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Changes in Kidney Tissue at Postmortem Magnetic Resonance Imaging Depending on the Time of Fetal Death

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Abstract : All cases of stillbirth undoubtedly subject to postmortem examination, since it is necessary to find out the cause of the stillbirths, as well as a forecast of future pregnancies and their outcomes. Determination of the time of death is an important issue which is addressed during the examination of the body of a stillborn. It is mean the period from the time of death until the birth of the fetus. The time for fetal deaths determination is based on the assessment of the severity of the processes of maceration. To study the possibilities of postmortem magnetic resonance imaging (MRI) for determining the time of intrauterine fetal death based on the evaluation of maceration in the kidney. We have conducted MRI morphological comparisons of 7 dead fetuses (18-21 gestational weeks) and 26 stillbirths (22-39 gestational weeks), and 15 bodies of died newborns at the age of 2 hours – 36 days. Postmortem MRI 3T was performed before the autopsy. The signal intensity of the kidney tissue (SIK), pleural fluid (SIF), external air (SIA) was determined on T1-WI and T2-WI. Macroscopic and histological signs of maceration severity and time of death were evaluated in the autopsy. Based on the results of the morphological study, the degree of maceration varied from 0 to 4. In 13 cases, the time of intrauterine death was up to 6 hours, in 2 cases - 6-12 hours, in 4 -12-24 hours, in 9 -2-3 days, in 3 -1 week, in 2 -1,5-2 weeks. At 15 dead newborns, signs of maceration were absent, naturally. Based on the data from SIK, SIF, SIA on MR-tomograms, we calculated the coefficient of MR-maceration (M). The calculation of the time of intrauterine death (MP-t) (hours) was performed by our formula: MR-t = 16,87+95,38×M²-75,32×M. A direct positive correlation of MR-t and autopsy data from the dead at the gestational ages 22-40 weeks, with a dead time, not more than 1 week, was received. The maceration at the antenatal fetal death is characterized by changes in T1-WI and T2-WI signals at postmortem MRI. The calculation of MP-t allows defining accurately the time of intrauterine death within one week at the stillbirths who died on 22-40 gestational weeks. Thus, our study convincingly demonstrates that radiological methods can be used for postmortem study of the bodies, in particular, the bodies of stillborn to determine the time of intrauterine death. Postmortem MRI allows for an objective and sufficiently accurate analysis of pathological processes with the possibility of their documentation, storage, and analysis after the burial of the body.

Keywords : intrauterine death, maceration, postmortem MRI, stillborn
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