singletons-based growth charts, respectively. Placental abnormalities were compared between twins and singletons and were classified into maternal vascular malperfusion, loss of integrity, fetal vascular malperfusion, and chronic inflammation.

RESULTS: 1) A total of 1,282 SGA newborns were identified during the study period, of whom 365 (28.5%) were twins. 2) The rate of any placental pathology was lower for SGA twins compared with SGA singletons (38.1% vs 67.8% p<0.001), mainly due to a lower rate of maternal malperfusion lesions (4.1% vs. 42.1% p<0.001). 3) On multivariable regression analysis, SGA in twins was associated with lower odds of any placental abnormality (OR 0.29, 95%-CI 0.23-0.38) and maternal vascular malperfusion (OR 0.06, 95%-CI 0.04-0.10) (TABLE). 4) Plurality was not associated with the risk of fetal vascular malperfusion lesions and chronic villitis (TABLE).

CONCLUSION: SGA in twin pregnancies is less likely to be associated with maternal vascular malperfusion lesions compared with SGA in singletons. These findings may imply that the mechanisms underlying fetal growth FGR in twins differ from those in singleton pregnancies.

Placental Abnormality Associated with SGA in Twins vs. SGA in Singletons

Placental abnormality	SGA in twins vs. SGA in singletons [OR (95%-CI)]
Any placental abnormality	0.29 (0.23-0.38)
Maternal vascular malperfusion	0.06 (0.04-0.10)
Maternal vascular loss of integrity	0.56 (0.28-1.12)
Fetal vascular malperfusion (fetal thrombotic vasculopathy)	0.78 (0.58-1.04)
Chronic inflammation (chronic villitis)	0.66 (0.42-1.02)

224 Perinatal outcomes of twin twin transfusion syndrome based on gestational age at time of selective fetoscopic laser photocoagulation

Corey Clifford[1,2], William Polzin[1,2], Foong-Yen Lim[2], Jose Peiro[2], Aimen Shaaban[2], Mounira Habli[1,2]

[1]TriHealth Hospitals, Cincinnati, OH, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH

OBJECTIVE: Selective fetoscopic laser photocoagulation (SFLP) remains the treatment of choice for twin twin transfusion syndrome (TTTS). Little is known about perinatal outcomes after SFLP treatment for TTTS when stratified by gestational age (GA) at the time of SFLP treatment. Our objective is to describe gestational-age-at-treatment specific perinatal outcomes after SFLP treatment for TTTS.

STUDY DESIGN: Data on all consecutive pregnancies diagnosed with TTTS (n=640) and treated by SFLP between 2008-2014 were reviewed. Exclusion criteria included fetal malformations, known chromosomal anomalies, and triplet gestations. Patient demographics and perinatal outcome data were collected. Data was stratified and compared based on GA at time of SFLP. ANOVA, T-test, and Chi-square tests were used as indicated.

RESULTS: The average GA at the time of evaluation, SFLP, and delivery was 20.42 ± 2.53, 20.9±2.6, and 30.1±4.2 weeks, respectively. 63% (n=403/640) were Quintero Stage III TTTS and 37% (n=238) had selective IUGR. Overall survival was 91% (n=582) with 76% (n=485) donor survival and 88% (n=560) recipient survival. The rate of preterm delivery <28 weeks and <34 weeks were 26% (n=169) and 83% (n=529), respectively. There was no significant difference in Quinetro stage among groups (table). With increasing GA at SFLP, there was a significant increase in donor and recipient survival, gestational age at delivery, and a significant decrease in rate of pregnancy loss, preterm delivery <28 weeks, and double and single fetal demise in TTTS treated with SFLP.

CONCLUSION: Regardless of Quintero stage, earlier GA at the time of SFLP in TTTS is associated with higher rate of adverse pregnancy outcome and lower survival. This information is important in patient counseling. Further studies are needed to identify predictors of outcome.

Comparison of perinatal outcome in TTTS treated with SFLP stratified by gestational age at procedure

Variables	16 weeks	17 weeks	18 weeks	19 weeks	20 weeks	21 weeks	22 weeks	23 weeks	24 weeks	25 weeks	26-27 weeks	P-value
Number of cases - n (%)	30 (4.7)	56 (8.8)	82 (12.8)	75 (11.7)	100 (15.6)	83 (13)	73 (11.4)	47 (7.3)	40 (6.3)	34 (5.3)	20 (3.1)	
Quintero stage												0.161
I - n (%)	1 (3)	5 (9)	12 (15)	11 (15)	21 (21)	12 (14)	17 (23)	10 (21)	12 (30)	9 (26)	4 (20)	
II - n (%)	5 (17)	5 (9)	10 (12)	7 (9)	11 (11)	9 (11)	8 (11)	6 (13)	3 (8)	8 (24)	1 (5)	
III - n (%)	21 (70)	45 (80)	52 (63)	53 (71)	62 (62)	54 (65)	42 (58)	28 (60)	21 (52)	12 (35)	13 (65)	
IV - n (%)	3 (10)	1 (2)	8 (10)	4 (5)	6 (6)	8 (10)	6 (8)	3 (6)	4 (10)	5 (15)	2 (10)	
Number of live births												0.005
0 - n (%)	7 (23)	6 (11)	11 (13)	10 (13)	10 (10)	5 (6)	5 (7)	2 (4)	1 (3)	1 (3)	0 (0)	
1 - n (%)	11 (36)	12 (21)	11 (13)	16 (21)	17 (17)	18 (21)	7 (10)	12 (26)	9 (22)	3 (9)	3 (13)	
2 - n (%)	12 (40)	38 (86)	60 (73)	49 (65)	73 (73)	60 (72)	61 (84)	33 (70)	30 (75)	30 (82)	17 (85)	
Delivery less than 24 weeks - n (%)	6 (20)	7 (12.5)	11 (13.4)	11 (14.7)	11 (11)	5 (6)	5 (6.8)	0 (0)	0 (0)	0 (0)	0 (0)	0.003
Delivery less than 28 weeks - n (%)	11 (36.7)	24 (42.9)	25 (30.5)	21 (28)	28 (28)	14 (16.9)	14 (19.2)	14 (29.8)	13 (32.5)	4 (11.8)	1 (5)	0.004
Donor survival - n (%)	14 (46.7)	38 (67.9)	61 (74.4)	52 (69.3)	77 (77)	65 (78.3)	63 (86.3)	36 (76.6)	32 (80)	30 (88.2)	17 (85)	0.003
Recipient survival - n (%)	21 (70)	50 (89.3)	70 (85.4)	62 (82.7)	86 (86)	73 (88)	66 (90.4)	42 (89.4)	37 (92.5)	33 (97.1)	20 (100)	0.054
Gestational age at delivery - weeks	28.0 ± 5.57	28.74 ± 4.66	29.43 ± 4.66	29.88 ± 4.57	29.99 ± 4.09	30.8 ± 3.51	31.15 ± 3.85	29.93 ± 3.69	30.53 ± 3.75	32 ± 2.84	31.54 ± 2.52	<0.0001

225 Timing of fetal death and pregnancy outcome in twin twin transfusion syndrome after laser

Corey Clifford[1,2], William Polzin[1,2], Foong-Yen Lim[2], Jose Peiro[2], Aimen Shaaban[2], Mounira Habli[1,2]

[1]TriHealth Hospitals, Cincinnati, OH, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH

OBJECTIVE: Single-fetal demise (SFD) in monochiorionic/diamniotic twins (MCDA) can pose substantial risks for the surviving co-twin, including increased risk of fetal loss, preterm delivery, neurovascular injury, and end-organ damage. In laser (SFLP) treated twin twin transfusion syndrome (TTTS)(10-15% of MCDA), SFD occurs in up to 20%. Little is known about pregnancy outcome in SFLP treated TTTS patients based on timing of SFD.

STUDY DESIGN: Data on all consecutive pregnancies diagnosed with TTTS (n=640) and treated by laser surgery and had SFD between 2008-2014 were reviewed. Exclusion criteria included fetal malformations, known chromosomal anomalies, and triplet gestations. Patient demographics and perinatal outcome data were collected. Data was stratified and compared based on timing of fetal death into 2 groups: immediate fetal death intra-operatively or day 1 post SFLP and fetal death within 7 days of SFLP. ANOVA, T-test and Chi-square tests were used as indicated.

RESULTS: 17% (111/640) had SFD with 82% (n=91) being donor demise and 18% (n=20) being recipient demise. Mean gestational age (GA) of demise and delivery was 24.4±4.6 and 30.7±4.2 weeks, respectively. 70% (n=78) were Quintero stage III at time of SFLP with 53% (n=59) selective fetal growth restriction (sIUGR). Rate of preterm delivery (PTD) at <28 weeks, <34 weeks and pregnancy loss in SFD pregnancies was 24% (n=27), 78% (n=86), and 4.5% (n=5), respectively. 41% (n=46) had immediate SFD and 84% (n=92) had death within 7 days of SFLP. In comparing pregnancy outcome in SFD within 7 days (table), there was a significantly higher rate of PTD <28weeks, lower GA at delivery and lower recipient birth weight as compared to SFD >7 days post SFLP. There was no significant difference among groups in staging, sIUGR, GA at evaluation, and PTD <34weeks. Similarly, there was no significant difference in all data variables when stratified based on immediate postoperative demise.

CONCLUSION: TTTS pregnancies post SFLP complicated with SFD within 7 days of procedure are at higher risk of adverse pregnancy

outcome. This information is important in patient counseling and delivery planning. Further studies are needed on proper timing of delivery.

Comparison of TTTS pregnancy outcome variables complicated with fetal death within 7 days of SFLP

		SFD within 7 days (n=92)	SFD ≥7 days (n=19)
Quintero stage	I n(%)	9(9.8)	2(10.5)
	II n(%)	9(9.8)	1(5.3)
	III n(%)	63(68.5)	15(78.9)
	IV n(%)	11(12.0)	1(5.3)
Preterm delivery <28 weeks - n(%)		26(28)	1(5.3)**
Gestational age at delivery- weeks		30.4±4.4	32.4±2.6**
Recipient weight - grams		1506.2±866.1	1944.3±607.5**

**p<0.05

226 Small for gestational age as an independent risk factor for long-term pediatric gastrointestinal morbidity of the offspring

Naama Steiner[1], Asnat Walfisch[1], Tamar Wainstock[2], Idit Sesgal[3], Daniella Landau[4], Eyal Sheiner[1]

[1]Department of Obstetrics and Gynecology, Soroka University Medical Center, Ben-Gurion University of the Negev, Beer-Sheva, Israel, [2]Department of Public Health, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel, [3]Ministry of health, Jerusalem, Israel, [4]Department of Neonatology, Soroka University Medical Center, Ben-Gurion University of the Negev, Beer-Sheva, Israel

OBJECTIVE: Scarce data exist regarding risk factors for neonatal long-term gastrointestinal (GI) morbidity. We aimed to evaluate the association between birthweight (BW) at term and long-term pediatric GI morbidity.

STUDY DESIGN: A population-based cohort analysis was performed, comparing the risk of long-term GI morbidity (up to the age of 18 years) in children delivered at term according to BW. The study included all term deliveries which occurred between 1991-2013 at a single regional tertiary medical center. Multiple gestations and fetuses with congenital malformations were excluded. Birth-weight was sub-divided into: small for gestational age (SGA - BW<5th centile), appropriate for gestational age (AGA - 5th centile<BW<95th centile) and large for gestational age (LGA - BW>95th centile). Hospitalizations up to the age of 18 years involving GI morbidity were evaluated. GI morbidity was evaluated using a predefined set of ICD-9 codes, as recorded by the hospital records. Kaplan-Meier survival curves were constructed to compare cumulative GI morbidity incidence. A Cox proportional hazards model was used to control for confounders.

RESULTS: During the study period 225,600 term singleton deliveries met the inclusion criteria. Of them, 4.6% (n=10 415) were SGA age and 4.34% (n= 9796) were LGA. During the follow-up period, 11,791 (5.2%) children were hospitalized with GI morbidity. Hospitalizations up to the age of 18 years involving GI morbidity, were significantly more common in the SGA group, as compared with the AGA and LGA groups (6.6% vs. 5.2% vs. 4.5% respectively, $p<0.001$ using the chi-square test for trends, selected morbidities shown in Table). Specifically, Inguinal hernia, inflammatory bowel disease (IBD), hepatitis, cholecystitis and celiac were more common in the SGA group. The Kaplan-Meier survival curve demonstrated a significantly higher cumulative incidence of gastrointestinal morbidity in the SGA group (Figure, log rank $p<0.001$). Using the Cox proportional hazards model, controlling for maternal age, hypertensive disorders of pregnancy and diabetes, SGA was found as an independent risk factor for long-term GI morbidity (adjusted HR=1.23, CI 1.14-1.33, $p<0.001$).

CONCLUSION: SGA offspring are at an increased and independent risk for long-term pediatric GI morbidity.

Table: Selected long-term pediatric gastrointestinal morbidity according to birth-weight.

Offspring long-term gastrointestinal morbidity	SGA n=10,415	AGA n =205,389	LGA n =9,796	*p* value*
Total GI Hospitalization	6.6%	5.2%	4.5%	<0.001
Esophageal	0.2%	0.2%	0.2%	0.301
Gastroduodenal	0.6%	0.5%	0.6%	0.751
Appendix	0.5%	0.6%	0.6%	0.182
Inguinal hernia	2.1%	1.3%	1.1%	<0.001
IBD	2.1%	1.7%	1.3%	<0.001
Anorectal	0.2%	0.2%	0.2%	0.725
Hepatitis	0.2%	0.1%	0.1%	0.015
Surgical obstruction	0.1%	0.1%	0.1%	0.421
Cholecystitis	0.1%	0.0%	0.0%	0.009
Celiac	0.6%	0.4%	0.3%	<0.001
Hemorrhoids	0.1%	0.1%	0.1%	0.939

* Using the linear by linear association test

Figure: Kaplan-Meier survival curve demonstrating the cumulative incidence of total gastrointestinal hospitalizations in children according to birthweight (Log rank $p<0.001$)