



“TWIN-TO-TWIN TRANSFUSION SYNDROME.”

Radio-diagnosis.

Dr. Nilesh Gupta*	Assistant Professor, PTJN Medical college and BRAM Hospital, Raipur, Chhattisgarh, India. *Corresponding Author
Dr Satya Bhuvan Singh Netam	Professor and Head of Department, PTJN Medical college and BRAM Hospital, Raipur, Chhattisgarh, India.
Dr. Vishal Jain	Assistant Professor, PTJN Medical college and BRAM Hospital, Raipur, Chhattisgarh, India.
Dr Ashutosh Gupta	Radiology Resident, PTJN Medical college and BRAM Hospital, Raipur, Chhattisgarh, India.

KEYWORDS

transfusion, twin, ultrasound, chorion, amnion

INTRODUCTION:

Twin-to-twin transfusion syndrome (TTTS) occurs in either monochorionic monoamniotic or monochorionic diamniotic twins and is due to arteriovenous anastomosis in the common placenta. Abnormal blood vessel connections form in the placenta and allow blood to flow unevenly between the babies. One twin – called the donor – becomes dehydrated; and the other – called the recipient – develops high blood pressure and produces too much urine and over fills the amniotic sac. The donor twin appears small and the recipient twin is large, and at risk for high-output cardiac failure. The mortality rate is 40-90%, with both twins at risk.

Ultrasonography remains the main modality for diagnosis of twin-to-twin transfusion syndrome (TTTS).

Ultrasound diagnosis:

There is imbalance in the net flow of blood across the placental vascular communications from one fetus, the donor, to the other, the recipient.

11-14 weeks: early TTTS is suspected if there is discordance in size of the amniotic fluid sacs, $\geq 20\%$ discordance in fetal nuchal translucency (NT) thickness, or absent / reversed end diastolic flow (EDF) in the ductus venosus usually in the fetus with higher NT.

≥ 15 weeks: oligohydramnios (deepest vertical pool of ≤ 2 cm) in the sac of the oliguric or anuric donor fetus and polyhydramnios (≥ 6 cm at 15-17 weeks, ≥ 8 cm at 18-20 weeks and > 10 cm at ≥ 20 weeks) in the sac of the polyuric recipient.

The condition is subdivided into 5 stages, by Quintero et al (4), according to the clinical and Doppler finding of EDF in the umbilical artery and ductus venosus of both fetuses:

Stage 1: donor bladder visible, EDF positive in both vessels in both fetuses.

Stage 2: donor bladder not visible, EDF positive in both vessels in both fetuses.

Stage 3: EDF absent or reversed in either vessel in either fetus.

Stage 4: presence of ascites or hydrops in either fetus; usually the recipient.

Stage V - The demise of 1 or both twins has occurred.

This staging has a role in the detection and diagnosis, leading to prompt treatment and improved prognosis.

The middle cerebral artery, umbilical artery, ductus venosus in both fetuses are assessed with Doppler sonography, abnormal Doppler studies are defined as absent or reversed end-diastolic velocity in the umbilical artery, reversed flow in the ductus venosus, or pulsatile flow in the umbilical vein.

Associated abnormalities:

- The incidence of chromosomal abnormalities or genetic syndromes is not increased.

Investigations:

- Detailed ultrasound examination.
- Ultrasound scans every 1 week to monitor growth, amniotic fluid volume and pulsatility index in the umbilical artery, middle cerebral artery and ductus venosus of both fetuses.

Management:

Therapeutic **amnio-reduction** can stop twin-to-twin transfusion and is therefore usually an effective treatment. Although amnioreduction is the most commonly used procedure for this condition, it is still unclear whether amnioreduction can change intrauterine circulation in TTTS. In cases requiring repeated amnio reductions and showing a persistence of the clinical syndrome, changes suggesting fetal hemodynamic improvement after **laser coagulation** are unlikely to be observed. (2)

Most fetal interventions are currently ultrasonographically guided. Monochorionic (MC) twin gestations are high-risk pregnancies, largely due to the vascular anatomy of the shared placenta and to the presence of vascular connections.

Discordance in amniotic fluid (but not sufficient to fulfill the oligohydramnios / polyhydramnios sequence) with normal fetal Doppler:

- Overall survival: 95%.
- Progression to TTTS: 15%.
- Ultrasound scans every 1-2 weeks to monitor evolution.

Stage 1:

- Survival: overall 85%, at least one twin 90%.
- Progression to stages 2 to 4: 20%.
- Ultrasound scans every 1 week to monitor evolution.
- Endoscopic laser ablation of communicating placental vessels if progression to stages 2-4 or increasing polyhydramnios and shortening of cervical length.

Stages 2-4:

- **<28 weeks:** the best management is endoscopic laser ablation of communicating placental vessels; all communicating vessels should be ablated and the area between them should also be coagulated to achieve dichorionization of the placenta.
- **≥ 28 weeks:** the best option is to deliver by cesarean section and the timing would depend on the Doppler findings in the umbilical artery and ductus venosus of both fetuses.
- Stage 2: survival overall 75%, at least one twin 85%.
- Stages 3 and 4: survival overall 60-70%, at least one twin 75-85%.
- Neurodevelopmental impairment in survivors: 5-10%.
- **Follow-up after laser therapy:** ultrasound scans and Doppler every 1 week until resolution of the signs of TTTS and

normalization of Doppler findings and every 2 weeks thereafter with special attention for signs of brain damage, recurrence of TTTS and development of TAPS.

- Normalization of amniotic fluid volume occurs after 1 week.
- Resolution of cardiac dysfunction in the recipient and of hydrops in stage 4 TTTS usually occurs after 3-4 weeks.
- In about 1 in 1,000 cases there may be limb amputation due to thrombotic events or amniotic bands.

Delivery:

- Vaginally at 37 weeks if there is normal growth and Dopplers in both babies.

Recurrence: No increased risk of recurrence

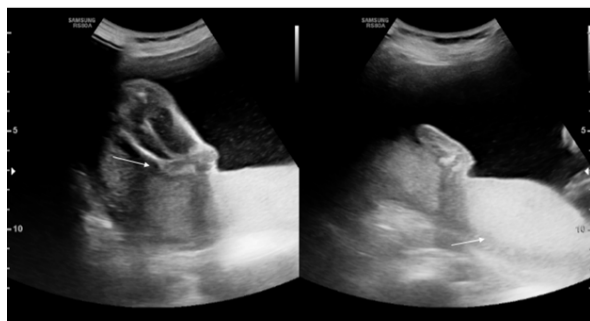
Differential diagnosis:

IUGR of one twin. To distinguish this from the twin-twin transfusion syndrome the recipient twin does not usually have polyhydramnios or congestive cardiac failure. IUGR may occur in dichorionic pregnancies whereas the twin-twin transfusion syndrome only occurs in monochorionic pregnancies.

Outcome:

Perinatal mortality of 71% (when diagnosed prior to 26 weeks).

FIGURES:



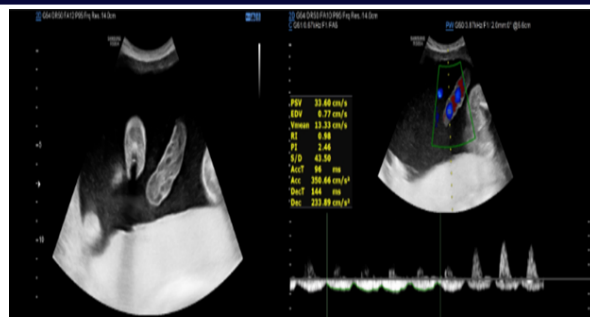
Twin-twin transfusion syndrome. *Stuck twin*: The donor twin appears stuck to the uterine wall (limbs and body), however the membrane is not appreciable.



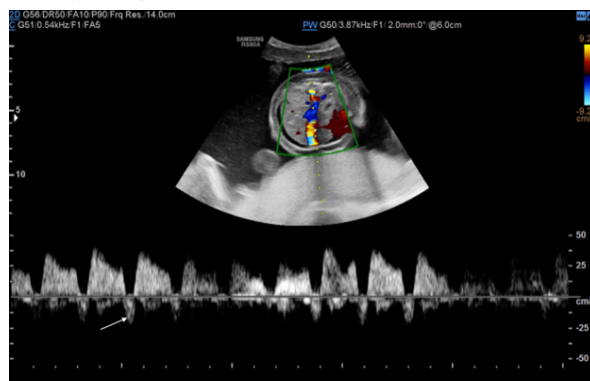
The recipient twin showing gross ascites secondary to transfusion overload.



Cardiomegaly noted in recipient fetus with gross pericardial effusion



Ultrasound image showing edematous cord of recipient twin with pulsatile flow noted in umbilical vein in Doppler findings



Reversal of (a) wave in ductus venosus Doppler (arrow) noted in recipient fetus indicating volume overload due to shunting seen in Twin-Twin transfusion.



Twin-Twin transfusion syndrome- image showing twins sharing a common placenta

REFERENCES:

1. <https://fetalmedicine.org/education/fetal-abnormalities/multiple-pregnancies/mc-twins-twin-to-twin-transfusion-syndrome>
2. Transient hydrops fetalis of the donor fetus in twin – twin transfusion syndrome after therapeutic amnioreduction. M. Morine, k. Maeda, k. Higashino, n. Miura, t. Kinoshita, s. Endo and m. Irahara Ultrasound Obstet Gynecol 2003;22 182 – 185
3. <http://www.fetalultrasound.com/online/text/4-015.HTM>
4. <http://journals.sagepub.com/doi/pdf/10.1177/8756479311402831>