Learning objectives

- To illustrate the role of MRI in assessment of endometriosis
- To make familiar with the manifestations of endometriosis in and outside the peritoneal cavity
- To alert to site special pain in different locations of endometriosis
- To present the imaging protocol for imaging endometriosis

Endometriosis is defined as presence of endometrial glands and stroma outside the uterus. It is most commonly found in the pelvis, however, deposits anywhere in the body have been described. Endometriosis is the most common cause of chronic pelvic pain in women of childbearing age, and it is estimated that 30-50% of females with endometriosis are infertile. Endometriosis in postmenopausal age is rare (5%). The most common sites of endometriosis include the ovaries, anterior and posterior pouch of Douglas, broad ligaments, uterosacral ligaments, fallopian tubes, rectosigmoid junction, and round ligaments. Other sites include vagina, urinary bladder and the ureters. The vast majority (80%) of endometriosis is intraperitoneal in location, particularly involving the ovaries.

Deep pelvic endometriosis, synonymous with deep infiltrating endometriosis, is defined as infiltration of endometriosis under the surface of the peritoneum. Although peritoneal endometriosis can be asymptomatic, it is typical deep pelvic endometriosis causing chronic pelvic pain, e.g. dysmenorrhea, dyspareunia, dyschezia, and urinary symptoms. Analysis of the type of pain aids in designing a tailored examination protocol in these patients, and it also aids in a specific image analysis at specific sites.

In MRI the most common manifestation of endometriosis are endometriotic cysts of the ovaries, also called endometriomas. Bilateral ovarian involvement occurs in one third to half of all patients.

Endometriotic cysts present as complex hemorrhagic lesions filled with blood products of different ages ranging from watery to mucinous to semiliquid chocolate colored contents. The cyst wall is usually thick and fibrotic, and commonly surrounded by dense adhesions. The vast majority of endometriomas range between 3 and 6cm in size, and rarely do they exceed the size of 15cm. Serum-CA-125 may be elevated in endometriosis.

In MRI the diagnosis of endometriomas is based upon the detection of blood product of different ages within a unilateral or bilateral adnexal mass. These lesions are composed of a single or multiple cysts typically displaying high SI on T1WI without and with FS. Signal intensity on T2WI is variable. Low SI on T2WI (“shading”) is due to chronic bleeding (fig. 1). This is a specific sign of endometriomas and is not found in hemorrhagic functional cysts or hemorrhagic ovarian tumors.

Using the criteria of hyperintense lesions on T1WI with shading on T2WI, or multiple hyperintense lesions regardless the SI on T2WI a sensitivity of 90% and specificity of 98% can be achieved. Endometriomas display often an irregular shape and a thick wall with low signal intensity and wall enhancement. Due to dense adhesions “kissing ovaries” may be found. Contrast enhanced MRI imaging is useful only in atypical cases, such as wall nodularity or suspected solid components.

Deep nodular (solid) endometriosis is typically found in the rectovaginal septum (fig. 2) and in other fibromuscular pelvic structures such as the uterine ligaments, the vagina, and the muscular wall of pelvic organs. The histologic findings of deep pelvic endometriosis are mainly characterized by fibromuscular hyperplasia that surrounds foci of endometriosis.
In MRI deep pelvic endometriosis differs substantially from endometriotic cysts. In deep endometriosis solid nodule formation is the predominant findings. If present, hemorrhagic foci tend to be very. These typically solid deep lesions demonstrate low to intermediate signal intensity with punctate regions of high signal intensity on T1-weighted images, uniform low signal intensity on T2-weighted images, and Gadolinium enhancement. Punctate foci of high signal intensity presenting hemorrhage surrounded by solid fibrotic tissue may sometimes be visualized.

Endometriosis of the bladder (fig. 3) can present as localized or diffuse bladder wall thickening and signal characteristics of deep pelvic endometriosis. As endometriosis seldom invades the mucosa, implants of the bladder or the colon are usually not seen during cystoscopy resp. endoscopy.

There is a 0.3-0.8% rate of malignancy in association with endometriosis. The presence of an enhancing mural withina- typically large (>15cm)- endometrioma is a finding suggesting malignant transformation, usually of endometroid and clear cell cancer. Caution should be paid in pregnancy where endometrioma may undergo decidual changes and thus may simulate malignancy. Furthermore, extensive endometriosis, resulting in a frozen pelvis may simulate ovarian cancer.