Safety of CMR During Pregnancy and Lactation

Author: Mahi Ashwath
Date: 11/1/2017

Why CMR (Specific Advantages)

- Imaging ability in pregnancy is limited by the desire to avoid radiation.
- MRI and ultrasound have emerged as the preferred imaging modalities in pregnancy.
- MRI is sometimes preferred to ultrasound given its ability to image deep soft tissue structures in a manner that is not operator dependent and does not use ionizing radiation.
- MR imaging has been used to evaluate obstetrical, placental and fetal abnormalities in pregnant patients for more than 30 years.

Possible concerns for the fetus

- Theoretical concerns include - teratogenesis, tissue heating, and acoustic damage, however these concerns have not been found to be real in multiple studies.
- With regard to teratogenesis, there are no published human studies documenting harm, and the preponderance of animal studies do not demonstrate risk. (1)
- Tissue heating is proportional to the tissue’s proximity to the scanner and, therefore, is negligible near the uterus (1,2).
- Studies in humans have documented no acoustic injuries to fetuses during prenatal MRI (2).
- The American College of Radiology concludes that no special consideration is recommended for the first (versus any other) trimester in pregnancy. (3)
- Despite the lack of harm from MR in pregnancy, the current guidelines of the FDA require labelling of MR devices to indicate that the safety of MRI with regard to the fetus ‘has not been established’.

Use of Gadolinium contrast during pregnancy

- Even though it can add value to the cardiac MRI, use of gadolinium-based contrast enhancement during pregnancy is controversial.
- Theoretical concerns are due the fact that gadolinium is water soluble and can cross the placenta into the fetal circulation and amniotic fluid.
- Given these findings, as well as ongoing theoretical concerns and animal data, gadolinium use should be limited to situations in which the benefits clearly outweigh the possible risks (3).

Evidence

   - The largest study about use of MRI during pregnancy included more than 1.4 million births, more than 1700 of whom had MRIs in the first trimester of pregnancy, and 397 had gadolinium MRI exposure at any time in pregnancy.
   - Conclusions: MRI use in the first trimester was not shown to be harmful to the fetus.
   - Gadolinium MRI at any time during pregnancy was associated with rare adverse outcomes in childhood - rheumatological, inflammatory, or infiltrative skin conditions and for stillbirth or neonatal death.
   - Limitations of the study include using a control group who did not undergo MRI (rather than patients who underwent MRI without gadolinium) and the rarity of detecting rheumatologic, inflammatory, or infiltrative skin conditions

   - The only prospective study evaluating the effect of antepartum gadolinium administration among 26 pregnant women who received gadolinium in the first trimester.
   - Conclusions: No adverse perinatal or neonatal outcomes
Use of Gadolinium during lactation

- The water solubility of gadolinium-based agents limits their excretion into breast milk.
- Less than 0.04% of an intravascular dose of gadolinium contrast is excreted into the breast milk within the first 24 hours.
- Of this amount, the infant will absorb less than 1% from his or her gastrointestinal tract.
- Although theoretically any unchelated gadolinium excreted into breast milk could reach the infant, there have been no reports of harm.
- It is not necessary to interrupt breastfeeding after gadolinium administration (9,10)

References