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Research Article

### STUDY TO DETERMINE THE FETAL SURVIVAL IMMEDIATE AFTER FETOSCOPIC LASER ABLATION IN TWIN TO TWIN TRANSFUSION SYNDROME

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**Abstract:**

**Objective:** The aim of this analysis was to conclude the prognostic factors that may affect fetal survival immediately after laser fetoscopic ablation.

**Study Design:** A retrospective study.

**Place and Duration:** In the Obstetrics and Gynaecology department of Alzahra Pvt Hospital, Sharjah for two year duration from May 2017 till May 2019.

**Methods:** In this study 57 consecutive twins pregnant women who were done with fetoscopic laser ablation for the TTTS (twin to twin transfusion syndrome) diagnosis were selected. After the procedure; immediate survival was defined as within 48 hours and neonatal survival after 28 days. At the end of the procedure, clinical features and findings of ultrasound were compared with fetal survival.

**Results:** Fifty-seven TTTS pregnant women were enrolled and after laser fetoscopic ablation fetal survival rate was 71.2% (81/114). The gestational age was higher in the fetuses who survived immediately after the method and the abnormal Doppler studies frequency was lower than those who did not endure. Though, the hydrops frequency was not dissimilar between patients with fetal death and fetal survival. The abnormal Doppler studies presence and early age of gestation were important risk aspects for the death of fetus even after adjustment.

**Conclusion:** According to these data, immediate survival of foetus (treatment with fetoscopic laser ablation) in TTTS may be affected by age of gestation in the procedure and if there were abnormal Doppler studies.

**Keywords:** Twin to twin transfusion syndrome; Fetoscopic laser ablation; Twin receiver, Twin donors.

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**INTRODUCTION:**

Twin to twin transfusion syndrome (TTTS) is obstacle of about 5 to 15% of monochorionic twin pregnancies with 90% perinatal mortality if not treated [1-3]. Due to increase mortality rate, various management plan have been proposed, such as selective fetocide, amnio-reduction and fetoscopic laser ablation is the only technique that reverses the pathophysiological issue in twin to twin transfusion syndrome [4-5]. In fact, the first line treatment option for stage 2<sup>nd</sup> to 4<sup>th</sup> with TTTS earlier than 26 weeks is fetoscopic laser ablation because of better results [6].

After fetoscopic laser ablation; testified neonatal survival is between 45% and 71%, and many revisions have published prognostic factors related with survival of neonates. Though, up until now there is a lack of evidence about death-related factors or fetal survival immediately after fetoscopic laser ablation, but this is one of the main complications we should consider when deciding emergency fetal death [7-8].

**MATERIALS AND METHODS:**

This retrospective study was held in the Obstetrics and Gynaecology department of Alzahra Pvt Hospital, Sharjah for two year duration from May 2017 till May 2019. In this study 57 consecutive twins pregnant women who were done with fetoscopic laser ablation for the TTTS (twin to twin transfusion syndrome) were selected. Intrauterine fetal death cases were excluded before the start of procedure. The fetus survival up till 48 hours after the procedure is defined as immediate fetal survival. Postoperative ultrasound findings and clinical features were matched according to death or fetal survival rate.

**Ultrasound findings:**

TTTS was detected with polyhydramnios in one twin and other twin have oligohydramnios, monochorionic

twins and these cases were classified rendering to Quintero staging system. In Doppler, abnormal findings are 1) non-appearance of diastolic flow or absence of reverse flow in umbilical artery; or 2) in the umbilical venous Doppler; absence of the pulsatile flow or 3) the non-appearance of the presence of reverse flow or final diastolic flow in the venous canal. Hydrops was demarcated as the fluid accumulation in minimum 2 parts of the body (pleural effusion, subcutaneous edema, acid or pericardial effusion).

**Fetoscopic laser ablation**

From all patients; written informed consent was taken by recommending the risk and benefit of fetoscopic laser ablation. Under ultrasound direction, trocar of 1.3 mm was introduced into the amniotic sac through a small incision of skin. The 8 Fr. curved sheath (curved11540KB Operating Sheath; Tuttlingen, Karl Storz SE, Germany) or straight sheath, 8 Fr (11540KA Operating Sheath, Karl Storz SE; straight) was introduced according to the placenta location. A 11540AA semi-rigid flat mini front telescope was used (0 ° viewing angle, 1.3 mm outlet diameter). After the placental vascular equator along with a systemic fetoscopic evaluation, selective clotting of the anastomosis vessels was done. After the procedure, an induction was performed in the recipient fetus until the volume of amniotic receptor fluid was sufficient before removal of the trocar. SPSS 21.0 software was used for static analysis. P <0.05 was taken significant statistically. Using Fisher's exact test; categorical variables were analysed. By the ethics committee; the study was approved.

**RESULTS:**

The fetoscopic laser ablation was done in 46 total pregnant females with TTTS underwent during the study time. The fetoscopic laser ablation results are given in Table 1.

**Table 1.** Outcomes of 57 cases of TTTS after fetoscopic laser ablation

Outcomes	Value
GA at procedure, wk	20.52 ± 2.42
GA at delivery, wk	29.29 ± 6.49
Interval from procedure to delivery, day	46.53 ± 48.91
<b>Fetal outcome immediate after procedure (within 48 hr)</b>	
Pregnancies with at least one survival	50/57 (87.7)
Pregnancies with two survivals	31/57 (54.4)
Pregnancies with one survival only	19/57 (33.3)
Pregnancies with no survival	7/57 (12.3)
Overall fetal survival immediate after the procedure (114 fetuses)	81/114 (71.1)
<b>Neonatal outcome (28 days after birth)<sup>a</sup></b>	
Pregnancies with at least one survival	32/47 (68.1)
Pregnancies with two survivals	20/47 (42.6)
Pregnancies with one survival only	12/47 (25.5)
Pregnancies with no survival	15/47 (57.4)
Overall neonatal survival after delivery (96 fetuses) <sup>b</sup>	52/96 (54.2)
<b>Neonatal outcome (excluding FDIU after procedure)</b>	
Overall neonatal survival after delivery (81 fetuses)	52/81 (64.2)

Data are presented as mean ± standard deviation or number (%).

TTTS = twin-twin transfusion syndrome, GA = gestational age, FDIU = fetal death in utero.

<sup>a</sup>Among 10 cases, 5 cases are excluded due to follow-up loss, 5 cases are excluded due to on-going pregnancy;

<sup>b</sup>Data for both fetuses are included in 47 cases, data for only one fetus are included in 2 cases.

20.46 weeks was the mean age of gestation at the start of procedure, and immediately after FLA (<48 hours), 67.4% was the total fetal survival: 47.8 was the dual fetal survival rate and 87.0% was single fetal survival rate. At delivery, the 29.63 weeks was the mean gestational age and 57.5% was the total survival rate

of the new born 28 days after delivery. At least one infant neonatal survival was 72.5% and double survival was 42.5%. The findings and clinical characteristics of ultrasound related to death or fetal survival immediately after the procedure given in Table II.

**Table 2.** Clinical characteristics according to the fetal survival immediate after procedure (within 48 hours after operation)

Characteristics	Fetal survival (n = 81)	Fetal death (n = 33)	P value
Maternal age, yr	32.1 ± 3.8	31.1 ± 3.8	0.289
Nulliparity	46 (56.8)	22 (66.7)	0.402
GA at procedure, wk	20.9 ± 2.6	19.5 ± 1.7	0.006
GA at procedure ≤ 21.6 wk	53 (65.4)	31 (93.9)	0.002
Interval from procedure to delivery	49.6 ± 48.2	39.0 ± 50.5	0.723
Stage at procedure			0.466
I	9 (11.1)	3 (9.1)	
II	18 (22.2)	4 (12.1)	
III	39 (48.1)	21 (63.6)	
IV	15 (18.5)	5 (15.2)	
V	0 (0)	0 (0)	
Advanced stage (III or IV)	54 (66.7)	26 (78.8)	0.261
Presence of abnormal Doppler	18 (22.2)	15 (45.5)	0.022
Presence of abnormal UAD	17 (21.0)	14 (42.4)	0.035
Presence of abnormal DV Doppler	3 (3.7)	7 (21.2)	0.006
Hydrops	7 (8.6)	2 (6.1)	1.000
Recipient twin	43 (53.1)	14 (42.4)	0.409
Location of placenta (anterior)	34 (42.0)	16 (48.5)	0.540

Data are presented as mean ± standard deviation or number (%).

GA = gestational age, UAD = umbilical artery Doppler, DV = ductus venosus.

The age of gestation was higher in the fetuses who survived immediately after the method and the abnormal Doppler studies frequency was lower than those who did not endure. The gestational age cut off value for fetal death prediction was derivative from the ROC curves (95% confidence interval [CI], 0.663 area under the ROC curve; 0.561–0.766), and  $\leq 21.6$  weeks age of gestation at the start of procedure was associated significantly with high death of fetus risk. Though, the hydrops incidence was not dissimilar between subjects with fetal death and fetal survival.

The incidence of progressive stage (stage Quintero III or IV) was lower in patients with fetal survival compared with fetal death, but this variation was not statistically significant. In multivariate analysis, the fetal death risk increased immediately later the procedure with anomalous findings on Doppler ultrasound (ratio [OR], 1,137–7,085; 2,838; 95% CI, 0.025 P value) and low age of gestation in the method below than 21.6 weeks; 95% CI, OR, 8,185, 1,790–37,449; 0.007 P) (Table 3).

**Table 3.** Logistic regression for fetal death immediate after procedure

Characteristics	OR	95% CI	P value
GA at operation $\leq 21.6$ wk	8.185	1.789–37.451	0.007
Abnormal Doppler	2.838	1.137–7.085	0.025
Hydrops	0.754	0.136–4.193	0.747

OR = odds ratio, CI = confidence interval, GA = gestational age.

Of the anomalous Doppler findings in 33 fetuses, twins were 4 fetuses and donor twins were 29 fetuses. These fetuses have same survival rate ([16/29]; donor twins 55.2%, [2/4] recipient twins 50% P = 1,000).

**Table 4.** Clinical characteristics per pregnancy according to the fetal survival immediate after procedure (within 48 hours after operation)

Characteristics	At least one fetal survival (n = 50)	Double fetal death (n = 7)	P value
Maternal age, yr	32.1 $\pm$ 3.8	30.1 $\pm$ 3.1	0.265
Nulliparity	29 (58.0)	5 (71.4)	0.689
GA at procedure	20.7 $\pm$ 2.5	19.1 $\pm$ 1.6	0.069
Interval from procedure to delivery	51.8 $\pm$ 49.9	8.6 $\pm$ 17.1	0.158
Stage at procedure			0.526
I	5 (10.0)	1 (14.3)	
II	11 (22.0)	0 (0.0)	
III	25 (50.0)	5 (71.4)	
IV	9 (18.0)	1 (14.3)	
V	0 (0)	0 (0)	
Advanced stage (III or IV)	34 (68.0)	6 (85.7)	0.662
Presence of abnormal Doppler in at least one fetus	27 (54.0)	6 (85.7)	0.220
Location of placenta (anterior)	22 (44.0)	3 (42.9)	1.000

Data are presented as mean  $\pm$  standard deviation or number (%).

GA = gestational age.

The ultrasound findings and clinical characteristics are given in Table 4 between subjects with minimum 1-survival of fetus and those with dual fetal death (apiece pregnancy). Patients with binary death of fetus had early age of gestation and abnormal Doppler findings in minimum 1-fetus. Though, these variations are not statistically significant, possibly due to the lesser quantity of patients.

Table 5 shows the fetal laser ablation complications. The intraoperative haemorrhage was the most important complications which was an important cause of early treatment, affecting fetal survival, preventing subsequent treatment of fetuses and risking premature rupture of membranes.

**Table 5. Complications after the procedure**

Complications	No. (%)
Intraoperative bleeding at placental surface	10.5 (6/57)
Cerclage after procedure	8.8 (5/57)
Preterm labor with cervical change	15.8 (9/57)
Preterm uterine contraction	36.8 (21/57)
PPROM	17.5 (10/57)
Immediate PPRM	5.3 (3/57)
Remote PPRM	12.3 (7/57)
Iatrogenic monoamnioticity	3.5 (2/57)

PPROM = preterm premature rupture of membranes.

### DISCUSSION:

Main findings of this study:

1) Post-operative emergency fetal survival was 67.4% (62/92) after laser fetoscopic ablation, and at 28 days; overall neonatal survival rate postpartum was 57.5%. ;  
 2) surviving foetuses immediately after the procedure, the gestational age was higher in the technique and the anomalous Doppler studies frequency was lower than those who did not survive.  
 3) The hydrops frequency was not dissimilar between patients with fetal death and fetal survival. In Korea's first study the literature of cases of TTTS managed with laser fetoscopic ablation. Immediately after the procedure, 87% was the fetal survival rate and 73% was the neonatal survival rate are similar to other trainings in some other regions (7% - 87% of minimum 1 fetal survival rate and minimum 1 neonatal survival ratio) 58-86%. Rendering to earlier accounts, after fetoscopic laser ablation neonatal survival may be pretentious by various influences such as the presence of hydrops or anomalous Doppler Ultrasound findings, the incidence of related anomalies, the technical ability of the operator, and the placenta location. These predictive influences can be used to recommend the outcome of FLA [9-10]. However, there are various aspects to consider in these results the interpretations. First, neonatal death cannot be associated only with fetal growth restriction because many factors for twin anaemia such as preterm labour, PPRM, fetal growth restriction, and even postoperative obstacles such as polycythemia or recurrent TTTS sequence [11-12] Second, the high risk of fetal death patient's identification immediately after FLA is another clinically significant issue because these cases may be candidates for other TTTS management modalities [13]. Though, to our information, there is little evidence about predictive factors related with IUD immediately after FLA, although this is another important point in clinical practice [14]. Though, this

study results does not offer new guidelines for defining the method, predictive influences disturbing survival ratio instantly after the technique may be used in counselling of patients on post-procedure prognosis [15].

### CONCLUSION:

It is concluded that after TTTS fetal survival may be affected by anomalous Doppler studies and gestational age.

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