

## In Vitro Simulation of Acute Feto-fetal Transfusion in Case of Single Intrauterine Fetal Death in Monochorionic Twins

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### Objective

Demonstration of the potential risk of acute feto-fetal transfusion (aFFTR) in basic clinical types of monochorionic (MC) twins using in vitro simulation with the determination of clinical risk factors.

### Methods

A prospective study analyzed 140 fresh MC placentas with physiological clinical course, selective fetal restriction (sFGR), and twin to twin transfusion syndrome (TTTS), all without intrauterine surgery were included in the study, between the period 2016-2020. A specially designed protocol was used for the preparation and analysis of the placentas. The number and types of anastomoses (AA, VV, and AV anastomoses), types and distances between cords insertions, and the size of the placental areas for each fetus were also statistically analyzed. The placental angioarchitecture with and without proven aFFTR was statistically compared, odds ratios and multivariable logistic analysis were performed.

### Results

A total of 75/140 (53,6%) cases of aFFTR were proven with an average transfusion time of 1ml in 30 seconds (19-240 sec). Positive aFFTR in the physiologic group, sFGR, and TTTS was in 49,5% (49/99), 51,8% (14/27) and 14,2% (2/14), respectively. In total, aFFTR was present in 75/109 (68.8%) of placentas with AA anastomosis. The median diameter of AA anastomoses with the present, and absent aFFTR was 2.0mm and 1.0mm, respectively. The proven interfetal transfusion was 8%, 31%, and 61% in AA anastomoses with a diameter below 0,5mm, 0,5-1,5mm, and above 1,5mm, respectively ( $p < 0,001$ ). AA anastomoses diameter  $> 1.5$  mm had OR of 44.2 (95% CI 5.54-352.39). In the case of coexistence of AA anastomosis and umbilical cord distance  $\leq 5^{\text{th}}$  percentile, the aFFTRF occurred in 90.9%.

### Conclusion

The potential risk of aFFTR in MC twins is mainly due to the presence and nature of AA anastomoses. The diameter and length of the vessels play a crucial role, which is clinically related to the distance of the umbilical cord insertions. Due to the different representation of AA anastomoses in the basic subgroups of MC twins, there are also different risks for surviving fetus in case of single intrauterine fetal death.