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JMIG The Journal of Minimally Invasive Gynecology

Review Article

Imaging for Uterine Myomas and Adenomyosis

James Shwayder, MD, JD*, and Khaled Sakhel, MD

From the Departments of Obstetrics and Gynecology, University of Mississippi Medical Center, Jackson, Mississippi (Dr. Shwayder), and Eastern Virginia Medical School, Norfolk, Virginia (Dr. Sakhel).

ABSTRACT Uterine myomas and adenomyosis are common findings, in particular in patients with symptoms of abdominal enlargement, pelvic pressure, abnormal uterine bleeding, dysmenorrhea, and dyspareunia. Diagnosis and differentiation between the 2 entities are critical in establishing treatment options and the operative approach for surgical management. Herein are reviewed diagnostic options, their relative accuracy, and the effect of accurate diagnosis on treatment. A review was performed using PubMed, MdConsult, OVID, and reviews including cross-referenced articles and prospective and retrospective studies published from 1980 to 2013. Also reviewed are use of ultrasound with its various methods, magnetic resonance imaging, computed tomography, and positron emission tomography in the diagnosis, pretreatment evaluation, and differentiation of myomas and adenomyosis. Journal of Minimally Invasive Gynecology (2014) ■, ■–■ © 2014 AAGL. All rights reserved.

Keywords: Adenomyosis; CT; Doppler; Elastography; Leiomyoma; Leiomyosarcoma; MRI; Myoma; Ultrasound

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Leiomyomas, commonly called myomas or fibroids, and adenomyosis are common in patients undergoing surgical treatment. Myomas are observed in as many as 77% of hysterectomy specimens [1], and adenomyosis is present in as many as 70% of such specimens [2]. The diagnosis and differentiation of these entities are critical in establishing treatment options and the operative approach for surgical management [3]. This article reviews various diagnostic options, their relative accuracy, and the effect of accurate diagnosis on treatment.

Myomas

Prevalence

Studies have indicated that 5.4% to 77% of women have myomas, depending on the population studied and the method of diagnosis [4]. Myomas are more common as women age, and have been identified in 4% of women aged 20 to 30 years, 11% to 33% of women aged 30 to 40 years, and 33% of women aged 40 to 60 years. They are more common in African American women, nulliparous women, obese women, and women with a positive family history of myomas [5–7]. They may be less common in women who have used depot medroxyprogesterone acetate or who have had prolonged use of oral contraceptive agents [8].

Etiology

Myomas are probably of unicellular origin [9], with their growth influenced by estrogen, growth hormone, and progesterone. Estrogen and growth hormone tend to enhance growth, whereas progesterone inhibits growth. Thus, myomas arising during the reproductive years may enlarge during pregnancy, and they tend to shrink in menopause. Although rapid growth was thought to be indicative of malignancy (leiomyosarcoma), studies have reported the incidence to be low (0.27%), even in patients with rapidly enlarging myomas [10].

Symptoms

Myomas are suspected on the basis of clinical findings of an enlarged or irregular uterus or a pelvic mass. Depending

The authors declare no conflicts of interest.

Corresponding author: James Shwayder, MD, JD, Department of Obstetrics and Gynecology, University of Mississippi Medical Center, 2500 N State St, Jackson, MS 39216.
E-mail: jshwayder@umc.edu

Submitted October 8, 2013. Accepted for publication November 18, 2013.
Available at www.sciencedirect.com and www.jmig.org

1553-4650/$ - see front matter © 2014 AAGL. All rights reserved.
http://dx.doi.org/10.1016/j.jmig.2013.11.011

on uterine size and myoma location, patients may report abdominal enlargement, a full feeling, frequent urination, or difficulty with bowel movements. Occasionally, ureteric obstruction results from compression by an enlarging uterus. Pain, in particular with degeneration, may be the initial symptom.

Heavy menstrual bleeding is a common initial symptom of uterine leiomyomas, denoted in the International Federation of Gynecology and Obstetrics (FIGO) system as AUB-L [11]. Patients may have substantial blood loss, leading to weakness, vertigo, and cardiac arrhythmias or ischemia. One study has attributed 11% of symptomatic heavy menstrual bleeding to uterine myomas [8].

Although most myomas are asymptomatic, it is estimated that 25% are associated with symptoms substantial enough to warrant intervention [12]. Accurate diagnosis is crucial for treatment selection when intervention is required.

Treatment Options

There are numerous treatment options for uterine myomas, ranging from medical to surgical treatment. Treatment is typically reserved for symptomatic myomas, with symptoms including abnormal uterine bleeding, pelvic pain, infertility, pregnancy loss, or pressure or obstructive symptoms due to the size and location of myomas. Traditional teaching has also recommended removal of rapidly growing myomas because of concern for malignancy. However, the risk of leiomyosarcoma is $<0.3\%$ [10], and the incidence of malignant degeneration is $<1.0\%$ [13].

Medical treatment includes gonadotropin-releasing hormone agonists and antagonists, progestins, progesterone receptor modulators, aromatase inhibitors, and hormone-containing intrauterine devices [14–20]. Noninvasive treatment options include magnetic resonance imaging (MRI)-focused ultrasound (MRgFUS) and uterine artery embolization (UAE) or uterine fibroid (myoma) embolization (UFE). Surgical treatments include myomectomy via various routes including vaginal, hysteroscopic, laparoscopic (including robotics), and laparotomy. Hysterectomy remains the definitive treatment option. Other treatment options that enable uterine preservation include myolysis via freezing or hypothermia and hyperthermic ablation via laser or radiofrequency electrical energy [20–26].

An in-depth discussion of these various techniques is beyond the scope of this article. However, application of various diagnostic methods is addressed because it can affect patient selection and the preferred treatment option.

Diagnosis

Uterine leiomyomas, or myomas, are well-circumscribed lesions composed of smooth muscle and various amounts of connective tissue. Occasionally, calcium is scattered within or surrounding the myoma. A pseudocapsule with feeding vasculature often surrounds the tumor. With growth, some myomas outgrow their blood supply, leading to ischemia, necrosis, and subsequent hyaline, cystic, myxomatous, fatty, or carneous degeneration [27]. Multiple methods exist for diagnosing uterine leiomyomas. The ability to highlight the various features, the size of the uterus, the number and location of the myomas, and the effect on surrounding structures all contribute to the relative merit of each method.

Ultrasound

Ultrasound is the ideal first-line method of evaluation when myomas are suspected at clinical examination, either because of an enlarged or irregular uterus. It is relatively inexpensive and readily available in many office and clinic settings. The uterus may be enlarged with lobular contours, depending on the size and location of the myomas. Sonographically, myomas are characterized by a spherical hypoechoic or heterogeneous uterine mass (Fig. 1). Compression of the surrounding myometrium creates a pseudocapsule, with a fairly well-defined border in many myomas. The sonographic texture of the mass depends on the relative amount of fibrous tissue and smooth muscle present. Variable absorption of the sonographic beam often results in distal acoustic shadowing, often referred to as the venetian blind effect (Fig. 2). The presence of calcium leads to hyperechoic lesions within or surrounding myomas (Fig. 3). As myomas enlarge, they may outgrow their blood supply, leading to variable degeneration. Central degeneration leads to a heterogeneous sonographic appearance, often with cystic spaces within the myoma (Fig. 4). Although vaginal sonography offers enhanced resolution and architectural detail, its depth of penetration is typically limited to 10 to 12 cm. Thus, abdominal sonography is required with enlarged uteri or when myoma location prevents adequate penetration and visualization. Fatty degeneration or infiltration results in a hyperechoic spherical mass in the myometrium, or lipoleiomyoma (Fig. 5).

Fig. 1

Slightly hyperechoic myoma (thin arrow). Slightly hypoechoic myoma (block arrow).