

## SHORT ABSTRACT

# Imaging of Endometriosis

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Endometriosis is a common cause of chronic pelvic pain, dysmenorrhea and infertility. Although 6–10% of women of child bearing age are affected by the disease, and even more in the group of patients with fertility problems, diagnosis is often delayed and treatment can be challenging. Depending on the complaints, extent of disease and the goals of treatment (fertility treatment, pain reduction, ...), both medical and surgical options are available for the management of this pathology and often a multidisciplinary approach will be necessary. Although diagnostic laparoscopy with histologic confirmation remains the golden standard for diagnosis, several imaging techniques can aid in the preoperative surgery planning. This presentation will focus mainly on the use of magnetic resonance imaging in the work-up of endometriosis.

**Keywords:** endometriosis; female pelvis; gynecological imaging; women's imaging

### Introduction

Endometriosis is a common cause of chronic pelvic pain, dysmenorrhea and infertility. Although 6–10% of women of child bearing age are affected by the disease, diagnosis is often delayed and treatment can be challenging. The impact on fertility is clear when we look at the higher prevalence of endometriosis in women with fertility problems (up to 47% according to some sources). Many theories on the pathophysiology exist, including the implantation of eutopic endometrium from retrograde menstruation, the metaplasia of pluripotent cells of the mesothelium, and thirdly the theory of müllerianosis: misplaced endometrial tissue at the time of fetal organogenesis developing into endometriosis. Endometriotic cells have the ability to embolize to distant locations, including the diaphragm, pleural cavity and even, on rare occasions, the brain. In doing so, this benign entity behaves much like a cancer. Malignant transformation of endometriomas can occur, and these patients have a fourfold increased risk of ovarian cancer. Endometriosis is a multifactorial disease, with a strong familial component but clear impact of environmental and other factors as well.

### The role of imaging

Treatment of endometriosis can be very challenging and depends on the goal: is it reduction of (pain) symptoms? Is it to tackle infertility? Or is it a combination of problems that needs addressing? The need for a multidisciplinary approach becomes clear at this point, discussing the extent of disease, the expectations of the patient, the goals of treatment and the best way to reach these goals. The Golden Standard of diagnosis in endometriosis remains diagnostic laparoscopy with histologic confirmation.

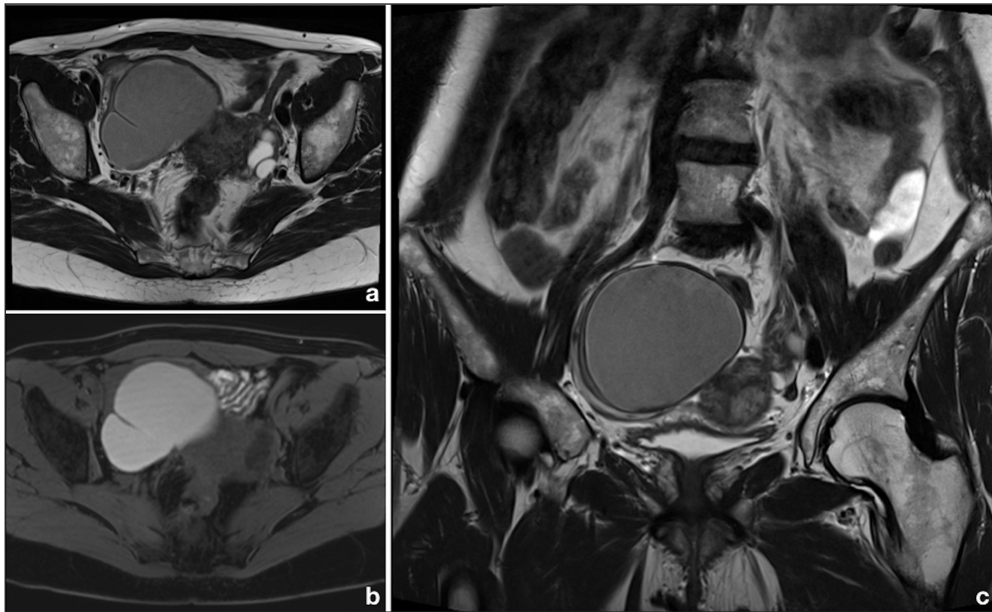
However, preoperative surgery planning can be aided by the use of several imaging techniques.

### Imaging techniques

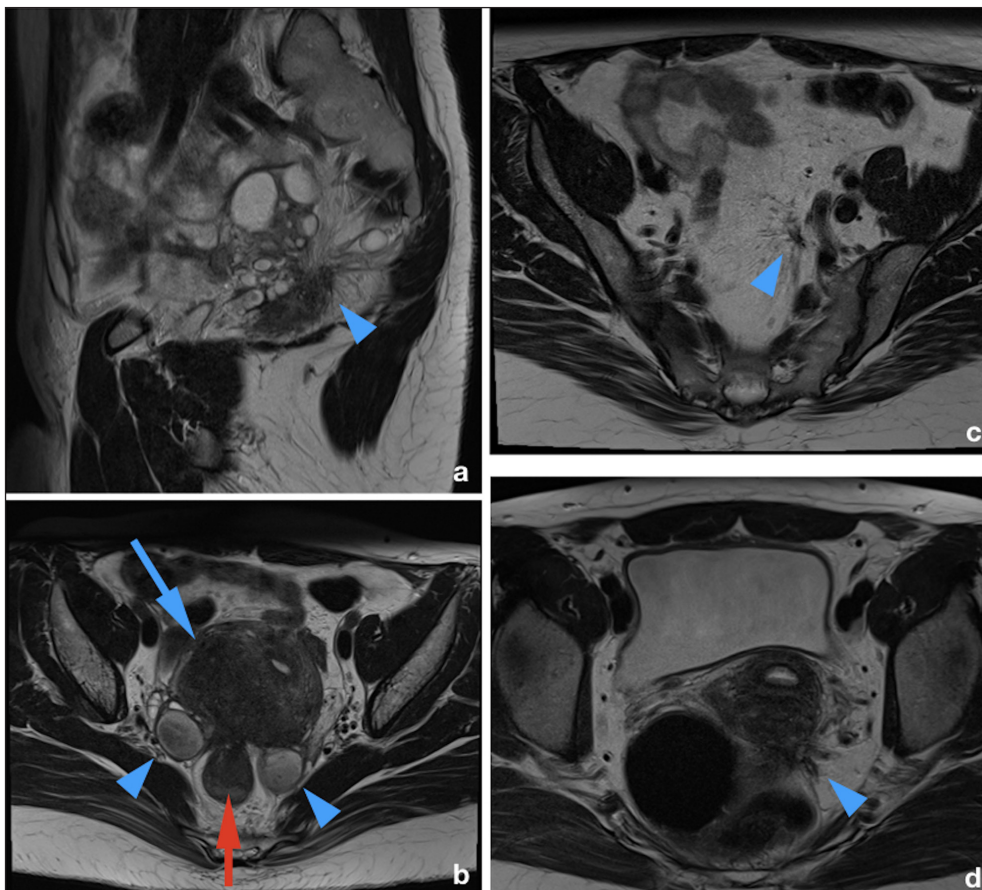
**Computed tomography (CT)** has no value in the initial work-up of endometriosis, lacking sensitivity and specificity. It does however play a role in the evaluation of postoperative complications.

**Transvaginal ultrasound (TVUS)** is relatively cheap and readily available. However, its sensitivity and specificity are very dependent on operator experience. The lack of anatomical landmarks for surgeons to recognize on these images explains why they are often reluctant to rely on this imaging technique alone. TVUS is difficult, if not impossible to apply in a virgo patient. Transabdominal ultrasound however is clearly inferior and should not be used as a substitute instead. Most often performed by gynecologists, this presentation will not go into further detail about this technique.

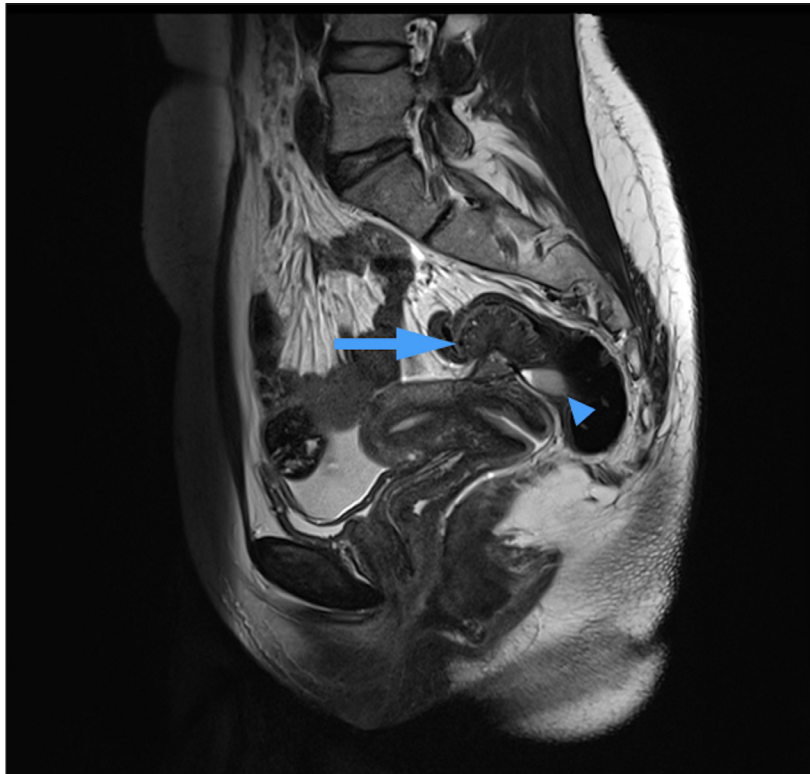
**Magnetic resonance imaging (MRI)** may be costlier and not so readily available, but it has the clear advantage of providing a more readily understandable anatomical image of the pelvis, with the additional possibility of second reading at a later time to look for additional findings. The larger field of view (FOV) of MRI as compared to TVUS allows for better evaluation of more distant locations. High resolution T2-weighted sequences with a small FOV in several planes form the basis of any endometriosis protocol. Endometrioma of the ovary is readily recognizable as a cystic lesion with T2 shading (**Figure 1**). Endometriosis implants most often present as T2-hypo-intense spiculated lesions that cause adhesions (**Figure 2**). Invasion through the serosa of the bladder or bowel wall and frank transmucosal growth is readily demonstrable (**Figure 3**). T1-weighted imaging can aid in the detection of hemorrhagic products (**Figure 1**). The addition of Gadolinium enhanced and diffusion weighted sequences should be



**Figure 1:** 45-year-old woman with cystic mass of the right ovary at routine gynecological check-up. Axial (a) and coronal (c) T2-weighted images show a thin-walled cyst of the right ovary with T2-shading. Axial T1-weighted image (b) demonstrates the high intensity content of blood degradation products.



**Figure 2:** Typical nodules appear as spiculate T2 hypo-intense lesions, but size does not always correlate with symptom severity. 33-year-old woman complaining of constant deep rectal pain (a), 40-year-old woman referred for suspected intramural myoma (b), 49-year-old premenopausal woman with very painful menstruation (c) and 33-year-old woman presenting with subfertility but otherwise asymptomatic (d). Patient in (b) does not only have a spiculate lesion in the cul-de-sac invading the rectal wall (red arrow), but also bilateral endometrioma of the ovaries, which are medially and posteriorly displaced (arrowheads). A large endometriotic nodule on the serosal side of the uterine wall (blue arrow) can be difficult to distinguish from a large adenomyoma.



**Figure 3:** 30-year-old woman with deep dyspareunia, cyclical dyschezia and hematoschezia. The large endometriosis nodule deeply invading the proximal rectal wall is evident as a mushroom shaped mass of intermediate to low signal intensity (arrow) with small hemorrhagic foci (not shown). Also note the loculated fluid in the cul-de-sac with T2-shading, representing hemorrhagic fluid (arrowhead). Surgical treatment incurs a risk of major bowel surgery and the possibility of a temporary stoma: facts that need to be discussed with the patient prior to surgical treatment. If surgical treatment is deemed necessary, the presence of an abdominal surgeon at the table for eventual bowel reconstruction can be planned.

considered when malignant transformation or concurrent malignancy of other origin is suspected.

#### Competing Interests

The author has no competing interests to declare.

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