestation then decreasing until the end of pregnancy. PSV and TAMXV showed a constant increment throughout pregnancy. No differences in any of the studied parameters were found between the two segments. Reproducibility analysis showed an intra class correlation coefficient of 0.9 and 0.89, and an inter class correlation coefficient of 0.88 and 0.85 for PCA S1 and PCA S2, respectively.

**Conclusion:** The two segments of the PCA behaved similarly. There is an increment in the PCA PI until 30 weeks of gestation then decreasing until the end of pregnancy. PSV and TAMVX increased constantly until the end of pregnancy.

#### OP19.03

##### Doppler indices of the middle cerebral artery in fetuses with cardiac defects associated with impaired cerebral oxygen delivery in utero. Is there a brain sparing effect?

C. Berg, O. Gembruch, U. Gembruch, A. Geipel

Department of Obstetrics and Prenatal Medicine, University Hospital Bonn, Bonn, Germany

**Objective:** To assess potential changes in the Doppler flow profiles of the middle cerebral artery in fetuses with cardiac defects associated with impaired cerebral oxygen delivery in utero, namely transposition of the great arteries (TGA), hypoplastic left heart (HLH) pulmonary atresia (PA) and tetralogy of Fallot (TOF).

**Methods:** Z-scores were calculated for pulsatility and resistance indices (PI/RI) of the middle cerebral artery (MCA), cerebroplacental pulsatility ratio (CPPR) and head circumference at birth (HC) in 113 fetuses with the following isolated cardiac defects: TGA (18), HLH (63), PA (18) and TOF (14). Multiple pregnancies, growth retardation (birth weight < 10th centile), extracardiac malformations and chromosomal anomalies were excluded. The results were compared with 1378 normal controls.

**Results:** Fetuses with PA and TOF had no significant alterations of mean MCA-PI, CPPR and HC-Z-scores at birth. In newborns with d-TGA, mean Z-scores of HC at birth were significantly smaller compared to controls ( $-0.73 \pm 1.25$ ; p < 0.05), while there was no significant difference concerning mean MCA-PI/RI and CPPR-Z-scores. Fetuses with HLH had significantly lower mean MCA-PI ( $-0.49 \pm 0.69$ ; p < 0.05) and CPPR-Z-scores ( $-1.23 \pm 1.14$ ; p < 0.05) compared to controls, however there was no difference concerning mean HC Z-scores at birth.

**Conclusions:** Only fetuses with cardiac defects associated with markedly impaired cerebral oxygen delivery in utero (d-TGA and HLH) have measurable cerebrovascular alterations. However, even in cardiac defects with similar reduction in cerebral oxygen delivery, these effects are inconstant. Therefore, additional factors are likely to influence the cerebrovascular autoregulation in these fetuses.

#### OP19.04

##### Cerebral three dimensional angio Doppler indices in fetuses of women with pregestational diabetes mellitus

R. Quintero, M. Fajardo, V. Melero Jimenez, F. G. Bugatto, B. Hervías, J. L. Bartha

Medicina Fetal, Hospital Universitario Puerta del Mar, Cádiz, San Fernando, Cádiz, Spain

**Objectives:** To evaluate fetal cerebral circulation by using 3-D angio Doppler indices in fetuses of pregestational diabetic mothers.

**Material and methods:** Three-dimensional angio Doppler indices (vascularization index (VI), flow index (FI) and vascularization flow index (VFI)) of 20 fetuses of pregnant women with pregestational diabetes were compared to those of fetuses of 107 healthy pregnant women without diabetes mellitus used as a control group. Voluson 730 Expert (GE) with VOCAL software and histogram facility was used. Measurements were done at PRF 0.9 kHz by using a virtual automated sphere between fetal parietal bones in an axial plane of fetal head. Student t test was used for comparisons.

OP19.02: Table

Parameter	Equation	SD
PCA S1 PI	$Y = -0.41 + 0.032 X + 0.001 X^2 - 0.001 X^3$	SD = 0.0869
PCA S2 PI	$Y = -2.559 + 0.291 X - 0.005 X^2$	SD = 0.313
PCA S1 Peak systolic velocity	$Y = 31,610 - 1,365 X + 0,0451 X^2$	SD = $-2.55 + 0.34 X$
PCA S2 Peak systolic velocity	$Y = 29,186 - 1,365 X + 0,0465 X^2$	SD = $-3.96 + 0.42 X$
PCA S1 Time-averaged mean maximum velocity	$Y = 38,987 - 2,315 X + 0,0501 X^2$	SD = $21,02 - 1,39X + 0,026 X^2$
PCA S2 Time-averaged mean maximum velocity	$Y = 39,745 - 2,473 X + 0,054 X^2$	SD = $-2.78 + 0.237 X$