Endometriosis

Endometriosis is defined as the presence of endometrial tissue outside the uterus (1). Regarding the histogenesis of endometriosis, metastatic theory, that mean ectopic transplantation of endometrial tissue, is the most widely accepted theory. Symptoms associated with endometriosis include infertility and pelvic pain. However, the severity of the diseases dose not always correlate with the heaviness of the symptoms. Laparoscopy is the standard of reference in the diagnosis of endometriosis. Staging of the disease can also be done during laparoscopy.

Although all pelvic organs can be affected by the disease, the most common site of involvement is the ovary. In the evaluation of suspected ovarian endometriotic cyst, ultrasonography (US) is the first imaging modality to be performed. Typical US findings of endometriotic cyst are cystic mass of diffuse low-level internal echoes, with or without septations. Dermoid cysts, hemorrhagic cysts and cystic neoplasms can all overlap in US appearance with that of endometriomas. MR findings are more specific and help to confirm diagnosis. The typical MR feature of endometriotic cyst is homogeneously hyperintense signal on T1-WI and hypointense signal on T2-WI. A common and important feature of an endometrioma is “shading” (ie, loss of signal within the lesion) on T2-WI. The high viscosity of the aged blood within the cyst contributes to the mechanism of shading. Multiplicity of hyperintense cysts on T1-WI regardless of intensity on T2-WI is another typical finding. Administration of gadolinium-based contrast material is not particularly useful in the evaluation of endometriotic cysts.

There are many lesion of endometriosis in extra-ovarian site, including cervix, urinary tract, gastrointestinal tract, chest and skin (2). MR imaging can demonstrate subtle finding of endometriosis that is difficult to detect by US. Regarding urinary tract, the bladder is the most frequently involved organ, followed by the ureters. On MR imaging, the lesion is shown as heterogenous bladder wall thickening at T2-WI of heterogenous signal intensity with occasional T1 hyperintense spots. Ureteral involvement of endometriosis is usually associated with local extension of other site of deep endometriosis, such as uterosacral ligament. Excretory urogram or MR urography obtained with 2D-T2WI reveals ureteral narrowing of a short or medium length (3). As for gastrointestinal tract, the most commonly affected areas are the rectosigmoid colon, followed by appendix, cecum, and distal ileum. The implants are usually at serosal but can eventually erode through the subserosal layers and cause marked thickening and fibrosis of the muscularis propria. The feature of disseminated area will be shown at the lecture.

Deeply infiltrating endometriosis is defined as an endometriotic lesion penetrating into the retroperitoneal space or the wall of the pelvic organs to a depth of at least 5 mm. MR imaging with high spatial resolution provide panoramic distribution of the deep lesions that was difficult by US and laparoscopy. Histologically, infiltrative lesions of deep pelvic endometriosis are mainly characterized by fibromuscular hyperplasia that surrounds foci of endometriosis. Therefore, the involvement of anatomic structures such as the uterosacral ligaments or the vaginal or rectal wall are suspected when these structures have a hypointense thickened or nodular appearance on T2-WI. The punctate foci of hemorrhage surrounded by solid fibrotic tissue is shown as high signal intensity at T1-WI. T1-weighted fast spin-echo with fat saturation sequence is useful for differentiation between hemorrhagic or fatty content of cystic lesions, detection of small implants, and better definition of their conspicuity.

Malignant transformation of endometriosis is an uncommon phenomenon at an approximate risk of about 2.5% (4). Cancer can occur in a wide histological range of tumors, with clear cell and endometrioid ovarian cancer at top frequencies. Endometriotic cyst with solid components and intermediate or high signal intensity on T2-WI or papillary projections are suggestive of malignancy. However, as almost half of the benign mural nodules are also enhanced, other clinical and imaging risk factors such as age of more than 40 years, large cyst size, lack of shading on MRI may help differentiation between benign and malignant lesion (5).

New approach for diagnosing endometriosis or functional analysis has been attempted. Since the endometriotic cyst consist of hemorrhage with strong susceptibility effects, diffusion weighted image and susceptibility-weighted imaging(SWI), both of which are very sensitive for susceptibility effect, will give additional information for diagnosis of endometriotic cysts. As for functional aspect, uterine peristalsis, which is rhythmic contraction of endometrial myometrial junction was examined by using cine MR. Uterine peristalsis in patients with endometriosis is weak in peri-ovation date. This fact can be related with higher rate of infertility in endometriosis patients. Evaluation of adhesion due to endometriosis was tried by using cine MRI with multislice acquisition.

In this lecture, MR finding including endometrioma and deep endometriosis and new techniques for diagnosing endometriosis will be illustrated.