Volumetric fetal brain pilot study in twins with severe discordancy using semiautomatic 3D MR imaging measurements.

Student: Tom Halevy Mentor – Dr. Eldad Katorza MD,MSc, MBA

Introduction

Twin pregnancy can be associated with growth retardation of one of the fetuses. This is termed sIUGR. It is define by weight discordance greater than 20 percent or when one of the twins estimated weight is under the <10th percentile.

Research questions

In MR Imaging:

- Is there a difference in bain volume between the twins?
- Is there a difference in brain volume comparing to the whole body weight discordancy?
- Does twin type such as BCBA vs. MCBA show different patterns?





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Methods:

- ★ This is a partly **retrospective cross sectional** study and partly **retrospective cohort** study.
- ★ Data was collected from Sheba Medical Center (SMC) database years 2012-2015.
- ★ Fetal brain MR imaging was performed using a 1.5T system (Optima scanner; GE Healthcare, Milwaukee, Wisconsin).
- ★ Volume measurements using Mathlab computing base software.
- ★ MRI was done due to abnormal Ultrasound examination with a suspicion of slUGR/severe discordancy complication.
- ★ Sum of 33 twins.

Inclusion criterias:

- Twin gestation
- MR Imaging between GA 28-34 weeks.
- No pathology other then sIUGR
- Agreement to enroll to the study

Exclusion criteria:

• Low quality MRI image.

Exposure:

Twin gestation with fetal growth restriction (FGR) diagnosed in ultrasound scan(US)

Outcomes:



Smaller brain volumes in 3D MRI.
Brain volumes of twins with severe discordancy were found to be significantly smaller in 3D MR imaging (P = 0.00 - 0.003) in compare to the adequate for gestational age (AGA) twin.

What next? Does the exposure to FGR associated with:

- Proportional lower brain volumes compared to birth weight in 3D MR imaging?
- BCBA or MCBA equally affected?

Potential confounders are:

- Smoking.
- Mother age.
- Fetal sex type.
- Medical complication or treatment during pregnancy.

Compare of ratio/discordance of fetal birth weight Vs. MRI neonatal brain volume:

- Using Spearman or Pearson correlation will be decided by distribution.
- Null hypothesis is the lack of correlation (0) between brain volume to difference in weight.

Compare of Weight Vs. head circumference (HC) ratio in gestation and at birth.

• Ratio of weight with ratio of HC will be presented in a scatter plot graph.

Compare between the fetus type BCBA Vs. MCBA:

- Using a correlation test
- Scatter plot will be use to present correlation

Sample size

Calculated sample size of 30 twins will be used to achieve correlation of 0.5 (medium), statistical significance of p <0.05 and power of 80 percent.



Is there a difference in the neurodevelopmental outcome?