Current clinical practices and needs: Fetal imaging

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Successful fetal MRI imaging requires high quality images that have to be acquired in a time of ideally 20 seconds per sequence or shorter (1). Sequences that .are longer bear the risk of being impaired by movement artifacts. There, not only gross fetal movement has to be taken into account, but also intrinsic movements, such as fetal and maternal breathing activity, and vascular pulsations. As fetal organs are small, especially during the second trimester, slice thickness should be thin. However, currently it is hardly possible to have a slice thickness of less than 2mm with sufficient resolution. Parallel imaging allows to speed up almost any sequence. Different contrasts are required to characterize fetal anatomy and pathology. T2- contrast is sufficient to describe , for instance development of brain sulcation and gyration, and organs that are filled with fluid, or surrounded by fluid respectively .For optimal results T2-parameters are adjusted to gestational age and the respective clinical question (1). T1- weighted sequences are necessary to describe the development of subcutaneous fat, glands (2) and meconium-filled bowels. T1-weighted FLAIR sequences may add information to the content of fluid filled cysts. Hemorrhage in the methemoglobin stage maybe also detected. Echoplanar sequences allow the delineation of bones, and may visualize deoxyhemoglobin and hemosiderin. In addition they are used for liver imaging. Diffusion-weighted sequences have a role in examination of the brain, kidney and placenta. Longer imaging times (up to 2-3 minutes) have to be considered in some special applications, such as diffusion tensor imaging.allowing tractography, BOLD imaging to look at brain function, and spectrososcopy.(3). There, about 50%-75% of examinations can be done successfully in unsedated fetuses. As soon as these applications that are currently in an experimental state become useful in clinical practice, fetal sedation may be taken into account. However, an examination of the fetus and the intrauterine contents can be done within 30-45 minutes. This time includes all necessary sequence repetitions and planning steps between the sequences.

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