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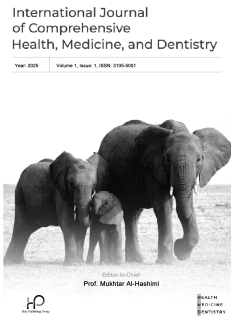

Original Article

Twin Reversed Arterial Perfusion (TRAP). Meet the Acardiac: Case Report.

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Abstract

Twin pregnancy carries many types of specific complications including Twin Reversed Arterial Perfusion (TRAP).

TRAP is a rare condition which when you see it once you will remember it forever.

Our case was detected early in pregnancy, which gave us the opportunity for family counselling and offering the appropriate method of management. As some cases of TRAP could be diagnosed late because of wrong diagnosis (e.g. vanishing twin: one fetal demise), early diagnosis and management could help to avoid late complications.

In the article, we start with a detailed general information taken from different articles and publications, then we will present a clinical case of TRAP including the ultrasound findings, follow- up, and management method.

Keywords: Twin Reversed Arterial Perfusion, TRAP, Acardiac Twin, Monochorionic pregnancies, Ductus Venosus Doppler, Anastomoses, Laser Ablation.

Introduction

TRAP or acardiac twin is a rare anomaly only seen in monochorionic twin, where one twin called “the pump twin” pumps the blood to the other twin, which usually will be without a cardiac system. [1,3]. The incidence is 1-2 % of monochorionic twins, and 6/ 100000 of all pregnancies [2].

Pathophysiology

The earliest description have been traced back to the 18th century number of cases of TRAP, and they described an abnormal amorphous twin, and they attributed this to abnormal vascular connection between the two foetuses [7 . A case report and a brief literature review. Radiol Case Rep. 2022 May].

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Benirschke (1977) suggested that the pathology of acardiac twins is not caused by genetic disorders, but it appears to be related to the vascular anastomoses in the placenta. Langlotz et al. (1991) assumed that cardiac morphogenesis or atrophy may be due to reversed arterial blood flow and hemodynamic pathophysiology [9]. Benirschke (2009) mentioned that the unequal splitting process in monozygotic twin may explain the embryological reason for acardiac twin and twin to twin transfusion syndrome. Sullivan et al. (2003) suggested that the high perinatal mortality rate in acardiac twinning is because of the increased demand placed on the normal twin to perfuse the acardiac twin [8. Sullivan AE, Varner MW, Ball RH, Jackson M, Silver RM, 2003]

Ultrasound Diagnosis

- A monochorionic twins with one normal fetus called the “pump twin “and another without heart components or activity called “recipient twin” with variable degrees of deficient development of the head and upper limbs [2,4]
- Colour Doppler in the “recipient twin “demonstrates reversed (opposite direction) pulsatile flow from an umbilical arterio-arterial anastomosis and venous return to the pump twin via a veno-venous anastomosis.
- The size of the acardiac mass is prognostic value for the survival of the pump twin (worse prognosis if acardiac weight is > 70 % of the normal fetus) [10. Sepulveda W.H., Quiroz V.H., Guilano A., Henriquez R, 1993]
- About 50% of pump twins (the healthy) die before or soon after birth from congestive heart failure (change in hemodynamic status).

Types of TRAP

It is widely classified into four subgroups morphologically. [4,5,6]

- Acardiac acephalic: the fetus has developed pelvis and lower extremities. Head, arms and thoracic organs are absent. This is the most common type with a frequency of 60 - 75%.
- Acardiac anceps: body and extremities have developed. Head and face are partially formed. This type consists approximately 20% of all cases.
- Acardiac acormus: only the head of the fetus has developed. It is quite rare and consists approximately 10% of all cases.
- Acardiac amorphous: the fetus has no identifiable organs. It is as an amorphous tissue mass and it consists approximately 5% of all cases.

Management, Follow-up, and Prognosis [2,6]

- Prenatal treatment is by occlusion of the blood vessels of the acardiac twin. Different methods have been used, including ablation of umbilical cord vessels by laser or diathermy (bipolar), coagulation of placental anastomoses by laser. When these methods are used at early second trimester around 16-18 weeks’ gestation the survival rate of the normal “pump “twin is high around 80- 85%. [2]
- Some ‘authers’ recommends an early intervention at 12-14 weeks to get more benefits for the normal fetus.

- Delay in intervention between the diagnosis of TRAP sequence at 11-13 weeks' gestation until 16-18 weeks is associated with spontaneous cessation of flow in the acardiac twin in 60% of cases and avoids the possible intervention complications. [2]
- After intrauterine intervention we recommend to follow the patient within 1 week to confirm that the pump twin is alive and there is a cessation of flow in the acardiac twin.
- Without intrauterine intervention it is recommend to repeat the scan every 2-3 weeks to monitor growth of the acardiac twin, heart function of the pump twin and amniotic fluid volume. [2]
- Prognosis depends on method of management if there is an intervention or without intervention, and gestational age at birth (we may need to deliver preterm to protect the healthy fetus).
- Standard obstetric care and delivery (caesarean section only for obstetric reasons).

The Clinical Case Presentation

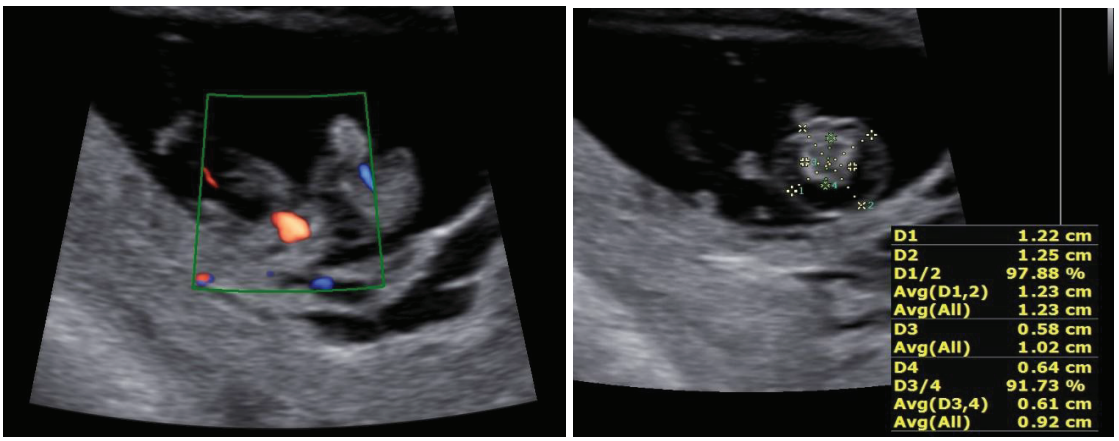
Our patient is a 30-year-old lady. She has two previous pregnancies, one vaginal delivery, and one miscarriage. This pregnancy is spontaneous.

She has Crohn Disease (quiescent), and was diagnosed with gestational diabetes in the last pregnancy, without any previous surgeries.

According to her history she received Dedroxyprogesteron injection for early vaginal bleeding.

She was seen in Fetal Medicine clinic for the first time while she was 12 weeks, 2 days with current medication of Folic Acid.

During the scan in our facility, we found: Two gestational sacs were noticed, one contains a fetus with CRL compatible with 10 weeks, 5 days, and the second contains only a mass with minimal perfusion. Acardiac Twin was suspected and the patient was given an appointment after 10 days for first trimester scan and EDD was corrected (Figure 1 and 2).



A B

Figure 1: Ultrasound image of 10 weeks, 5 days gestation. (A) transverse section of the mass (Acardiac). (B) left is a normal fetus with normal antegrade flow " redish colour", right is acardiac fetus with reversed flow "bluish colour".

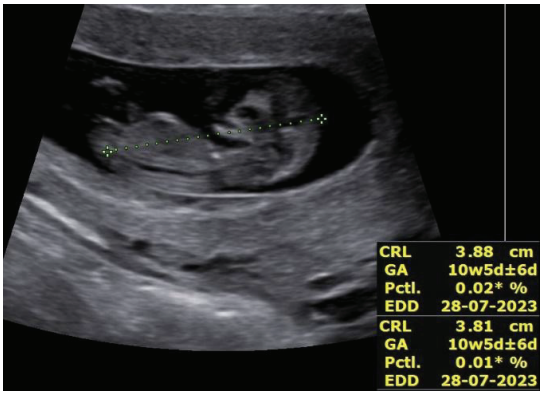


Figure 2: midsagittal view of the normal twin. CRL= 10 weeks+ 5 days.

Patient was seen again after 2 weeks and ultrasound showed: A monochorionic- diamniotic twin, the first twin scan was normal (including NT, NB, and all other markers) (Figure 3), only a reversed A-wave in ductus venosus doppler was noticed (Figure 4).

The second sac includes acardiac twin: upper body parts above the diaphragm were not formed, there is no cardiac structure, both lower limbs were seen, passive (reversed) vascular perfusion through the umbilical cord (Figure 5).

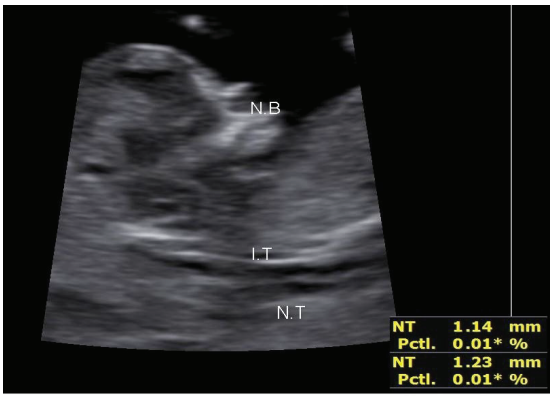


Figure 3: ultrasound at 12 weeks of mid-sagittal view of the pump twin showing nasal bone (NB), intracranial lucency (IT), and nuchal translucency (NT).

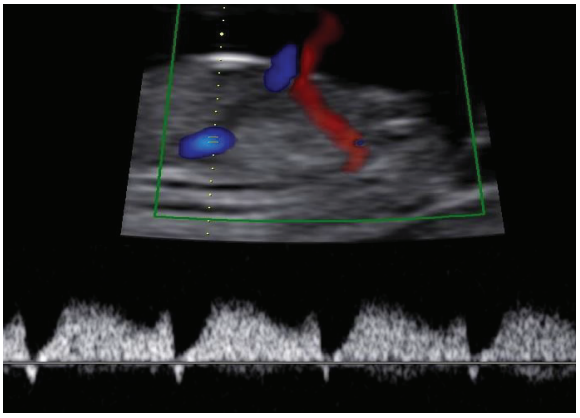


Figure 4: Reversed A-wave of Ductus Venosus at 12 weeks gestation in the pump twin.

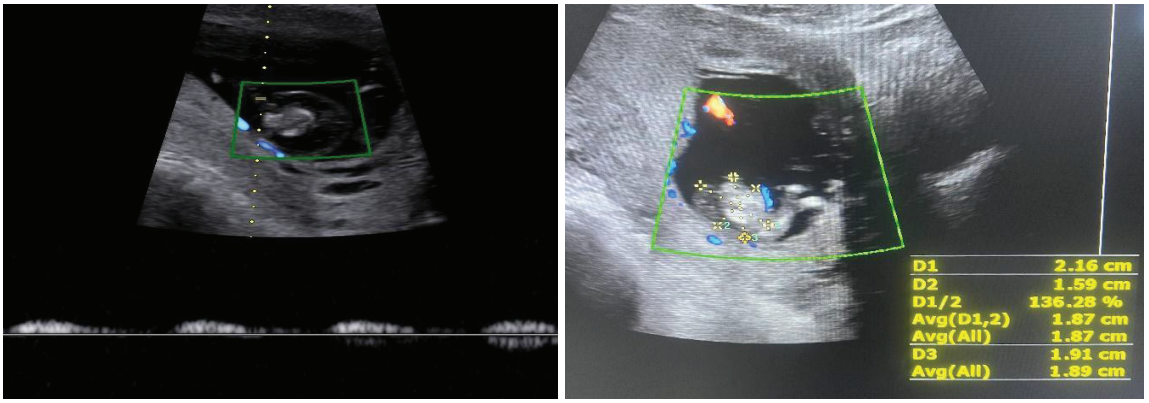


Figure 5: Reversed flow (blue colour in doppler) in the acardiac twin. Note the lower limbs on the left image.

We explained the findings to the family including all possible complication and the management option between only observation or fetal intervention by occluding the acardiac twin vessles. We suggest an amniocentesis (during the intervention) to rule out any undiscovered genetic disorders.

Patient chose to go for umbilical cord occlusion of the acardiac twin which was done in another country at 16 weeks. Some limited vaginal leaks from the breach in the amniotic cavity was noticed after one day, managed conservatively by antibiotics.

Patient was seen again at 18 weeks for morphology ultrasound which was totally normal for the pump twin, and no circulation or vascularity were noticed in the acardiac.

Routine uneventful antenatal visits until the patient delivered vaginally at 36 weeks of a healthy baby.

Discussion

Although, we work in an IVF facility, and we scan many cases of Twin, this was the first case of TRAP recorded in our facility. We were lucky in the fetal medicine clinic to scan the patient as early as 10 weeks, because it was easy to make a wrong diagnosis of early fetal demise (vanishing Twin) and the case could be neglected. The diagnosis of TRAP sequence requires adequate knowledge of pathology and the sonographic interpretation of the condition. The fetal medicine specialist and/or sonographer must be diligent in documenting and reporting the sonographic features of any suspected rare cases.
The authors reported that the pregnancy outcome is favourable if the ratio of abnormal to normal twins in TRAP is <70% and worse if it is more than 70%. Sepulveda et al. (1993) also believed that the twin weight ratio is an essential prognostic factor for the outcome of the TRAP pregnancy [10]. In our case the early diagnosis gave the opportunity to give the suitable management before any complication.

Conclusion

It is important to confirm chorionicity early in Twin pregnancies to discover any complication specific to monochorionic twin. TRAP is a rare condition which could be detected early at first trimester; hence, we can offer the patient the appropriate management plan depending on ultrasound assessment and targeted follow- up to save the healthy fetus from possible adverse effect.

General Peer Review & Conflict of Interest Statement

Peer Review: All manuscripts published in The International Journal of Comprehensive Health, Medicine & Dentistry (IJCHMD) undergo a rigorous double-blind peer review process and are evaluated by at least two independent reviewers.

Handling of Editorial Submissions: When a manuscript is authored by a member of the editorial board, it is assigned to a designated handling editor to ensure transparency and impartiality in the review process.

Conflict of Interest: The authors declare that there are no conflicts of interest related to this study. If an author is a member of the editorial board, they have no role in the peer-review or editorial decision-making process.

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