

## Case Series

# Double trouble: A case series exploring the complications of twin pregnancy

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## ABSTRACT

Monochorionic twin pregnancies are associated with unique and serious complications due to shared placental circulation, including twin-to-twin transfusion syndrome (TTTS), twin anemia-polycythemia sequence (TAPS), and twin reversed arterial perfusion (TRAP) sequence. This case series presents four monochorionic diamniotic pregnancies complicated by TAPS, TTTS (Quintero stages I and IV), and TRAP. Diagnostic features such as intertwin discrepancies in middle cerebral artery peak systolic velocity, amniotic fluid discordance, and Doppler studies were critical in identifying these conditions. Management strategies included conservative monitoring, radiofrequency ablation, and, in one case, termination due to poor prognosis. Outcomes varied, highlighting the unpredictable nature of these conditions despite timely intervention. This study underscores the importance of early chorionicity determination, regular ultrasound monitoring, and individualized multidisciplinary care in optimizing outcomes for monochorionic twin pregnancies.

**Keywords:** Twin anemia polycythemia sequence, Twin pregnancy, Twin reversed arterial perfusion, Twin-to-twin transfusion syndrome

## INTRODUCTION

Twin pregnancies present unique challenges due to the shared environment of the fetuses, with complications varying based on the type of twin gestation and placental structure. Monochorionic twin pregnancies, where both twins share a single placenta, are particularly at risk for serious complications, such as twin-to-twin transfusion syndrome (TTTS), twin anemia-polycythemia sequence (TAPS), and twin reversed arterial perfusion (TRAP) sequence. These conditions require meticulous monitoring and management to improve perinatal outcomes.<sup>[1]</sup>

TAPS, which is a milder form of TTTS, occurs when one twin becomes anemic (the donor) and the other polycythemic (the recipient) due to imbalanced blood flow between the twins. This complication can be diagnosed by measuring the middle cerebral artery peak systolic velocity (MCA-PSV) through ultrasound. However, there is no universal standard for its diagnosis or monitoring, creating variations in clinical practice. The ISUOG guidelines recommend bi-weekly monitoring of MCA-PSV for high-risk pregnancies, especially after laser surgery for TTTS, but the exact diagnostic criteria for TAPS are still debated.<sup>[2]</sup>

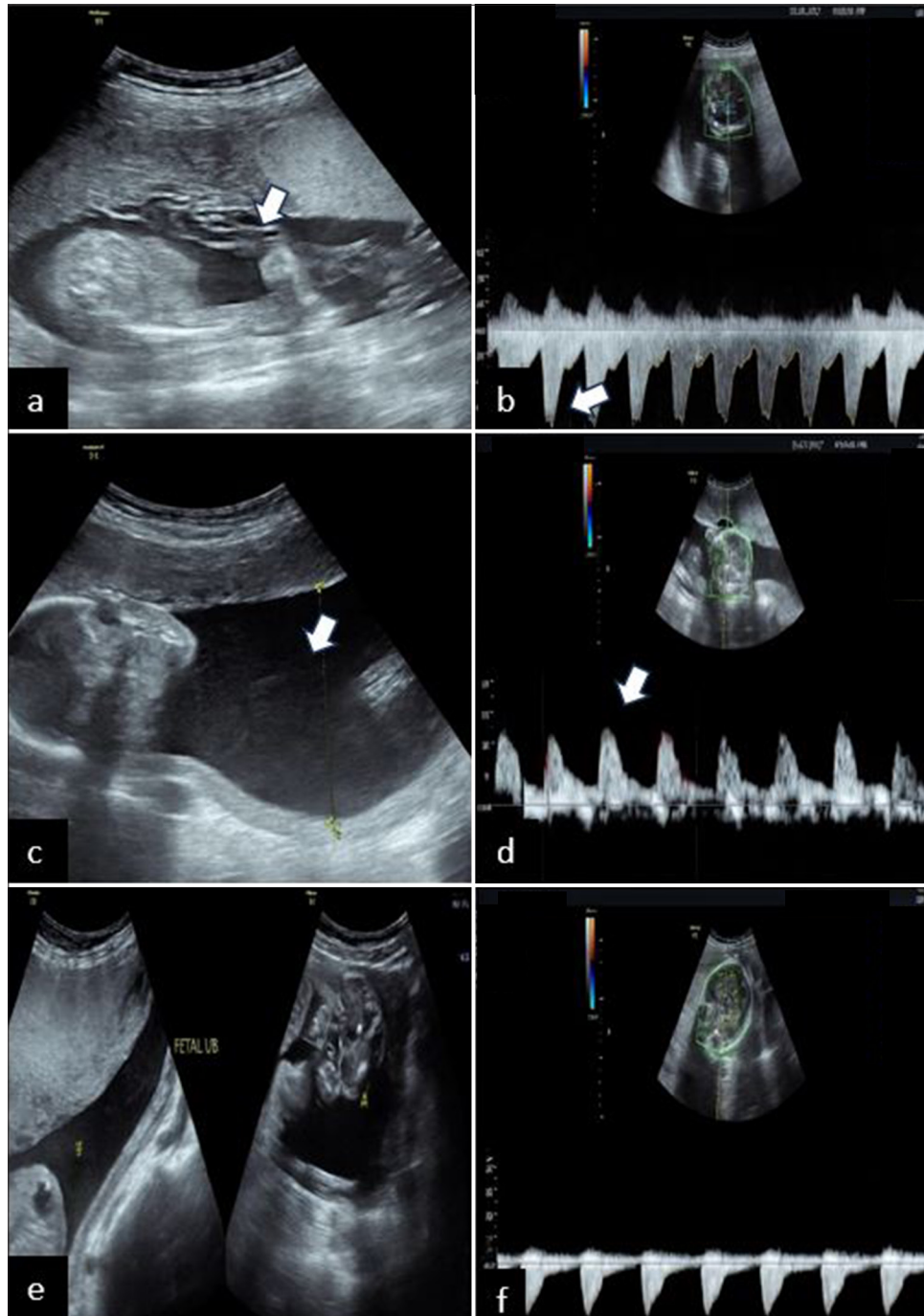
Another serious complication, TTTS, occurs in monochorionic diamniotic (MCDA) pregnancies when abnormal blood flow causes one twin to receive too much blood and the other too little,

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often requiring early intervention like fetoscopic laser surgery. Despite these treatments, the risk of fetal demise and neurological issues remains significant, underlining the importance of early detection and timely delivery.

A rare yet critical issue in monochorionic pregnancies is the TRAP sequence, in which one twin (the acardiac twin) fails to develop a heart and upper body structures due to abnormal blood flow from the healthy twin. The prognosis for the acardiac

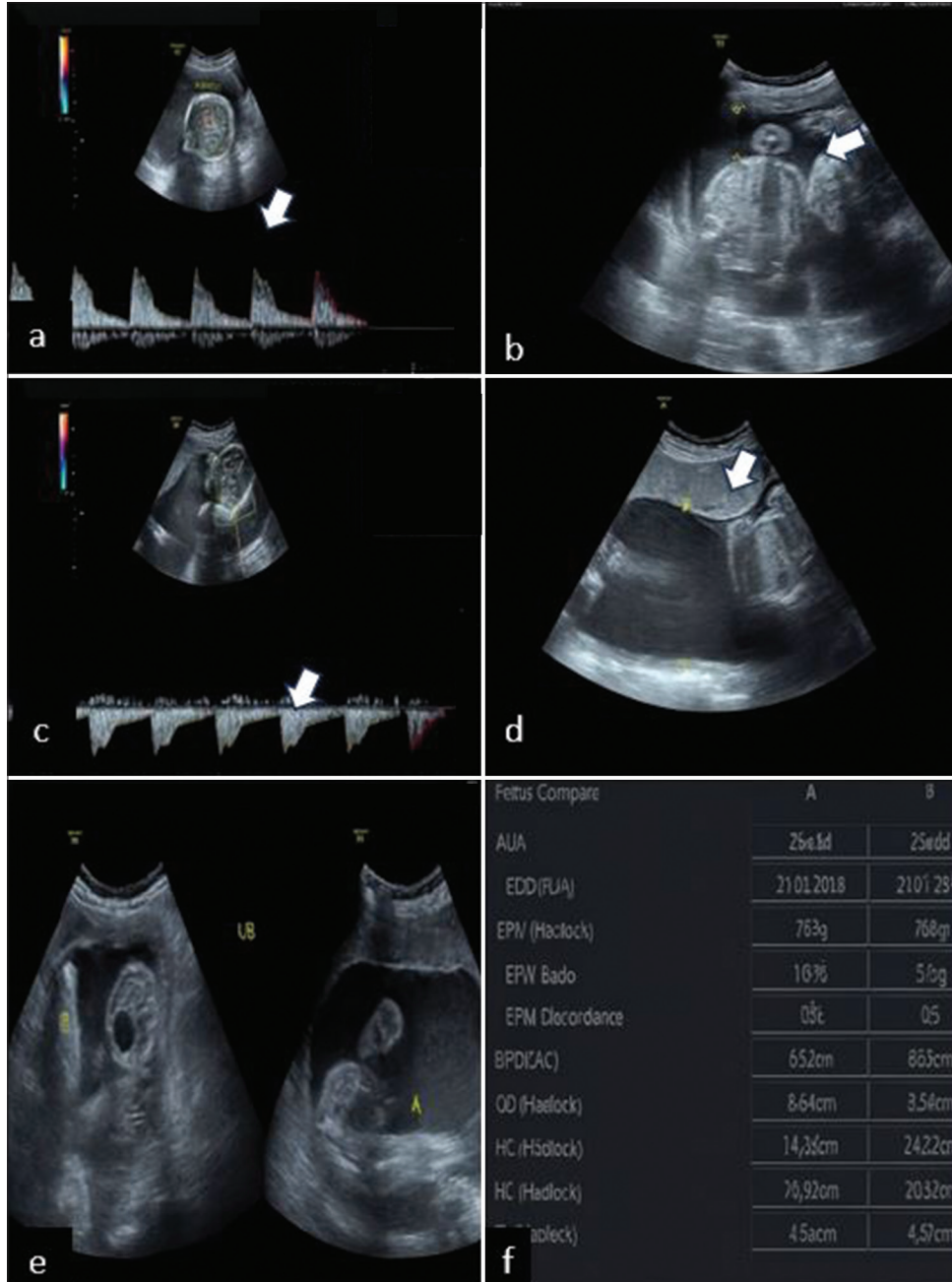


**Figure 1:** (a and b) Reduced amniotic fluid around fetus A with elevated middle cerebral artery (MCA) peak systolic velocity (PSV). (c and d) Increased amniotic fluid around fetus B with reduced MCA PSV. (e) Ultrasound images at the pelvic level of both fetuses reveal partially distended urinary bladders. These findings are suggestive of twin anemia-polycythemia sequence. (f) Post-radiofrequency ablation follow-up Doppler scan at 28 weeks of gestation demonstrates normal MCA PSV in fetus B (arrows).

twin is always poor, and early diagnosis through ultrasound is crucial for giving the healthy twin a chance of survival.<sup>[3]</sup>

In this article, we explore the complexities of twin pregnancies, focusing on their complications, diagnostic

challenges, and the evolving practices in imaging and intervention. Understanding these issues is crucial for optimizing care and outcomes for both mothers and babies.



**Figure 2:** (a and b) Middle cerebral artery (MCA) Doppler and ultrasound images reveal normal Doppler parameters and reduced amniotic fluid around fetus A. (c and d) MCA Doppler and ultrasound images demonstrate normal Doppler parameters and increased amniotic fluid around fetus B. (e) Ultrasound images at the pelvic level show distended urinary bladders in both fetuses. (f) A comparative table of biometric values between the two fetuses indicates no significant weight discordance. These findings are suggestive of twin-to-twin transfusion syndrome stage I (arrows).

## CASE SERIES

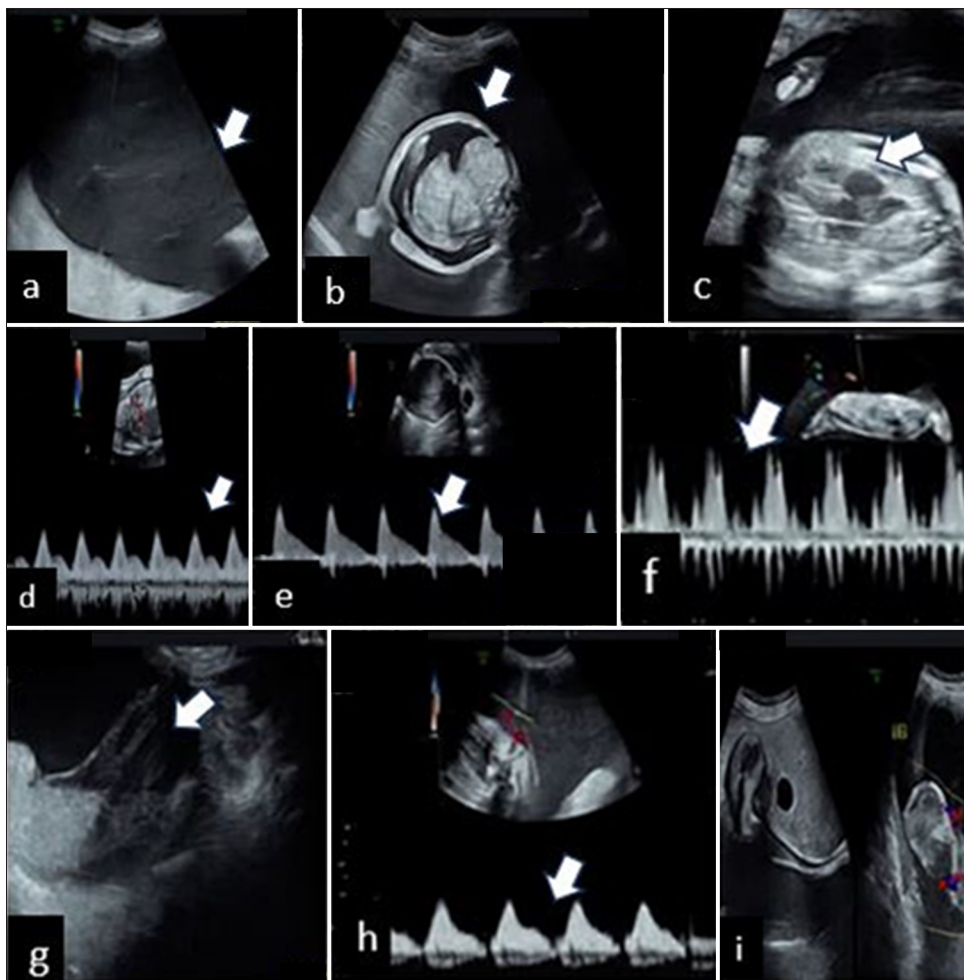
### Case 1

A 28-year-old Gravida4 Para1 Live1 Abortion2 (G4P1L1A2) woman with a twin pregnancy was followed up with an ultrasound at 22 weeks. Fetus A showed severe oligohydramnios (Single Vertical pocket [SVP] <1.5 cm) and an MCA-PSV of 54 cm/s (1.9 Multiple of the median [MoM]), with an estimated fetal weight (EFW) of 375 ± 55 g. Fetus B had mild polyhydramnios (SVP 8.5 cm), an MCA-PSV of 12 cm/s (0.5 MoM), and an EFW of 514 ± 75 g. There was a 27% weight discordance and a significant MCA-PSV difference between the twins. A single anterior placenta

showed variable echogenicity. Bladders were visible in both fetuses, and umbilical artery Dopplers were normal. The above findings were suggestive of TAPS. The patient underwent radiofrequency ablation (RFA) of fetus A at 26 weeks. Post-procedure scans showed normalized MCA-PSV in fetus B. The pregnancy was managed conservatively, and an elective vaginal delivery was conducted at 34 weeks [Figure 1].

### Case 2

A 29-year-old primigravida with a known MCDA twin pregnancy was followed up with an ultrasound at 25 weeks. Fetus A had oligohydramnios (SVP 2 cm), MCA-PSV of 43 cm/s, and an EFW of 760 ± 11 g. Fetus B had polyhydramnios

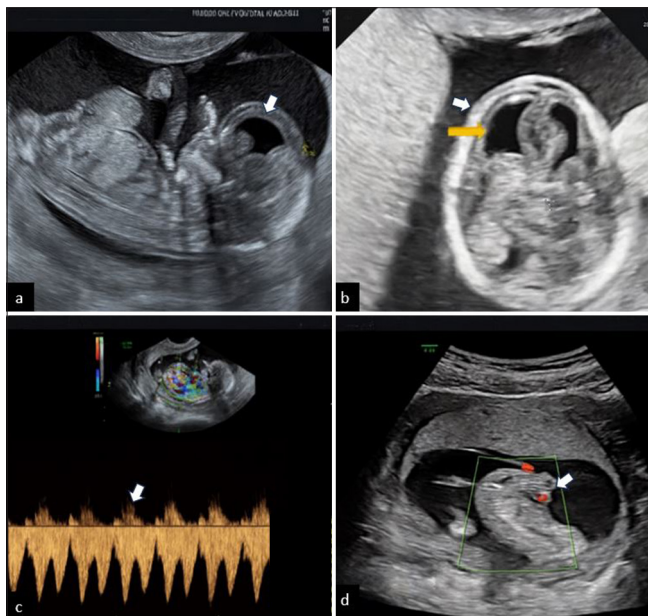


**Figure 3:** (a) Ultrasound image reveals increased amniotic fluid around fetus A. (b) Presence of ascites in fetus A. (c) Evidence of cardiomegaly in fetus A. (d) Ductus venosus doppler shows a reversed “a” wave in fetus A. (e) Normal middle cerebral artery doppler parameters in fetus A. (f) Tricuspid regurgitation observed in fetus A. (g) Ultrasound image indicates reduced amniotic fluid around fetus B. (h) Absent enddiastolic flow in the umbilical artery of fetus B. (i) Ultrasound images at the pelvic level show a normally distended bladder in fetus A and an empty bladder in fetus B. These findings are suggestive of twin-to-twin transfusion syndrome stage IV, with fetus A as the recipient and fetus B as the donor (arrows).

(SVP 10.2 cm), MCA-PSV of 34 cm/s, and an EFW of 783 ± 114 g. Both fetuses had visible bladders and normal Doppler studies. Findings were suggestive of TTTS, Quintero stage I. Serial scans at 28 and 29 weeks showed no progression. The pregnancy was managed conservatively and resulted in an elective vaginal delivery at 36 weeks [Figure 2].

### Case 3

A 21-year-old primigravida with an MCDA twin pregnancy was referred at 27 weeks for suspected selective intrauterine growth restriction (IUGR). Ultrasound revealed Fetus A with polyhydramnios (SVP 17.5 cm), MCA-PSV of 47 cm/s, an enlarged and persistently full bladder, cardiomegaly, tricuspid regurgitation, reversed “a” wave in ductus venosus, subcutaneous edema, and ascites – findings consistent with hydrops. Fetus B had oligohydramnios (SVP 3 cm), MCA-PSV of 33 cm/s, and absent end-diastolic flow with intermittent reversal in the umbilical artery, but no signs of hydrops or cardiomegaly. These findings were consistent with TTTS, Quintero stage IV, with Fetus A as the recipient. The patient was counseled, and RFA of the recipient twin was performed at 29 weeks. Despite close monitoring and preterm delivery at 30 weeks, both fetuses died postnatally [Figure 3].



**Figure 4:** (a) Ultrasound image of the fetus displaying a crown-rump length with gestational age. (b) Ultrasound image at the level of the cranium of fetus A, revealing hydrocephalus. (c) Ultrasound image demonstrating normal ductus venosus Doppler parameters for fetus A. (d) Ultrasound image of fetus B, indicating the absence of a functional heart, with a poorly formed cranium and upper limbs. These findings are suggestive of twin reversed arterial perfusion sequence, with fetus A as the pump twin and fetus B as the acardiac twin (arrows).

### Case 4

A 29-year-old G2P1L1 woman with an MCDA twin pregnancy underwent a nuchal translucency scan at 12 weeks. A single large anterior placenta was noted. Fetus A (the pump twin) had polyhydramnios and a normal CRL but showed interhemispheric fluid collection (4 × 4 mm) with evolving hydrocephalus. Fetus B appeared edematous and deformed, with poorly developed craniofacial structures, minimal ascites, pleural effusion, and no cardiac activity. Caudal structures were better formed. Doppler revealed sluggish arterial flow toward Fetus B at the cord insertion. No amniotic fluid was seen in the sac, and the intertwin membrane was closely apposed to the fetus and cord structures. Findings were suggestive of the TRAP sequence. Due to the evolving hydrocephalus and interhemispheric cyst in the pump twin, the patient was counseled, and termination was advised [Figure 4].

## DISCUSSION

Twin pregnancies, particularly those with monochorionic placentation, carry a significantly higher risk of maternal and fetal complications compared to singletons. Shared vascular architecture and limited intrauterine space contribute to unique pathologies requiring early identification and specialized care. Chorionicity and amnionicity are critical in determining prognosis. Dichorionic diamniotic twins generally have favorable outcomes, while monochorionic monoamniotic twins face the highest perinatal mortality due to risks like cord entanglement, TTTS, and congenital anomalies. Early ultrasound is essential for determining chorionicity and guiding surveillance.<sup>[1,3]</sup>

TTTS, unique to MCDA pregnancies, results from unbalanced arteriovenous anastomoses. It is characterized by the polyhydramnios-oligohydramnios sequence and staged (Quintero I–V) to guide management. Fetoscopic laser ablation is standard in advanced cases, while conservative management may suffice in stable early stages.

TAPS is a subtler imbalance diagnosed through Doppler ultrasound, using intertwin differences in MCA-PSV. While criteria vary, MCA-PSV discordance is considered a sensitive indicator. Management ranges from monitoring to interventions like intrauterine transfusion or RFA, depending on severity and gestational age.<sup>[4]</sup>

TRAP sequence is a rare, severe complication where an acardiac twin is perfused by a normal “pump” twin, risking heart failure and fetal demise. Early diagnosis and intervention, often through RFA, are critical to reduce risk to the pump twin.<sup>[3,5]</sup>

Congenital anomalies and cardiac defects are more frequent in twins, particularly in monochorionic gestations and those

complicated by TTTS or TRAP. Serial ultrasounds and fetal echocardiography are essential, and fetal magnetic resonance imaging may be used to assess neurological injury post-intervention.

This case series highlights the diverse presentations and outcomes of twin complications. While interventions like RFA and conservative monitoring can be effective, some cases still result in poor outcomes, underscoring the need for multidisciplinary care and individualized management.

## CONCLUSION

Monochorionic twin pregnancies carry a high risk of complications due to shared placental circulation. This case series highlights the varied presentations of TTTS, TAPS, and TRAP, emphasizing the importance of early diagnosis, regular Doppler surveillance, and individualized management. While interventions such as RFA and conservative monitoring can be effective, outcomes remain variable, especially in advanced stages. Early determination of chorionicity and multidisciplinary care are essential to improving perinatal outcomes in these high-risk pregnancies.

## TEACHING POINTS

1. Early determination of chorionicity and amnionity in twin pregnancies is crucial for predicting complications such as TTTS, TAPS, and TRAP and for planning appropriate surveillance and interventions.
2. Regular Doppler ultrasound monitoring, especially of MCA-PSV, is vital for the early detection of intertwin hemodynamic imbalances and timely management to optimize perinatal outcomes.

## MCQs

1. Which Doppler parameter is most useful in diagnosing TAPS?
  - a) Umbilical artery S/D ratio
  - b) MCA-PSV
  - c) Ductus venosus flow
  - d) Umbilical vein pulsations

Answer Key: b

Explanation: TAPS is diagnosed based on significant intertwin discordance in MCA-PSV values, indicating anemia in one twin and polycythemia in the other.

2. The Quintero staging system is used to classify the severity of which twin pregnancy complication?
  - a) TRAP sequence
  - b) TTTS
  - c) TAPS

- d) Selective IUGR

Answer Key: b

Explanation: The Quintero staging system (Stages I–V) is used to classify TTTS based on sonographic and Doppler findings, helping guide clinical management.

3. In the TRAP sequence, the following statement is TRUE
  - a) The acardiac twin supplies blood to the pump twin.
  - b) Both twins have normal cardiac function.
  - c) The pump twin is at risk of high-output cardiac failure.
  - d) The acardiac twin usually survives after delivery.

Answer Key: c

Explanation: In the TRAP sequence, the acardiac twin receives reversed arterial perfusion from the pump twin, increasing the workload on the pump twin's heart and predisposing to heart failure.

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