

Value of MCA-PSV and of expected daily decrease in fetal hemoglobin for the timing of serial in utero transfusions in red-cell alloimmunization

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BACKGROUND:

The accuracy of middle cerebral artery peak systolic velocity (MCA-PSV) for the prediction of fetal anemia has been questioned after previous in utero transfusions (IUT). In particular, the false positive rate is increased after in utero transfusion.

OBJECTIVE:

- We assessed the detection and false positive rates of MCA-PSV in fetuses undergoing serial IUTs and searched for an effect of gestational age.
- Fetal hemoglobin level was also estimated from the expected daily decrease between transfusions.

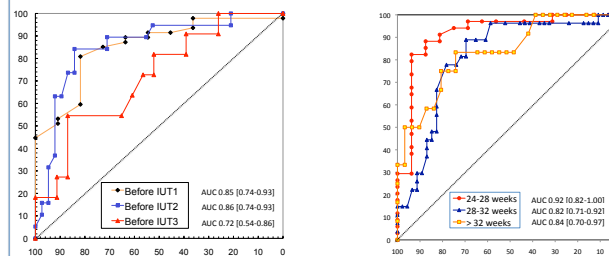
STUDY DESIGN:

- Doppler measurement of MCA-PSV was performed before cordocentesis at the time of the first (n=64), second (n=43) and third (n=29) in utero transfusions (IUT).
- We assessed the predictive value of MCA-PSV according to the rank of transfusion by comparing area under ROC curves (AUC).
- The effect of gestational age at the time of the first IUT was also assessed by AUC. Severe anemia was defined as hemoglobin <0.5 MoM.
- Daily decrease of fetal hemoglobin (Hb) after 1st, 2nd and 3rd IUT was estimated and expressed as MoM/day.

RESULTS (1)

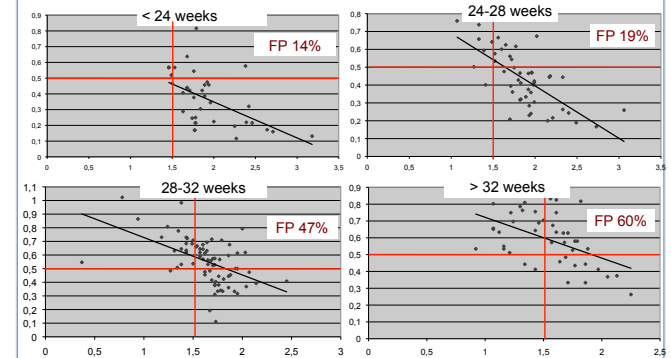
- 201 in-utero transfusions in 64 women
- in a single center from 2003 to 2009 (allo-immunization RhD: 74%; Kell: 20%; c: 3%; others 3%)

- at least 1 IUT: 64 (100%)
- at least 2 IUT: 43 (67%)
- at least 3 IUT: 23 (36%)



- The area under ROC curve of MCA-PSV for the prediction of fetal anemia:
- is decreased after 2 in-utero transfusions
 - decreases with increasing gestational age

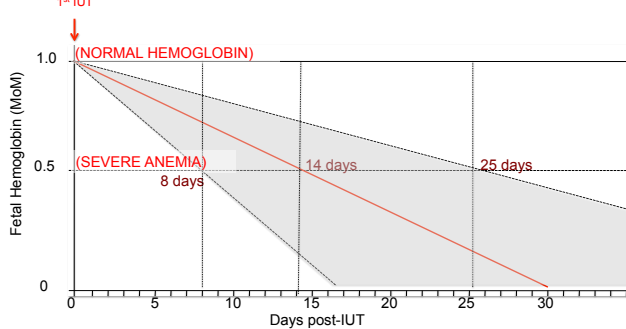
RESULTS (2)



- The false positive rate increases with gestational age
- The negative predictive value remains unchanged and high whatever gestational age

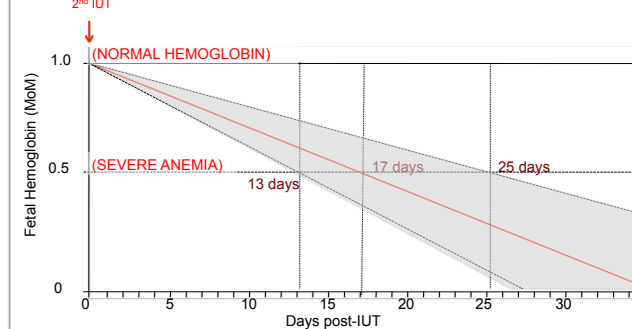
RESULTS (3)

- Mean drop in fetal Hb :
 - after 1st IUT : 0.43 g/dL/day (± 0.17)
 - after 2nd IUT : 0.36 g/dL/day (± 0.08)
 - after 3rd IUT : 0.32 g/dL/day (± 0.07)
- Theoretical time before the fetus becomes severely anemic again after the first IUT

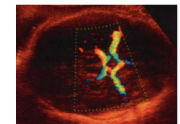


RESULTS (4)

- Mean drop in fetal Hb :
 - after 1st IUT : 0.43 g/dL/day (± 0.17)
 - after 2nd IUT : 0.36 g/dL/day (± 0.08)
 - after 3rd IUT : 0.32 g/dL/day (± 0.07)
- Theoretical time before the fetus becomes severely anemic again after the second IUT



CONCLUSION



-MCA-PSV:

- Accuracy of MCA-PSV decreases with increasing order of IUTs
- Accuracy of MCA-PSV decreases with increasing gestational age
- BUT: negative predictive value remains high (>90%) whatever the gestational age

-Prediction of fetal Hb from post-transfusion Hb value:

- Is rather inaccurate after the first IUT (wide variability)
- Is more accurate with increasing order of IUTs (slower decrease, less variability)
- Is not influenced by gestational age