

MR manifestations of endometrial cysts at 3T compared to 1.5T

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[Introduction] Endometriosis is a common disease in women of reproductive era. Because recurrent hemorrhage and repeated rupture of endometrial cysts may cause pelvic adhesions with infertility, early diagnosis is important for adequate treatment. Endometrial cysts usually show high signal intensity on T1-weighted images, but other hemorrhagic adnexal cystic masses such as corpus luteum cysts also show high signal intensity. The shading sign, which is T2-shortening in an adnexal cyst, is a characteristic magnetic resonance (MR) imaging feature of endometrial cysts, and is helpful for the differential diagnosis. The cause of hypointensity on T2-weighted images is complex, and hyperviscosity, and high concentration of protein and hemosiderin from recurrent cyclical bleeding may contribute to T2-shortening. Deposition of hemosiderin-laden macrophages in the cyst wall is another pathologic feature of endometrial cysts. Signal voids due to hemosiderin deposition in cyst wall may be well demonstrated in susceptibility-weighted images (SWI) and may be diagnostic for endometrial cyst, especially in the cysts, which are not bright on T1-weighted images, and are without the shading sign on T2-weighted images. Because susceptibility-induced signal intensity loss may increase from 1.5T to 3T, the shading sign on T2-weighted images and signal voids due to hemosiderin deposition on SWI may well visualized on 3T. In this study we evaluated MR manifestations of endometrial cysts at 3T compared to 1.5T.

[Materials and Methods] Fifteen ovarian endometrial cysts in ten patients were evaluated. MR examinations of the same patient at 3T and at 1.5T were performed continuously. Fast spin-echo T2-weighted images (TR/TE=4000ms/99.3ms) and fat saturated spin-echo T1-weighted images (TR/TE=600-700ms/7.9-9.6ms) were obtained in all patients both on a system with a 1.5T superconducting unit (Signa Excite HD, General Electric, Milwaukee, WI) and on a system with a 3T superconducting unit (Signa 3T HD, General Electric, Milwaukee, WI). Fast spin-echo T2-weighted images (TR/TE=9000ms/105.3ms) were also obtained at 3T in all patients. SWI (2D-FSPGR, TR/TE=700ms/30ms) were obtained in five patients both at 1.5T and at 3T. The cyst-to-muscle signal intensity ratio (SIR) was calculated from region-of-interest measurements. The signal intensity ratio was defined as the signal intensity of the cyst divided by the signal intensity of the piriform muscle or the iliopsoas muscle in the same plane.

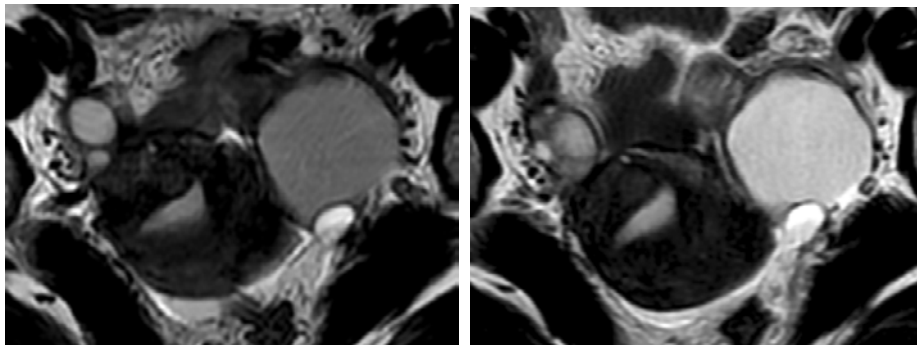


Fig. 1. T2-weighted images of a left endometrial cyst at 3T (left) and at 1.5T (right). The shading sign was demonstrated at 3T but not at 1.5T.

[Results] The signal intensity of the cysts was lower at 3T than that at 1.5T by visual evaluation. The cyst-to-muscle SIR at 3T (2.04 ± 0.90) was significantly ($p < 0.001$) lower than that at 1.5T (4.72 ± 2.34). In two lesions the shading sign was demonstrated at 3T but was not at 1.5T (Fig. 1). These results may reflect the higher sensitivity of 3T to the susceptibility-induced T2-shortening effect caused by intra-cystic old hemorrhagic contents such as hemosiderin. The signal voids due to hemosiderin deposition in the cyst wall were demonstrated better in susceptibility-weighted

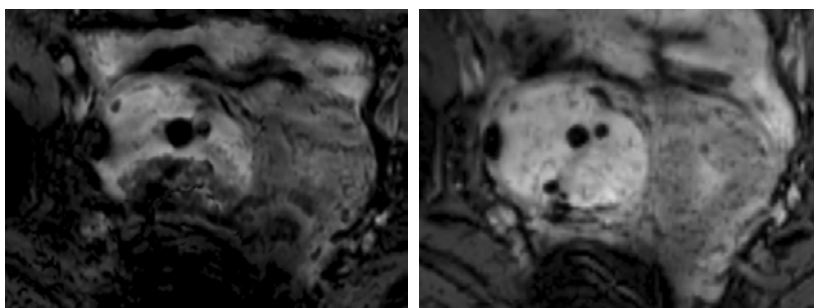


Fig. 2. SWI of a right endometrial cyst without the shading sign at 3T (left) and at 1.5T (right). Signal voids due to hemosiderin deposition are demonstrated larger at 3T. The susceptibility artifacts caused by air in the rectum were more prominent at 3T.

images (SWI) at 3T than at 1.5T (Fig. 2). However, the susceptibility artifacts caused by air in the intestines were more prominent on SWI at 3T.

[Conclusion] MR imaging at 3T is useful for the diagnosis of endometrial cysts with better demonstration of the shading sign on T2-weighted images. SWI may contribute to the diagnosis of endometrial cysts by demonstrating the hemosiderin deposition in the endometrial cyst wall.