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CLINICAL AND PARACLINICAL CHARACTERISTICS OF FETAL ANEMIA TREATED WITH INTRAUTERINE TRANSFUSION: A CASE SERIES AT HANOI OBSTETRICS AND GYNECOLOGY HOSPITAL

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ABSTRACT

Objective: To describe the clinical and paraclinical characteristics of fetal anemia cases treated with intrauterine transfusion at Hanoi Obstetrics and Gynecology Hospital.

Materials and Methods: A prospective case series study was conducted on 05 fetuses diagnosed with anemia (MCA-PSV > 1.5 MoM and/or hydrops fetalis) at the Fetal Intervention Center, Hanoi Obstetrics and Gynecology Hospital, from April 2023 to April 2025, treated with intrauterine blood transfusion.

Results: The mean maternal age was 32.2 ± 2.77 years. The mean gestational age at diagnosis was 28.21 ± 3.02 weeks. The primary etiologies of anemia included complications of monochromatic twin pregnancies (4/5 cases), Parvovirus B19 infection (1/5 cases), and immune-mediated alloimmunization due to atypical antibodies (1/5 cases). Ultrasound findings revealed hydrops fetalis in 60%, cardiomegaly in 80%, and abnormal umbilical cord insertion (velamentous/marginal) in 60%.

Conclusion: Intrauterine transfusion (IUT) is an effective intervention for managing severe fetal anemia. However, late diagnosis remains a significant challenge, emphasizing the need for enhanced screening using MCA-PSV Doppler during the second trimester, particularly in high-risk pregnancies.

Keywords: Fetal anemia, intrauterine transfusion, hydrops fetalis.

1. INTRODUCTION

Fetal anemia is a rare but life-threatening condition with significant risks of mortality and perinatal morbidity. The etiology is diverse, with Rhesus (Rh) alloimmunization being the most common cause, alongside other factors such as Parvovirus B19 infection, twin anemia-polycythemia sequence (TAPS), and twin-to-twin transfusion syndrome (TTTS) [1]. Without timely diagnosis and intervention, severe anemia can lead to hydrops fetalis, heart failure, and intrauterine fetal demise.

Since the 1960s, intrauterine transfusion has marked a turning point in treatment. Liley first introduced intraperitoneal transfusion for Rh alloimmunization [2]. Subsequently, ultrasound-guided Intrauterine Transfusion (IUT) via the umbilical vein has emerged as the most successful method. International studies have demonstrated IUT efficacy with overall survival rates exceeding 95% [3]. Currently, IUT is considered the "gold standard" in managing severe fetal anemia, improving survival prognosis and minimizing long-term complications.

In Vietnam, IUT is a high-tech intervention requiring close coordination between advanced diagnostic imaging, fetal intervention skills, and specialized blood bank support. Hanoi Obstetrics and Gynecology Hospital, as a tertiary maternal center, has pioneered this technique. This study aims to describe the clinical and paraclinical characteristics of fetal anemia cases treated with intrauterine transfusion at Hanoi Obstetrics and Gynecology Hospital.

2. SUBJECTS AND METHODS

2.1. Study Subjects

All fetuses presenting for examination diagnosed with anemia (MCA-PSV > 1.5 MoM and/or ultrasound signs of hydrops fetalis) at the Fetal Intervention Center - Hanoi Obstetrics and Gynecology Hospital between April 2023 and April 2025, treated with fetal blood transfusion.

- Inclusion Criteria:

+ Fetus diagnosed with anemia (MCA-PSV > 1.5 MoM and/or ultrasound signs of hydrops fetalis).

+ Gestational age between 18-34 weeks.

+ Pregnant woman and family consent to the surgery and study participation..

- Exclusion Criteria:

+ Severe fetal morphological abnormalities.

+ Severe fetal genetic abnormalities.

+ Risk factors: threatened preterm labor, oligohydramnios, acute infection, etc.

+ Allergy to local or general anesthesia....

2.2. Methods

Study Design: Prospective descriptive case series.

Sample Size: Convenience sampling resulted in 5 subjects.

2.3. Research Ethics

The research project was approved by the Ethics Committee of Hanoi Obstetrics and Gynecology Hospital.

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3. RESULTS

Table 1. General Characteristics of Subjects

General Characteristics		n = 5	Ratio
Maternal Age (years)	Mean	32.2 ± 2.77	
	Min-Max	28-35	
Number of Fetuses	Singleton	3	3/5
	Multiple	2	2/5
Gestational age at Diagnosis (weeks)	< 24	0	0/5
	24-28	2	2/5
	≥ 28	3	3/5
	Mean	28.21± 3.02	
	Min-Max	23-30	
Medical History	Healthy	5	5/5

The mean maternal age was 32.2 ± 2.77 years. Singleton pregnancies accounted for 3/5 cases, while multiple pregnancies accounted for 2/5 cases. The mean gestational age at diagnosis was 28.21 ± 3.02 weeks.

Table 2. Fetal Ultrasound Characteristics Prior to Transfusion

Fetal Ultrasound Characteristics		n = 5	Ratio
Placental Location	Anterior uterine wall	5	5/5
Umbilical Cord Characteristics	Marginal, velamentous	3	3/5
	Central placental insertion	2	2/5
	3 vessels	5	5/5
Amniotic Fluid Volume	Normal	4	4/5
	Oligohydramnios	1	1/5
Ultrasound Abnormalities	Hydrops fetalis	3	3/5
	Cardiomegaly	4	4/5
	Pericardial effusion	3	3/5
	Ascites	2	2/5
Intrauterine Growth Restriction		2	2/5
Monochorionic Twin Complications (n=2)	TAPS	1	1/2
	Acardiac twin	1	1/2
	Selective IUGR	1	1/2

Regarding placental location, all 5 cases had an anterior uterine wall placenta; no cases had a posterior placenta. Regarding umbilical cord characteristics, there were 3 cases of marginal or velamentous insertion and 2 cases of central placental insertion. All 5 cases had a 3-vessel umbilical cord. Hydrops fetalis appeared in 3/5 cases, cardiomegaly was the most common sign, found in 4/5 cases, pericardial effusion was found in 3/5 cases, and tricuspid regurgitation and ascites were both found in 2/5 cases.

Table 3. Etiology of Fetal Anemia

Etiology		n = 5	Ratio
Maternal-fetal incompatibility	Rh incompatibility	0	0
	Atypical antibodies	1	1/5
Monochorionic twin complications	TAPS	1	1/5
	Acardiac twin	1	1/5
	Selective IUGR	2	2/5
Fetal Infection	Parvovirus B19	1	1/5

The most common causes were monochorionic twin-related complications, accounting for 4/5 cases, including Twin Anemia-Polycythemia Sequence (1/5), acardiac twin (1/5), and selective intrauterine growth restriction (2/5).

Table 4. Gestational Age at First Blood Transfusion

No.	Gestational Age
1	28 weeks 3 days
2	24 weeks
3	30 weeks 4 days
4	29 weeks 5 days
5	29 weeks 2 days
Mean	29,05 ± 2.43 weeks

The gestational age at the time of transfusion ranged from 24 weeks to 30 weeks 4 days, with a mean value of 29,05 ± 2,43 weeks.

4. DISCUSSION

The study recorded a mean maternal age of 32.2 ± 2.77. Advancing age is known to be associated with pregnancy complications, similar to the results of a large-scale retrospective analysis by Zwiers et al. (2018) on 1,678 IUT cases in the Netherlands, where the mean maternal age was recorded as 31.6 ± 5.4 years [3]. This result is completely consistent with reports from major fetal medicine centers worldwide; however, our sample size is small, so it is insufficient to confirm this relationship.

The prominent difference in our study is that the multiple pregnancy rate accounted for 40% (2/5 cases), significantly higher than the 6–7% rate in the reports by Zwiers (2018) and Van Kamp (2016) [3], [4]. This can be explained by the specific nature of our center as a tertiary unit, primarily receiving monochorionic twin cases with complex complications such as TAPS and TRAP. According to Slaghekke et al. (2010), placental vascular anastomoses in monochorionic twins are the direct agent causing hematological imbalance, increasing the demand for IUT intervention compared to standard singleton pregnancies [5].

A significant finding is that the mean gestational age at diagnosis in our study was relatively late (28.21 ± 3.02 weeks), with no cases detected before 24 weeks. This contrasts sharply with international literature: Enders et al. (2004) reported a mean gestational age at first transfusion of 19.3 weeks; Zwiers (2018) reported 24.6 weeks [6], [3]. This may be related to delays in seeking medical attention, reflecting a "gap" in routine Middle Cerebral Artery Peak Systolic Velocity (MCA-PSV)

Doppler screening in Vietnam. MCA-PSV is a highly sensitive non-invasive tool for predicting fetal anemia. Late diagnosis not only reduces the opportunity for early intervention but also leads to the high rate of hydrops fetalis in our study (60% compared to 24-27% in international studies), directly affecting the survival prognosis of the fetus. In our study, 100% of pregnant women had no prior medical pathology. This result is consistent with international literature, where the common causes of fetal anemia primarily stem from the fetus or placenta, such as blood group incompatibility, fetal infection, or twin circulatory disorders, rather than maternal underlying pathology [7], [4].

Ultrasound recorded 100% of cases with an anterior placenta, providing favorable technical conditions for accessing the umbilical vein at the placental insertion site. However, the rate of abnormal umbilical cord insertion (marginal, velamentous) reached 60%, much higher than the 5–10% rate in the general population. According to Ebbing et al. (2013), abnormalities in the umbilical cord insertion site are often accompanied by placental perfusion disorders and fetal hematological complications [8]. This reinforces the hypothesis that abnormal placental structure is an important risk factor contributing to severe fetal anemia requiring intervention. The presence of cardiomegaly (80%), pericardial effusion (60%), and hydrops fetalis (60%) in this case series demonstrates that anemia has progressed to the decompensated stage causing congestive heart failure. Hydrops fetalis is considered the poorest prognostic indicator in the treatment of fetal anemia. The high rate of hydrops fetalis in our study reflects the consequence of late diagnosis, requiring highly accurate and urgent transfusion techniques to save the fetus. Intrauterine growth restriction accounted for 2/5 cases. According to Zwiers et al. (2018), intrauterine growth restriction is recorded in approximately 22% of fetal anemia cases requiring fetal blood transfusion [3]. The simultaneous presence of anemia and intrauterine growth restriction increases the risk of adverse perinatal outcomes. In the group of 2 monochorionic twin cases, the study recorded complex complications such as TAPS, TRAP, and selective intrauterine growth restriction. International studies show that TAPS and TRAP can lead to severe anemia in the donor fetus, and fetal blood transfusion is one of the treatment options aimed at improving hemodynamics and prolonging pregnancy.

The study recorded a diversity of causes: immune-mediated (atypical antibodies), Parvovirus B19 infection, and monochorionic twin complications (TAPS, TRAP). Notably, there was an absence of classic Rh incompatibility , reflecting the effectiveness of current Anti-D prophylaxis programs in Vietnam. Conversely, the increase in non-immune causes and twin complications requires a more comprehensive high-risk pregnancy management strategy.

In our study, the mean gestational age at the time of fetal blood transfusion was 29.05 ± 2.43 weeks, with 3/5 cases intervened at a gestational age over 28 weeks. The indication for intervention was quite late compared to global literature as previously noted due to the delayed access to fetal anemia diagnosis.

5. CONCLUSION

The study indicates that fetal anemia is often detected at a late stage with high rates of hydrops fetalis and heart failure (60-80%), severely affecting the survival prognosis. Complications from monochorionic twins and infectious conditions are the leading causes recorded. To optimize intervention effectiveness, the implementation of periodic screening using MCA-PSV Doppler ultrasound in the second trimester is an urgent requirement for early detection and timely treatment.

REFERENCES

[1] Prefumo F, Fichera A, Fratelli N, Sartori E. Fetal anemia: Diagnosis and management. Best Pract Res Clin Obstet Gynaecol. 2019; 58:2-14. doi: 10.1016/j.bpobgyn.2019.01.001

[2] Liley AW. Intrauterine Transfusion of Foetus in Haemolytic Disease. Br Med J. 1963;2(5365):1107-1109.

[3] Zwiers C, Oepkes D, Lopriore E, Klumper FJ, de Haas M, van Kamp IL. The near disappearance of fetal hydrops in relation to current state of the art management of red cell alloimmunization. Prenat Diagn. 2018;38(12):943-950. doi:10.1002/pd.5355

[4] Van Kamp, Inge L. et al. Complications of intrauterine intravascular transfusion for fetal anemia due to maternal red-cell alloimmunization. American Journal of Obstetrics & Gynecology, Volume 192, Issue 1, 171 – 177

[5] Slaghekke F, van den Wijngaard JP, Akkermans J, van Gemert MJ, Middeldorp JM, Klumper FJ, Oepkes D, Lopriore E. Intrauterine transfusion combined with partial exchange transfusion for twin anemia polycythemia sequence: modeling a novel technique. Placenta. 2015 May;36(5):599-602. doi: 10.1016/j.placenta.2015.01.194. Epub 2015 Feb 9. PMID: 25703231.

[6] Enders, M., Weidner, A., Zoellner, I., Searle, K. and Enders, G. (2004), Fetal morbidity and mortality after acute human parvovirus B19 infection in pregnancy: prospective evaluation of 1018 cases. Prenat. Diagn., 24: 513-518. https://doi.org/10.1002/pd.940

[7] Moise KJ Jr. Intrauterine transfusion with red cells and platelets. West J Med. 1993 Sep;159(3):318-24. PMID: 8236973; PMCID: PMC1011345.

[8] Ebbing C, Kiserud T, Johnsen SL, Albrechtsen S, Rasmussen S. Prevalence, risk factors and outcomes of velamentous and marginal cord insertions: a population-based study of 634,741 pregnancies. PLoS One. 2013 Jul 30;8(7):e70380. doi: 10.1371/journal.pone.0070380. PMID: 23936197; PMCID: PMC3728211.