EP03.024 Parvovirus B19 infection in pregnancy with positive prenatal genetic screening

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INTRODUCTION

Prenatal diagnostics can reveal structural fetal abnormalities that may result from both genetic causes and intrauterine infections, often with overlapping clinical features.

RASopathies are a group of disorders caused by alterations in the Ras/MAPK signaling pathway. RASopathies (also known as Noonan spectrum disorders) are characterized by short stature, distinctive facial features, heart defects, developmental delay, and an increased risk of malignancies. Prenatally, they may present with increased nuchal translucency or cystic hygroma, while their genetic heterogenity limits the reliability of phenotype-based diagnosis.

Parvovirus B19 infection represents a significant risk during pregnancy and may lead to fetal anemia, non-immune hydrops, and other developmental complications.

We present three cases of Parvovirus B19 infection during the 2024 epidemic with overlapping genetic findings identified during prenatal diagnostics. The coexistence of infection and an underlying genetic disorder highlights the diagnostic complexity of prenatal evaluation.

METHODS

Massively parallel sequencing was performed using the Clinical Exome Solutions panel (CES v3, SOPHiA GENETICS) on the Aviti (Element) platform, targeting coding regions and adjacent intronic sequences (±20 bp) of genes associated with RASopathies. The panel includes genes of the Ras/MAPK signaling pathway underlying Noonan spectrum disorders.

Data analysis was performed using SOPHiA DDM™, VarSome Clinical, and IGV (minimum coverage 30×). Clinically relevant variants were confirmed by Sanger sequencing on a SeqStudio instrument (Thermo Fisher Scientific), using Sequence Scanner and Alamut Visual Plus.

Parvovirus B19 infection was detected using serological and molecular methods. IgM and IgG antibodies were measured by ELISA (TestLine Diagnostics) on a DS2 automated system (DYNEX Technologies). Viral DNA was detected by real-time PCR (GeneProof Parvovirus B19 PCR Kit, GeneProof) on a CFX96 Touch system (Bio-Rad).

CASE REPORT

Patient 1:

Clinical findings / Ultrasound:
- First-trimester combined screening: T21 1:14, T18 1:30, T13 1:201
- Increased nuchal translucency (NT 4.1 mm at 13+4)
- Mega cisterna magna (12 mm at 30+5)

Genetic analysis:
- *De novo* pathogenic variant in NF1:c.2970_2972del (p.Met992del) in heterozygous state

Infectious disease testing:
- Positive serology (Parvovirus B19 IgM/IgG)
- Positive PCR for Parvovirus B19 in maternal blood
- Negative PCR for Parvovirus B19 in amniotic fluid

Summary:
- The pregnancy is complicated by the coexistence of potential Parvovirus B19 infection and an underlying genetic disorder.

Patient 2:

Clinical findings / Ultrasound:
- First-trimester combined screening: T21 1:30, T18 1:52, T13 1:809
- Increased nuchal translucency (NT 5.4 mm at 13+1)
- IUGR

Genetic analysis:
- No pathogenic findings explaining the fetal phenotype (NGS panel for RASopathies, array CGH)

Infectious disease testing:
- Positive serology (Parvovirus B19 IgM/IgG)
- Positive PCR for Parvovirus B19 in maternal blood and amniotic fluid

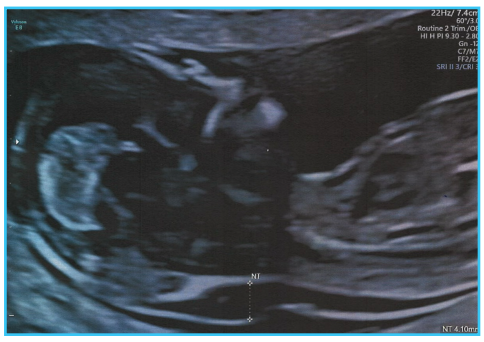
Summary:
- Initial findings included hydrops fetalis and IUGR, with no pathogenic genetic variants identified. Follow-up showed no progression of anemia or other severe complications. Hydrops indicated an increased neurological risk, and the pregnancy was managed under close medical supervision.

Patient 3:

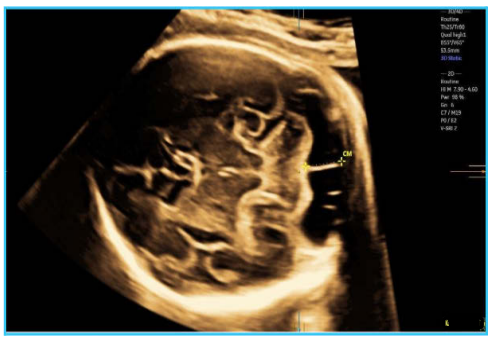
Clinical findings / Ultrasound:
- First-trimester combined screening: T21 1:590, T18 1:1496, T13 1:4676
- Nuchal translucency (NT 2.2 mm at 13+2)

Infectious disease testing:
- Positive serology (Parvovirus B19 IgM/IgG)
- Positive PCR for Parvovirus B19 in maternal blood

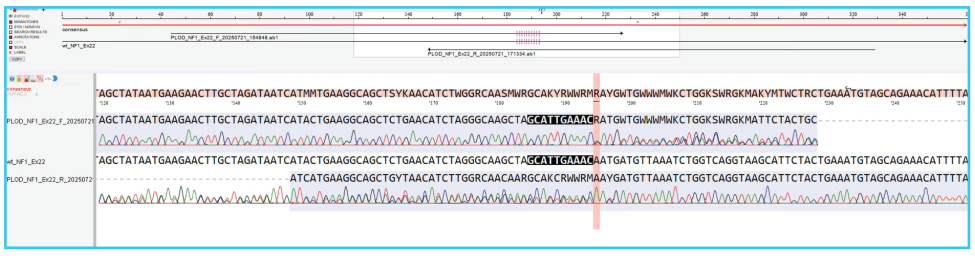
Summary:
- Despite confirmed Parvovirus B19 exposure, no structural abnormalities or signs of fetal infection were observed, and the pregnancy progressed without complications.



Ultrasound (13+4 weeks): NT 4.1 mm



Ultrasound (30+5 weeks): mega cisterna magna



NM_001042492.3(NF1):c.2970_2972del (p.Met992del), visualized using Sequence Scanner v1.0 software.

CONCLUSION

This study highlights the variable impact of Parvovirus B19 infection on fetal development in the first trimester and its potential clinical overlap with serious genetic conditions. The management of complex pregnancy cases, particularly when fetal anomalies or ongoing infection are suspected, requires interdisciplinary collaboration and expertise in genetics, prenatal diagnostics and microbiology. Integration of these disciplines enables accurate diagnosis, guides further investigations, and supports informed pregnancy management.

The authors declare that they have no conflict of interest. All presented data comply with informed consent, applicable regulations and GDPR.