Fetomaternal hemorrhage in invasive prenatal diagnostic procedures (chorionic villus sampling, amniocentesis)

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AIM OF THE STUDY

Determine the incidence and volume of fetomaternal hemorrhage (FMH) in invasive prenatal diagnostic procedures (chorionic villus sampling or amniocentesis), identify risk factors, which lead to excesive FMH. Determination of these variables would enable optimalization of guidelines for RhD alloimmunization prophylaxis.

WORKING HYPOTHESIS

Immunoglobulin (Ig) G anti-D in a dose of 10 µg administered intramuscularly should cover 0.5 mL of fetal RhD positive red blood cells (RBCs) or 1mL of whole fetal blood. FMH is fetal RBC volume; fetal blood volume is double (expected fetal hematocrit is 50%). In chorionic villus sampling or amniocentesis performed before the 20th week of gestation, less than 2.5 mL of fetal RBCs (5 mL of whole fetal blood, sufficient dose of IgG anti-D 50 µg) enter the maternal circulation. If the procedure is performed after the 20th week of gestation, FMH > 5 mL (10 mL of whole fetal blood, sufficient dose of IgG anti-D, 100 µg) does not occur. **Transplacental needle penetration does not present a risk factor for the incidence of high volumes of FMH.**

METHODS

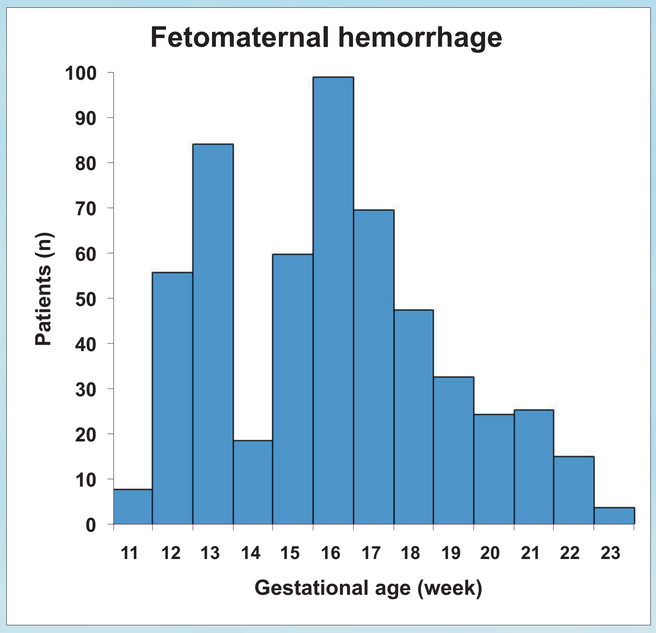
In a prospective cohort study, a total of **1052** examinations were performed after invasive prenatal diagnostic procedures. FMH was assessed by flow cytometry. (FMH is fetal red blood cell [RBC] volume; fetal blood volume is double [expected fetal hematocrit is 50%]).

RESULTS

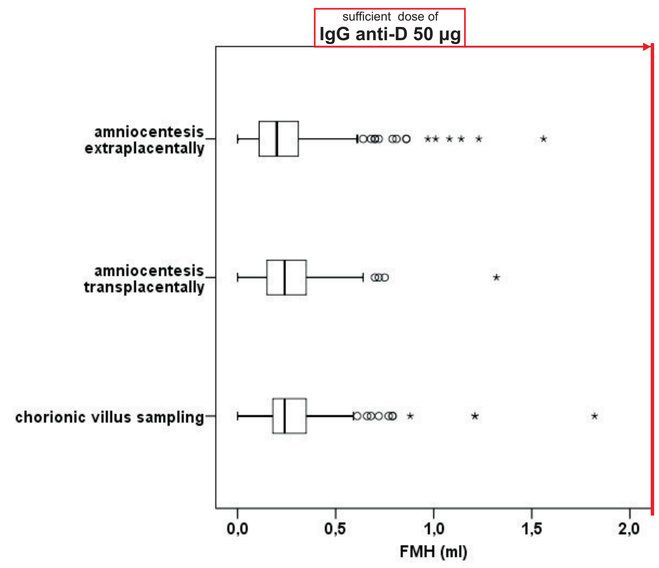
After chorionic villus sampling or amniocentesis, the fetal RBC volume diagnosed in maternal circulation ranged from insignificant FMH ≤ 0.1 mL to FMH = 1.8 mL (median, 0.2; mean, 0.25; SD, 0.18). Excessive volume of FMH > 2.5 mL (immunoglobulin [Ig] G anti-D insufficient dose 50 µg) was not observed. The control group, amniocentesis in which the needle entered extraplacentally during the procedure (n=617), FMH median 0.2 ml (≤ 0.1-1.6), FMH 90 perc (0.4 ml). The risk groups: amniocentesis in which the needle entered transplacentally (n=113), FMH > 0.4 ml (P 1.0; OR 0.94, 95% CI 0.46-1.89); chorionic villus samplling (n=322), FMH > 0.4 ml (P 0.9; OR 1.03, 95% CI 0.65-1.62). The age of the pregnant women at the time of the procedure 17-45 years (median 34), gestational age 11-23 weeks (median 16).

CONCLUSION

In chorionic villus sampling or amniocentesis, excessive FMH < 2,5 mL (5 mL of fetal blood) does not occur, and thus for the prevention of RhD alloimmunization, **an IgG anti-D dose of 50 µg should be sufficient**. Transplacental needle penetration does not present a risk factor for the incidence of high volumes of FMH.



Characteristics	Total	Control group amniocentesis extraplacentally	Risk groups amniocentesis transplacentally	Risk groups chorionic villus sampling
n	1052	617	113	322
maternal age (years)				
minimum	17	17	20	20
maximum	45	45	42	44
median	34	34	34	34
mean	33.1	33.0	32.9	33.3
SD	5.4	5.5	5.3	5.2
GA (days)				
minimum	78	105	105	78
maximum	161	161	161	104
median	114	121	121	92
mean	114.8	125.0	124.4	91.8
SD	19.5	14.1	14.9	4.8
FMH (ml)				
minimum	0	0	0	0
maximum	1.8	1.6	1.3	1.8
median	0.2	0.2	0.2	0.2
mean	0.25	0.23	0.26	0.27
SD	0.18	0.18	0.18	0.18



	Total n	FMH ≤ 0.4 ml n	FMH > 0.4 ml n (%)	FMH > 2.5 ml n (%)
amniocentesis	730	662	68 (9.3)	0
extraplacentally	617	559	58 (9.4)	0
transplacentally	113	103	10 (8.8)	0
chorionic villus sampling	322	291	31 (9.6)	0

amniocentesis - transplacental needle penetration

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 0.4	10/113 (8.8)	58/617 (9.4)	0.94	0.46	1.89	1.000[a]
> 2.5	0					

chorionic villus sampling

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 0.4	31/322 (9.6)	58/617 (9.4)	1.03	0.65	1.62	0.907[a]
> 2.5	0					

[a]Fisher's exact test

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