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Single Centre Retrospective Analysis of MR Imaging in Placenta Accreta Spectrum Disorder with Histopathological Correlation

Authors : Frank Dorrian, Aniket Adhikari

Abstract : The placenta accreta spectrum (PAS), which includes placenta accreta, increta, and percreta, is characterized by the abnormal implantation of placental chorionic villi beyond the decidua basalis. Key risk factors include placenta previa, prior cesarean sections, advanced maternal age, uterine surgeries, multiparity, pelvic radiation, and in vitro fertilization (IVF). The incidence of PAS has increased tenfold over the past 50 years, largely due to rising cesarean rates. PAS is associated with significant peripartum and postpartum hemorrhage. Magnetic resonance imaging (MRI) and ultrasound assist in the evaluation of PAS, enabling a multidisciplinary approach to mitigate morbidity and mortality. This study retrospectively analyzed PAS cases at Royal Prince Alfred Hospital, Sydney, Australia. Using the SAR-ESUR joint consensus statement, seven imaging signs were reassessed for their sensitivity and specificity in predicting PAS, with histopathological correlation. The standardized MRI protocols for PAS at the institution were also reviewed. Data were collected from the picture archiving and communication system (PACS) records from 2010 to July 2024, focusing on cases where MR imaging and confirmed histopathology or operative notes were available. This single-center, observational study provides insights into the reliability of MRI for PAS detection and the optimization of imaging protocols for accurate diagnosis. The findings demonstrate that intraplacental dark bands serve as highly sensitive markers for diagnosing PAS, achieving sensitivities of 88.9%, 85.7%, and 100% for placenta accreta, increta, and percreta, respectively, with a combined specificity of 42.9%. Sensitivity for abnormal vascularization was lower (33.3%, 28.6%, and 50%), with a specificity of 57.1%. The placenta bulge exhibited sensitivities of 55.5%, 57.1%, and 100%, with a specificity of 57.1%. Loss of the T2 hypointense interface had sensitivities of 66.6%, 85.7%, and 100%, with 42.9% specificity. Myometrial thinning showed high sensitivity across PAS conditions (88.9%, 71.4%, and 100%) and a specificity of 57.1%. Bladder wall thinning was sensitive only for placenta percreta (50%) but had a specificity of 100%. Focal exophytic mass displayed variable sensitivity (22.9%, 42.9%, and 100%) with a specificity of 85.7%. These results highlight the diagnostic variability among markers, with intraplacental dark bands and myometrial thinning being useful in detecting abnormal placentation, though they lack high specificity. The literature and the results of our study highlight that while no single feature can definitively diagnose PAS, the presence of multiple features -especially when combined with elevated clinical risk- significantly increases the likelihood of an underlying PAS. A thorough understanding of the range of MRI findings associated with PAS, along with awareness of the clinical significance of each sign, helps the radiologist more accurately diagnose the condition and assist in surgical planning, ultimately improving patient care.

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