

MR manifestations of Hyperreactio Luteinalis: Value of diffusion-weighted imaging in the differentiation from neoplastic lesions

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[Introduction] Hyperreactio luteinalis (HL) is rare benign physiological ovarian enlargement with multiple theca lutein cysts caused by increased human chorionic gonadotropin (hCG) serum levels. HL is usually associated with gestational trophoblastic disease, and less commonly associated with normal pregnancy. Iatrogenic form of HL is known as ovarian hyperstimulation syndrome (OHSS). HL may mimic multilocular cystic neoplasm on imaging manifestations, and misdiagnosis may lead to unnecessary surgery. In this study we evaluated MR manifestations of HL for the differentiation from neoplastic lesions.

[Materials and Methods] 11 HL in 6 women (19 to 41 years of age, 3 pregnant; 2 hydatid mole; 1 iatrogenic) were evaluated. 5 cases were bilateral, and one case was unilateral. One HL was surgically proven, and the other 10 HL were clinically diagnosed and disappeared on follow up examinations. Fast spin-echo T2-weighted images and spin-echo T1-weighted images were obtained in all 6 women on a system with a 1.5T/3T superconducting units (Signa Excite/Signa Excite HD 3T, General Electric, Milwaukee, WI) with 8ch body-array torso coils. Gadolinium-enhanced T1-weighted images were obtained in 4 lesions in 2 patients. Diffusion-weighted images (DWI) were obtained in 7 lesions in 4 patients with high b-value ($b=800 \text{ sec/mm}^2$) with a spin-echo, single-shot EPI sequence. The parallel image-encoding techniques (the array spatial sensitivity encoding techniques: ASSET, General Electric, Milwaukee, WI) were employed. The ADCs ($\times 10^{-3} \text{ mm}^2/\text{seconds}$) in solid portions of the lesions were measured in a small circular ROI so as not to contain cystic portions as much as possible from ADC maps on the workstation (AW4.2). The ADCs in solid portions of surgically proven 39 ovarian cancers were also measured. Mann-Whitney's U test was used to compare ADCs among 7 HL and 39 ovarian cancers. A value of $p<0.05$ was considered statistically significant.

[Results] All 11 HL appeared as multilocular cystic masses with septations mimicking mucinous cystic tumors. Ovarian stroma in the marked enlarged ovaries were demonstrated as small solid portions exhibiting intermediate signal intensity on T2-weighted images, low intensity on T1-weighted images which showed intense contrast-enhancement, and high intensity on DWI. The ADCs in ovarian stroma in 7 HL and solid portions in 39 ovarian cancers were 1.86 ± 0.37 and 1.10 ± 0.28 and, respectively ($p<0.001$). Ovarian stroma in HL usually shows edema and luteinization which may increase the ADC, whereas ovarian cancers show hypercellularity which may decrease the ADC.

[Conclusions] We conclude that ovarian stroma in HL may mimic solid tumoral components in mucinous neoplasms as high intense area on DWI and as intensely enhanced area on Gadolinium-enhanced T1-weighted images, however, high ADC reflecting edematous, luteinized stroma may be helpful for the differential diagnosis, especially in HL associated with normal pregnancy, or in unilateral HL.

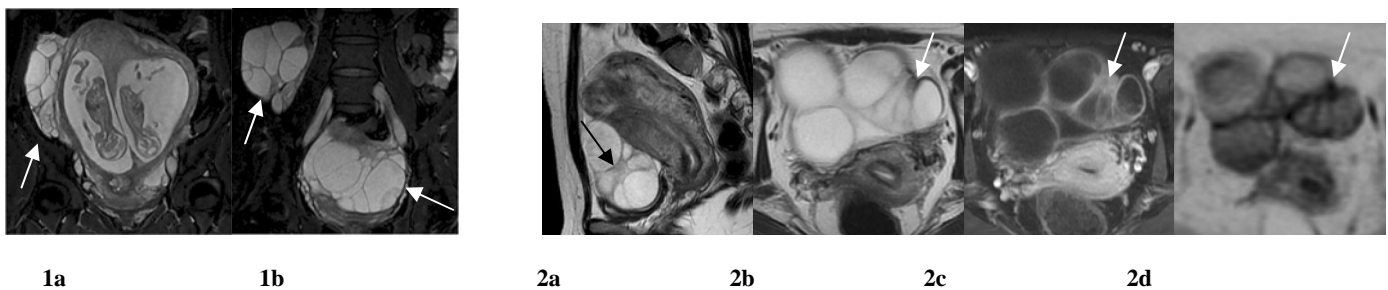


Fig.1: Twin-Pregnancy related HL: **a-b.** Coronal fat saturated T2WIs, Bilateral enlarged ovaries (arrow) are well demonstrated.

Fig.2: Hydatid mole related HL (after curettage): **a-b.** T2WI; **c.** Gd-fsT1WI; **d.** DWI, Ovarian stroma (arrow) in HL appears as small solid portion in multilocular cystic mass exhibiting intermediate intensity on T2WI, intense contrast-enhancement on Gd-fsT1WI, and high intensity on DWI.

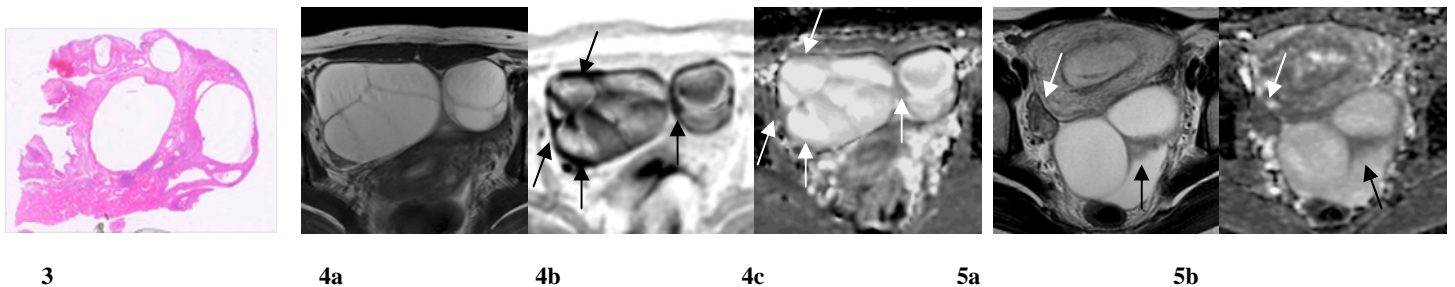


Fig.3: Pregnancy-related HL: Loupe photograph, Enlarged ovary with multiple theca lutein cysts.

Fig.4: OHSS: **a.** T2WI; **b.** DWI; **c.** ADC map, Bilateral HL containing high intense stroma (arrows) on DWI with relatively high ADC.

Fig.5: Pregnancy-related HL: **a.** T2WI; **b.** ADC map, Left sided unilateral HL containing stroma (black arrow) in which the ADC is similar to that in right ovarian stroma (white arrow).