Adenomyosis

8

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8.1 Epidemiology and Risk Factors

The true incidence of adenomyosis has not been accurately determined since the diagnosis can only be confirmed with histology, usually after hysterectomy. The prevalence of adenomyosis reported in the literature ranges widely from 5 to 70 % (Azzi 1989; Bergholt et al. 2001; Bird et al. 1972). The discrepancy may be due to the lack of a uniform diagnostic criterion. Adenomyosis is confirmed by the microscopic presence of endometrial tissue in the myometrium (Fig. 8.1). However, the depth of invasion of these endometrial implants for classification is variable in different studies. One study defines adenomyosis as endometrial glands within the myometrium greater than one low power field from the basalis layer, while another definition states that the foci need to be deeper than 25 % of myometrial thickness (Bergeron et al. 2006; Ferenczy 1998). While there is a large variation in the definition for diagnosis, most studies use the cut off of endometrial glands 25 mm below the basalis layer (Bergholt et al. 2001; Farquhar and Bronsens 2006; Uduwela et al. 2000). With this criterion, the mean frequency of adenomyosis at the time of hysterectomy is approximately 20–30 % (Azzi 1989; Parazzini et al. 1997; Vercellini et al. 1995).

While the exact etiology of adenomyosis is unknown, several risk factors have been identified in clinical series. Seventy to eighty percent

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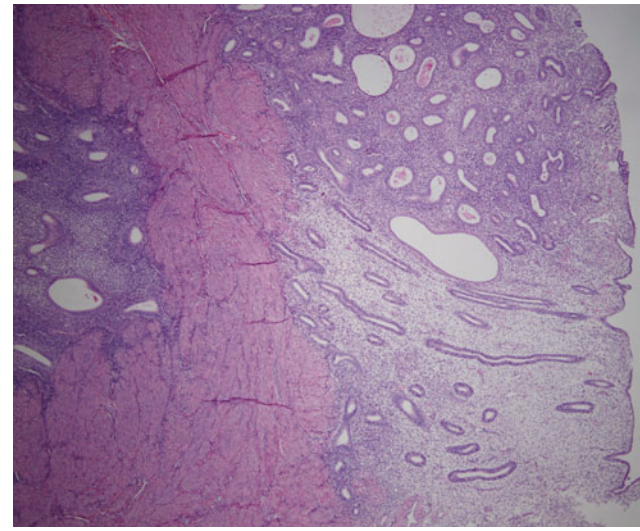

Fig. 8.1 Histological findings of adenomyosis with foci of endometrial glands and stroma found deep within the myometrium

of adenomyosis is reported in women in their fourth and fifth decades, but it is unclear if age is indeed a risk factor or a confounding factor (Azzi 1989). The higher prevalence in older women may be due to higher rates of hysterectomy later in life. It may, however, also be due to longer exposure to hormones that over time may stimulate endometriotic glands to invaginate into the myometrial wall (Garcia and Isaacson 2011).

Multiparous women also have higher rates of adenomyosis (Bergholt et al. 2001; Levgur et al. 2005; Parazzini et al. 1997; Vercellini et al. 1995; Taran et al. 2010). The frequency of adenomyosis has been linked directly to the number of pregnancies (Vercellini et al. 1995). The invasive nature of the trophoblast into the myometrium at the time of implantation may weaken the myometrium to allow active endometrial tissue to grow into the injured lining (Ferenczy 1998; Garcia and Isaacson 2011). In addition, the increase in hormones during pregnancy may also help stimulate the invagination of endometrial implants (Levgur et al. 2005).

Pelvic surgery, like pregnancy, can also weaken the myometrium through trauma with instrumentation during dilation and curettage, transmural surgery, or cesarean section (Ferenczy 1998). However, it remains unclear if prior uterine surgery is a risk factor since only a small series of cases show that pregnancy termination and dilation and curettage have an association with adenomyosis, while other studies show no statistical relationship between this disorder with cesarean section or myomectomy (Bergholt et al. 2001; Harris and Daniel 1985; Levgur et al. 2005; Parazzini et al. 1997; Taran et al. 2010).

8.2 Clinical Manifestations and Pathophysiology

Not all women with adenomyotic uteri are symptomatic but up to 75 % of women present with either menorrhagia, dysmenorrhea, or both (Benson and Sneeden 1958; Bergholt et al. 2001). Menorrhagia is likely caused by adenomyotic foci interfering with the normal musculature of the myometrium, preventing adequate contractions and permitting greater blood loss (Ferenczy 1998; Azzi 1989). Dysmenorrhea is likely a result of uterine irritability stimulated from the increase blood and from edema of the adenomyotic foci within the myometrium (Azzi 1989). Symptoms of chronic pelvic pain and dyspareunia are also common in women with adenomyosis. The pathophysiology of these symptoms is unclear. There is, however, high prevalence of adenomyosis in 70 % of women with endometriosis, which may contribute to these symptoms (Kunz et al. 2005). It is unclear if adenomyosis

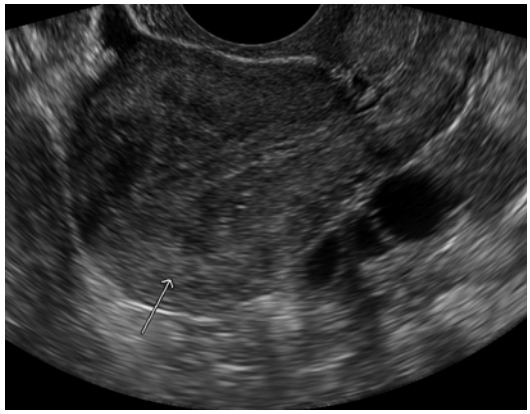

Fig. 8.2 Sagittal transvaginal sonography shows an asymmetric uterus with thickened posterior myometrial wall. The "*Arrow* show decreased echogencity and heterogeneity consistent with diffuse adenomyosis in the posterior wall of the uterus"

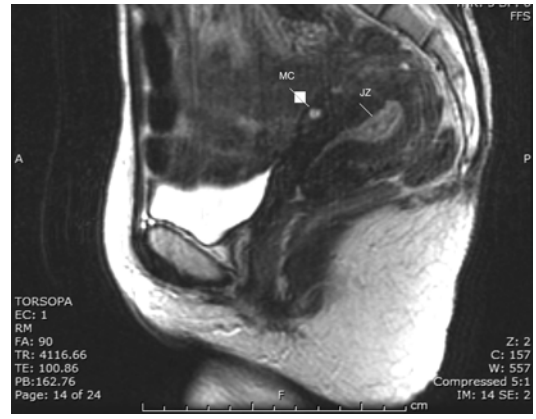

Fig. 8.3 Sagittal T2 weighted MRI images demonstrate ill defined 6.0×6.8 cm heterogeneous, hyperintense foci extending from the junctional zone (*JZ*) anteriorly measuring 21.94 mm (greater than 12 mm) suggesting adenomyosis. Myometrial cysts can be seen anteriorly (*MC*)

plays a role in reproductive outcomes, but some studies hypothesize that adenomyotic foci may interfere with implantation or impede sperm function through immune responses causing infertility (Devlieger et al. 2003; Ota et al. 1998).

8.3 Diagnostic Procedures

As described earlier (e.g. see Sect. 8.1), the diagnosis of adenomyosis is usually made from tissue specimens collected at the time of hysterectomy. Currently, the development of high quality, non-invasive imaging modalities has also been proven to be accurate in the diagnosis of adenomyosis as well. Findings of myometrial cysts, heterogeneous myometrial echotexture, and the visualization of the endometrial–myometrial interface (known as the junctional zone) have assisted with the differential diagnosis of adenomyosis using transvaginal ultrasound and magnetic resonance imaging (Bazot et al. 2001; Dueholm and Lundorf 2007; Felde et al. 1992; Reinhold et al. 1995) (Figs. 8.2 and 8.3).

In addition, advances in hysteroscopy and laparoscopy have provided minimally invasive techniques to assist in the diagnosis of adenomyosis. Hysteroscopy provides direct visualization into the uterine cavity and allows for the option

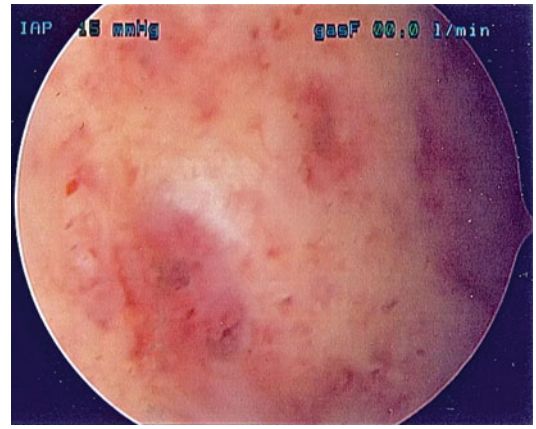

Fig. 8.4 Hysteroscopic image of adenomyosis with pathognomonic signs of pitting endometrial defects, cystic hemorrhagic lesions

of superficial myometrial biopsies for a histological diagnosis. Hysteroscopic findings of intramyometrial lacunae, an irregular endometrium with pitting defects, or cystic hemorrhagic lesions are all suggestive of adenomyosis (Fernandez et al. 2007; Molinas and Campo 2006) (Fig. 8.4). When adenomyosis cannot be seen, hysteroscopic myometrial biopsies can be performed at the posterior wall, where adenomyosis is most frequently found (Benson and Sneeden 1958; Emge 1962). In one study, hysteroscopic

myometrial biopsies were performed using a 5 mm loop electrode in fifty women with normal appearing cavities as well as a history of menorrhagia. Of those 50 women, 33 (66 %) had adenomyosis present at a depth greater than 1 mm (McCausland 1992). However, the sensitivity of the biopsy depends on extent, depth, and location of disease (Garcia and Isaacson 2011). Laparoscopic myometrial biopsies can be performed as well but have a high risk of bleeding (Popp et al. 1993).

8.4 Treatment

Suppressive hormonal treatments are effective for reducing symptoms of menorrhagia and dysmenorrhea but these medications only temporarily induce regression of adenomyosis during the course of therapy. Continuous oral contraceptive pills, high dose progestins, the levonogestrol intrauterine device, danazol, and GnRH agonists have all been used as conservative treatment options, as an alternative for hysterectomy. The standard of treatment still remains hysterectomy for those women who have completed child bearing. As imaging and minimally invasive diagnostic methods have evolved, less aggressive surgical options have also been developed in place of hysterectomy (Levgur 2007). Interventional radiology techniques such as uterine artery embolization and magnetic resonance guided focused ultrasound surgery have been used to treat adenomyosis (Kim et al. 2007; Rabinovici et al. 2006). Other conservative surgical treatment options such as endometrial ablation and resection, adenomyotic muscle excision and reduction, and electrocoagulation have also been performed and will be discussed in further detail.

When considering surgery as a treatment option, it is important to try to determine the area and extent of disease (Farquhar and Bronsens 2006). Because adenomyosis tends to be a diffuse process with ectopic endometrium invading throughout the entire myometrium, hysterectomy still remains the gold standard of treatment. It is the only guaranteed treatment for adenomyosis. Less invasive approaches with vaginal and laparoscopic hysterectomy are preferable to abdominal hysterectomy because of lower morbidity and faster recovery. While vaginal hysterectomy is more cost effective than the laparoscopic approach, laparoscopy may be more beneficial to the patient.

Furuhashi et al. (1998) showed that women with adenomyosis had higher rates of bladder injury at the time of vaginal hysterectomy. The authors concluded that the reason for increased rate of injury was unknown but it was hypothesized that there may be greater difficulty in identifying the supravaginal septum and the vesicovaginal or vesicocervical planes without direct visualization. In addition to allowing direct visualization for dissection, laparoscopy has the advantage of detecting and removing endometriosis that is commonly found in patients with adenomyosis (Wood 1998). The laparoscopic approach may also be beneficial due to less postoperative pain in comparison to vaginal hysterectomy (Candiani et al. 2009; Ghezzi et al. 2010). A review of 70 articles regarding hysterectomy showed lower costs and shorter operating times with vaginal hysterectomy, but the rates of blood transfusions, unexplained fever, and bleeding were higher with vaginal rather than the laparoscopic approach (Wood et al. 1997).

Adenomyosis can also appear in focal forms of circumscribed nodular aggregates of smooth muscle, endometrial glands, and stroma called adenomyomas. When adenomyomas can be localized with ultrasound or MRI, attempts can be made to excise the lesion alone. This conservative surgical option is usually attempted in women who wish to maintain fertility. However, unlike myomectomies, it can be difficult to define margins and expose lesions, which can lead to postoperative sequale affecting fertility. With excision, scar formation can affect the gestational capability of uterus, putting women at higher risk for spontaneous miscarriages (38.8 %) and uterine rupture (Wood 1998; Wang et al. 2009). However, a small study showed that conservative treatment with adenomyoma excision (mean size of 55 mm) resulted in a 70 % pregnancy rate (49/71 patients) with relief of symptoms of menorrhagia and dysmenorrheal (Wang et al. 2009).

In addition, with an excisional procedure, lesions can be left behind causing patients to remain symptomatic or relapse due to the inability to clearly exposure margins in adenomyomas. Due to the low efficacy of excision of 50 %, medical therapy is often used in combination to help prevent relapses (Wang et al. 2009).

Excision of diffuse adenomyosis, also known as myometrial reduction, can be performed as well. A wedge defect is created in the myometrium and is repaired by metroplasty with laparoscopy or laparotomy (Levgur 2007). Only a small number of cases have been performed and the outcomes show low postoperative pregnancy rates likely due to scar tissue formation (Wood 1998; Fujishita et al. 2004; Nishida et al. 2010; Fedele et al. 1993). Similar to excision of adenomyomas, clinical improvement may only be temporary and there is high risk of recurrence due to poorly defined margins (Levgur 2007).

Laparoscopic myometrial electrocoagulation is another conservative treatment option that allows women to maintain their uterus this procedure is performed by the laparoscpic insertion of a unipolar or bipolar needle electrode into the affected myometrium. It can be used for both focal and diffuse adenomyosis, causing necrosis to the abnormal tissue. The procedure is not recommended for women who wish to conceive given that it can reduce the strength of the myometrium by replacing the adenomyotic foci with scar tissue and therefore has an increased risk of uterine rupture (Wood et al. 1994). Outcomes are inferior to surgical excision since the electrical conduction through the abnormal tissue may be incomplete and some foci of adenomyosis may be missed at the time of surgery (Levgur 2007). It can be performed concurrently with patients undergoing endometrial ablation/resection to improve rates of success (Wood 1998; Phillips et al. 1996).

The most common conservative surgical option performed for adenomyosis is endometrial ablation/resection. It can be performed with a YAG laser, rollerball resection, or with global ablation techniques including Novasure, ThermaChoice, or cryotherapy in women who no longer wish to conceive. However, success rates are dependent on the depth of invasion of adenomyotic foci into the uterine wall (McCausland and McCausland 1996). Resection is performed to a depth of 2–3 mm into the myometrium. Deeper resection has a higher risk of bleeding from the arteries that are situated approximately 5 mm deep to the myometrial surface. In patients with superficial adenomyosis (penetration less than 2 mm), endometrial resection has successful outcomes with no residual bleeding or postablation light cyclic periods that resolved with continuous progesterone therapy (McCausland and McCausland 1996). However, patients with deep adenomyosis (greater than a depth of 2 mm) have poor results with 33 % failure rate, which usually require hysterectomy (Raiga et al. 1994; McCausland and McCausland 1996). With deep adenomyosis, the ectopic deep endometrial glands can persist under the scar and eventually proliferate though the area of ablation or resection to cause recurrent bleeding. Repeat resection is usually unsuccessful for deep adenomyosis and these patients rarely respond to continuous progesterone therapy.

Global endometrial ablation has also been proven to successfully treat excessive bleeding in women with adenomyosis. However a retrospective review of women who underwent thermal balloon and radio frequency ablation showed 1.5 times increased risk of failures in women with findings of adenomyosis on ultrasound requiring the need for subsequent hysterectomy or repeat ablation (El Nashar et al. 2009).

8.5 Summary

Advances in endoscopic surgery have allowed for various diagnostic and therapeutic surgical options for adenomyosis other than hysterectomy. While hysterectomy still remains the gold standard treatment, minimally invasive procedures with hysteroscopy and laparoscopy can improve symptoms of dysmenorrhea and menorrhagia in young women. Laparoscopic treatments, such as adenomyotic muscle excision and reduction, and electrocoagulation, allow women to maintain their uterus but may have higher

failure rates and compromise fertility due to scarring and incomplete excision. Hysteroscopic procedures such as ablation and resection are effective in improving symptoms of menorrhagia in women who have completed when adenomyotic foci are superficial (<2 mm). High failure rates are noted when deep adenomyosis is present.

References

Azzi R (1989) Adenomyosis: current perspectives. Obstet Gynecol Clin North Am 16:221–235

Bazot M, Cortez A, Darai E et al (2001) Ultrasound compared with magnetic resonance imaging for the diagnosis of adenomyosis: correlation with histopathology. Hum Reprod 16:2427–2433

Benson R, Sneeden V (1958) Adenomyosis: a reappraisal of symptomatology. Am J Obstet Gynecol 76:1044

Bergeron C, Amant F, Ferency A (2006) Pathology and physiology of adenomyosis. Best Pract Res Clin Obstet Gynaecol 20:511–521

Bergholt T, Eriksen L, Ferendt N et al (2001) Prevalence and risk factors of adenomyosis at hysterectomy. Hum Reprod 16:2418–2421

Bird C, McElin T, Manalo-Estrella P (1972) The elusive adenomyosis of the uterus revisited. Am J Obstet Gynecol 112:583–593

Candiani M, Izzo S, Bulfoni A et al (2009) Laparoscopic vs vaginal hysterectomy for benign pathology. Am J Obstet Gynecol 200:368.e1–7

Devlieger R, D'Hooghe T, Timmerman D (2003) Uterine adenomyosis in the infertility clinic. Hum Reprod Update 9:139–147

Dueholm M, Lundorf E (2007) Transvaginal ultrasound or MRI for diagnosis of adenomyosis. Curr Opin Obstet Gynecol 19:505–512

El Nashar S, Hopkins M, Creedon D (2009) Prediction of treatment outcomes after global endometrial ablation. Obstet Gynecol 113:97–106

Emge L (1962) The elusive adenomyosis of the uterus. Am J Obstet Gynecol 83:1541–1563

Farquhar C, Bronsens I (2006) Medical and surgical management of adenomyosis. Best Pract Res Clin Obstet Gynaecol 20:603–626

Fedele L, Bianchi S, Zanotti F et al (1993) Fertility after conservative surgery for adenomyomas. Hum Reprod 8:1708–1710

Felde L, Bianchi S, Dorta M et al (1992) Transvaginal ultrasonography in the diagnosis of diffuse adenomyosis. Fertil Steril 58:94–97

Ferenczy A (1998) Pathophysiology of adenomyosis. Hum Reprod Update 4:312–322

Fernandez C, Ricci P, Fernandez E (2007) Adenomyosis visualized during hysteroscopy. J Minim Invasive Gynecol 14:555–556

Fujishita A, Masuzaki H, Khan K et al (2004) Modified reduction surgery for adenomyosis. A preliminary report of the transverse H incision technique. Gynecol Obstet Invest 57:132–138

Furuhashi M, Miyabe Y, Katsumata Y et al (1998) Comparison of complications of vaginal hysterectomy in patients with leiomyomas and in patients with adenomyosis. Arch Gynecol Obstet 262:69–73

Garcia L, Isaacson K (2011) Adenomyosis: a review of the literature. J Minim Invasive Gynecol 18: 428–437

Ghezzi F, Uccella S, Cromi A et al (2010) Postoperative pain after laparoscopic and vaginal hysterectomy for benign gynecologic disease: a randomized trial. Am J Obstet Gynecol 203:118.e1–8

Harris W, Daniel J (1985) Prior cesarean section: a risk factor for adenomyosis? J Reprod Med 30:173–175

Kim M, Kim S, Kim N (2007) Longer term results of uterine artery embolization for symptomatic adenomyosis. AJR Am J Roentgenol. 2007;188(1):176–181

Kunz G, Beil D, Huppert P et al (2005) Adenomyosis in endometriosis-prevalence and impact on fertility. Evidence from magnetic resonance imaging. Hum Reprod 20:2309–2316

Levgur M (2007) Therapeutic options for adenomyosis: a review. Arch Gynecol Obstet 276:1–15

Levgur M, Abdai MA, Tucker A (2005) Adenomyosis: symptoms, histology, and pregnancy terminations. Obstet Gynecol 95:688–691

McCausland A (1992) Hysteroscopic myometrial biopsy: its use in diagnosing adenomyosis and its clinical applications. Am J Obstet Gynecol 166:1619–1626

McCausland A, McCausland V (1996) Depth of endometrial penetration in adenomyosis helps determine outcome of rollerball ablation. Am J Obstet Gynecol 174: 1786–1794

Molinas C, Campo R (2006) Office hysteroscopy and adenomyosis. Best Pract Res Clin Obstet Gynaecol 20:557–567

Nishida M, Takano K, Arai Y (2010) Conservative surgical management for diffuse uterine adenomyosis. Fertil Steril 94(2):715–719

Ota H, Igarshi S, Hatazawa J et al (1998) Is adenomyosis an immune disease? Hum Reprod 4:360–367

Parazzini F, Vercellini P, Pazza S et al (1997) Risk factors for adenomyosis. Hum Reprod 12:1275–1279

Phillips D, Nathanson H, Milim S et al (1996) Laparoscopic bipolar coagulation for the conservative treatment of adenomyomata. J Am Assoc Gynecol Laparosc 4:19–24

Popp L, Schwiedessen J, Gaetje R (1993) Myometrial biopsy in the diagnosis of adenomyosis uteri. Am J Obstet Gynecol 16(3):546–549

Rabinovici J, Inbar Y, Eylon S (2006) Pregnancy and live birth after focused ultrasound surgery for symptomatic focal adenomyosis: a case report. Hum Reprod 21:1255–1259

Raiga J, Bowen E, Glowaczower E et al (1994) Failure factors in endometrial resection. J Gynecol Obstet Biol Reprod 23:274–278

Reinhold C, Atrim M, Mehio A et al (1995) Diffuse uterine adenomyosis: morphologic criteria and diagnostic accuracy of endovaginal sonography. Radiology 1197: 609–614

Taran F, Weaver A, Coddington C et al (2010) Characteristics indicating adenomyosis coexisting with leiomyomas: a case control study. Hum Reprod 25:1177–1182

Uduwela A, Perra M, Aiquig L et al (2000) Endometrial-myometrial interface: relationship to adenomyosis and changes in pregnancy. Obstet Gynecol Surv 55: 390–400

Vercellini P, Parazzini F, Oldani S et al (1995) Adenomyosis at hysterectomy: a study on frequency distribution and patient characteristics. Hum Reprod 10:1160–1162

Wang P, Wei-Min L, Jong LF et al (2009) Comparison of surgery alone and combined surgical-medical treatment in the management of symptomatic uterine adenomyoma. Fertil Steril 92:876–885

Wood C (1998) Surgical and medical treatment of adenomyosis. Hum Reprod 4:323–336

Wood C, Maher P, Hill D (1994) Biopsy and conservative surgical treatment of adenomyosis. J Am Assoc Gynecol Laparosc 4:313–316

Wood C, Maher P, Hill D (1997) Bleeding associated with vaginal hysterectomy. Aust N Z J Obstet Gynaecol 37:457–461