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Maternal alloimmunization outcomes: comparison between multiple and single antibodies

Brittany J. Arkerson, **Faezeh Aghajani**, Evelyn McGuire, Katherine Modrall, Lucy Salter, Alireza Shamshirsaz, Anthony L. Shanks, Hiba J. Mustafa

Introduction

Maternal red cell alloimmunization is an important cause of fetal anemia and hemolytic disease of the fetus and newborn (HDFN). The clinical course may differ depending on whether a single antibody or multiple antibodies are present.

Methods

This single-center retrospective cohort study examined alloimmunized singleton pregnancies with antibodies known to be associated with HDFN from 2018 to 2023.

Results

Among the 166 analyzed alloimmunized pregnancies:

- Those with multiple antibodies had higher early and maximum titers (254 vs. 20; 382 vs. 41).
- MCA Doppler monitoring was more frequent (93% vs. 60%) and initiated earlier (26 vs. 30 weeks).
- These patients required IUT more often (80% vs. 34%) with more transfusions, and they delivered at an earlier gestational age (34.7 vs. 36.7 weeks).

Variable	1 antibody (n=136)	≥2 antibodies (n=30)	P-Value
Alloimmunization diagnosis and antenatal monitoring characteristics			
Early pregnancy antibody titer	N=88, 19.55 ± 50.5	N=18 254.5 ± 325.8	0.007
GA at antibody titer collection (weeks.days)?	N=89 10.25 ± 2.7	N=18 10.97 ± 3.3	0.3
Maximum antibody titer	N=87 40.56 ± 92.2	N=18 381.6 ± 431.4	0.004
GA at maximum titer (weeks.days)?	N=87 17.43 ± 10.75	N=18 15.9 ± 7.8	0.6
MCA Dopplers monitoring	81 (60.4%)	28 (93.3%)	<0.001
GA at MCA Dopplers	N=78 23.4 ± 5.9	N=28 22.7 ± 5.6	0.6
What was the maximum MCA MoM?	N=80 1.47 ± 0.3	N=26 1.55 ± 0.39	0.3
GA at maximum MCA MoM?	N=80 29.4 ± 5.9	N=27 28.8 ± 5.1	0.6
Was the maximum MCA MoM≥ 1.5	38/80 (45%)	15/27 (53.6%)	0.51
What GA MoM was ≥1.5	N=37 29.8 ± 6.3	N=15 25.6 ± 4.6	0.02
did the patient end up needing IUT?	12/35 (34.3%)	12/15 (80%)	0.005
Maternal antenatal characteristics			
Maternal antibodies in prior pregnancy (alloimmunization)?	47/88 (53.4%)	16/26 (61.5%)	0.5
Maximum antibody titer prior pregnancy	18.25 ± 28	315 ± 386	0.09
History of IUT at previous pregnancy?	1/118 (0.8%)	5/25 (20%)	<0.001
History of maternal blood transfusion prior to current pregnancy?	29/61 (47.5%)	7/15 (46.7%)	1
Patient with history of prior abortion or miscarriage?	72/134 (53.7%)	18/29 (62.1%)	0.5
Rh negative blood type?	35/135 (25.9%)	18/30 (60%)	<0.001
Did she receive Rhogam for all prior abortions/miscarriages?	1/9 (11.1%)	1/2 (50%)	0.3
Did she receive Rhogam in all previously indicated preterm or term deliveries?	11/17 (64.7%)	2/4 (50%)	0.6
Prior newborn requiring phototherapy or transfusion due to HDFN	12/69 (17.4%)	9/22 (40.9%)	0.04
Was IUT performed?	12/122 (9.8%)	12/28 (42.9%)	<0.001
Was there pre-IUT hydrops?	0/12 (0%)	1/12 (8.3%)	1
If IUT needed, how many IUTs?	N=10 1.9 ± 1	N=11 3.6 ± 1.3	0.003
GA First IUT-(weeks.days)	N=12 28.6 ± 4.5	N=12 25.2 ± 4	0.06
GA at delivery-weeks.days	N=116 36.7 ± 2.6	N=23 34.7 ± 5.4	0.01

Conclusion

Patients with multiple antibody alloimmunization are more likely to have critical antibody titers, require early MCA Doppler monitoring, develop HDFN necessitating earlier and more frequent IUTs, and deliver at an earlier gestational age compared to those with a single antibody.