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UTERINE FIBROIDS AND ENDOMETRIAL LESIONS (T. TULANDI, SECTION EDITOR)

Surgical Treatment of Adenomyosis

Marco Aurelio Pinho Oliveira[1] · Leila Cristina Brollo[1] · Thiers Soares[1] · Thiago Dantas Pereira[1] · Ricardo Jose de Souza[1]

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Abstract

Purpose of review This paper aims to discuss the state of the art of the conservative surgical treatment of adenomyosis.

Recent findings Medical treatment for adenomyosis is usually the first step, but some patients do not respond. Hysterectomy using minimally invasive techniques is the gold-standard treatment for those patients that do not desire pregnancies. Although there is no definitive evidence to support conservative surgical treatment for adenomyosis, many authors described good results in women who wish to preserve fertility.

Summary Although hysterectomy is the main form of treatment, conservative options should be offered to women who wish to maintain their fertility. Several excisional and non-excisional techniques can be indicated for selected patients with promising results, always keeping in mind the risks of uterine rupture and recurrence with these techniques.

Keywords Adenomyosis · Fertility · Minimally invasive surgery · Robotic surgery · Conservative surgery · Laparoscopy

Introduction

Adenomyosis is a benign uterine disease where endometrial glands and stroma are pathologically demonstrated in the myometrium. Women affected by this disease may have abnormal uterine bleeding, dysmenorrhea, dyspareunia, or infertility. However, they are asymptomatic in about one-third of cases [1].

Although adenomyosis and endometriosis are independent diseases, they usually coexist, and approximately 20% of patients undergoing surgery to treat endometriosis have uterine adenomyosis [2].

This condition has been associated with a negative impact on fertility, decreasing the rate of spontaneous pregnancy and increasing the rate of miscarriage. It also affects the results of assisted reproduction techniques [1].

Medical treatment for adenomyosis is usually the first step, but some patients do not respond and need surgery to relieve symptoms. Furthermore, there is no scientific evidence that drug treatment can increase pregnancy rates, and conservative surgery may be indicated, especially in cases of multiple failures in vitro fertilization [3].

Surgical Treatment

Hysterectomy is the gold-standard treatment for women who do not want future fertility and offers, as an advantage, non-recurrence [4]. This procedure should preferably be performed using minimally invasive techniques. It is recommended to perform the surgery vaginally, laparoscopically, or robotically [5]. However, many women with adenomyosis complain of infertility and have a history of recurrent abortions. Furthermore, some symptomatic women (dysmenorrhea, abnormal uterine bleeding) still want to become pregnant in the future. Therefore, it is essential to consider conservative surgeries for those patients that still want to get pregnant. Conservative surgeries such as adenomyomectomy and myometrial excision can be indicated. Excision of extensive adenomyosis is complex and is associated with a high recurrence rate [6].

This article is part of the Topical Collection on *Uterine Fibroids and Endometrial Lesions*

✉ Marco Aurelio Pinho Oliveira
endometriose@gmail.com

[1] Department of Gynecology, State University of Rio de Janeiro, Avenida 28 de Setembro, 77, Vila Isabel, Rio de Janeiro, Brazil

Conservative Surgery

The surgical approach is still controversial. There is no robust evidence to support conservative surgical treatments for adenomyosis, and the patient should be informed of the potential risks in pregnancy. Minimally invasive surgical treatments should be performed in specific cases [1].

Cytoreductive surgery combined with GnRH analogs (GnRHa) has been used successfully in patients who desire to become pregnant [7]. However, it is essential to emphasize that the woman's age indicates conservative surgery. For example, Kishi et al. found that women under 40 years of age have a pregnancy rate of 41.3% after conservative surgery versus 3.7% in women 40 years of age and older [8].

Most procedures are still performed by laparotomy or laparoscopy, but the robotic approach can also be performed. In addition, the simultaneous occlusion of the uterine artery has been advocated to reduce blood loss [6].

There are two basic types of conservative techniques: non-excisional techniques (thermal coagulation of the diseased myometrium, uterine artery embolization, ablative radiofrequency) and excisional techniques, which include adenomyomectomy (complete removal of the focal disease, usual adenomyoma – Fig. 1A) and myometrectomy (partial removal of the diseased myometrium, usually diffuse-type – Fig. 1B) [9•].

Younes and Tulandi, in a revision, found an estimated recurrence rate of 9% in the complete excision technique, 19% in the partial excision technique, and 32.5% in the non-excisional techniques (endometrial ablation and myometrial electrocoagulation) [6].

Non-excisional Techniques

Thermal Coagulation

The high-intensity focused ultrasound method uses the thermal effect of the ultrasound beam, causing coagulative necrosis within the adenomyotic lesion. The lesion must be visible on imaging (ultrasound or magnetic resonance) so that the beam can be directed to the adenomyoma. This technique is not suitable for the diffuse form of adenomyosis [10].

Uterine Artery Embolization

Uterine artery embolization for the treatment of adenomyosis remains new compared to its use in treating fibroids. Randomized controlled trials demonstrated no difference in satisfaction between uterine artery embolization and surgery to treat myoma. The ongoing QUESTA study seeks to address satisfaction (uterine artery embolization x hysterectomy) for the treatment of adenomyosis [9•]. They estimate an 80% success rate of the uterine artery embolization for the treatment of adenomyosis, with a cumulative failure rate of 20/102 (20%) at 52 months.

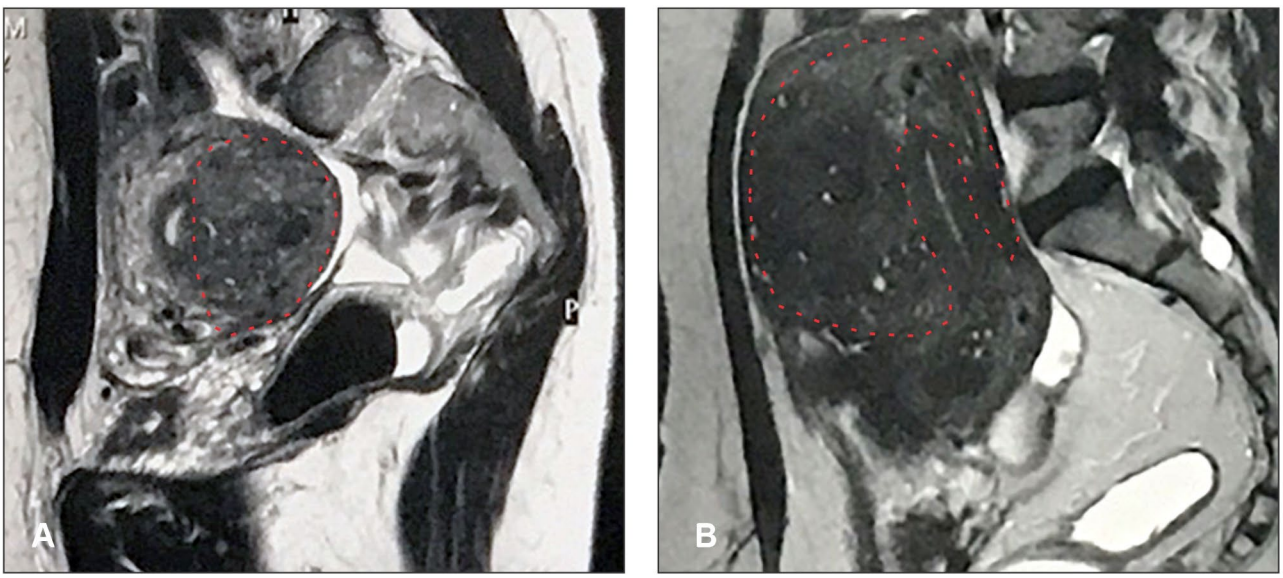

Fig. 1 **A** Focal adenomyosis (inside red line); usually treated with adenomyomectomy. **B**- Diffuse adenomyosis; usually treated by extensive myometrium excision (myometrectomy)

Ablative Radiofrequency

One of the most recent technologies to treat focal or diffuse adenomyosis is ablative radiofrequency (RF). It can be done by laparoscopy, transcervical, or transvaginal route. The transvaginal RF is performed using a long needle guided by transvaginal ultrasound introduced through the vagina to destroy adenomyosis by elevating the temperature inside the tissue. In a study from 2020, the mean reduction of adenomyosis was 67.3% [11•]. Scarperi et al., 2015 achieved the same result using laparoscopic radiofrequency [12]. Pregnancy outcome after this procedure was also evaluated in another study. From 81 patients enrolled, twenty-nine (36%) conceived. Age < 40 and focal adenomyosis were associated with higher pregnancy rates [12, 13]. We still need further studies, but radiofrequency is a promising tool to help selected patients improve their quality of life and hopefully increase the pregnancy rate.

Excisional Techniques

Endometrial Ablation or Resection

Endometrial ablation/resection is widely used to treat abnormal bleeding and may be an alternative treatment for adenomyosis. It can be performed with laser, rollerball, loop, and using third-generation ablative techniques such as thermal balloons and radiofrequency. However, there is a high clinical failure with a chance of reducing hysterectomy by only 30% [14].

Adenomyomectomy

Adenomyomectomy is the preferred technique in cases of focal disease and has long been described by Hyams [15]. Dissection and extraction of the lesion were performed after a longitudinal incision and, finally, closure of the uterine wall [2]. The main difference is that the transition between the normal and pathologic myometrium is challenging to identify in patients with adenomyomas compared to patients with myomas.

Myometrial Excision (myometrectomy)

Myometrectomy consists of removing as much of the macroscopic lesion as possible. The surgeon must take care because if a large amount of healthy myometrium is excised, the result can lead to a "functional" hysterectomy [2].

Myometrectomy can be performed by many techniques, such as wedge resection of the uterine wall, transverse H incision, and flap techniques.

a. Wedge Resection of the Uterine Wall

   In this technique (Fig. 2), the surgeon removes parts of the uterine serosa and adenomyosis by wedge resection via laparotomy, laparoscopy, or robotics. First, a V-shaped incision is made to remove as much of the adenomyotic area as possible [16]. Then, the wound in the uterine wall created by the adenomyoma resection is sutured together with the remaining muscle layer and the serosa [3]. However, parts of adenomyotic tissue may remain on either or both sides of the incision.

b. Transverse H incision

   Fujishita, in 2004, proposed a different approach toward adenomyosis resection. The authors performed a longitudinal incision and two transverse incisions that resemble the letter H. The dissection was carried out, leaving a 5 mm serosal margin from the adenomyotic tissue resected. The incision created is wide enough to remove large amounts of the affected tissue. Resection is extended as close to the endometrium as possible [17]. A blue dye test can be used if there is doubt about opening the uterine cavity. The defect is closed in multiple layers to achieve hemostasis and minimize dehiscence risk. This approach was used in six patients and compared with the conventional approach used in five patients. No difference was observed in blood loss and operating time; however, subjective pain relief was slightly higher in the novel technique group.

c. Flap techniques

These techniques were developed for patients with diffuse adenomyosis to preserve the uterus for a future pregnancy.

In 2011, Osada described a triple-flap technique that consists of radical excision of the adenomyotic tissue, leaving a 1 cm margin of healthy tissue above the endometrium and a 1 cm margin of healthy tissue below the serosal surface. A tourniquet is placed during the beginning of the procedure. First, a miduterus incision is made from the serosa until the uterine cavity is opened. Then, the adenomyotic tissue is removed from the two sides of the uterus. Finally, Osada used the 3-flaps technique to close the uterine wall [18].

In the same study, Osada evaluated 104 patients from 1998 to 2008. Dysmenorrhea and hypermenorrhea were present in all patients. Duration of surgery was 182.7 +—62.2 min, and the volume of blood loss during surgery was 372.0 +—314.4 ml. Twenty-six women wished to conceive, and 61.5% subsequently achieved it. Sixteen out of 26 patients got pregnant. In addition, there were 14 elective C-sections and two abortions [18].

In 2014, Kim et al. introduced the double flap procedure assisted by laparoscopy [19]. Huang et al. compared the conventional approach and the double flap procedure but

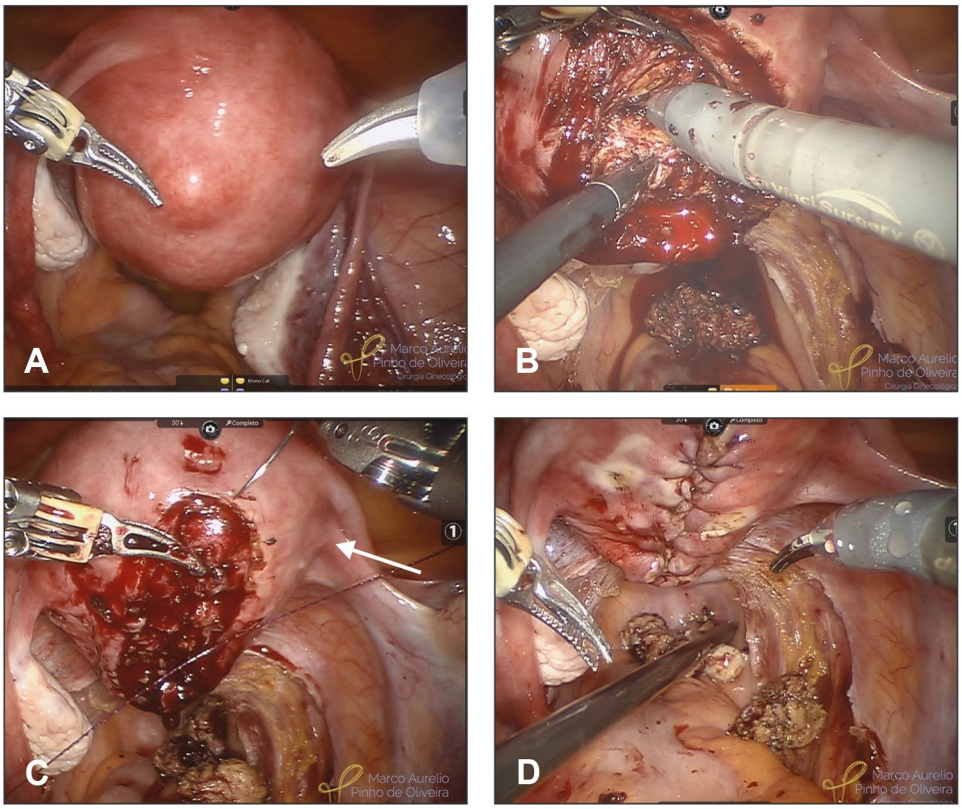

Fig. 2 **A**—Focal adenomyosis in the posterior wall. **B** – Robotic surgery (longitudinal excision of the adenomyoma). **C** – Suture of the myometrium defect (second layer). **D** – Final aspect of the myometrium closure

used a complete laparoscopic approach [20]. Although both methods effectively reduced all the parameters observed compared to baseline scores, the latter technique had a statistically significant reduction in CA-125 levels, pain VAS, uterine size, and menstrual flow, but the surgical time was longer. Blood loss was comparable in both procedures.

It is postulated that the laparotomic approach is superior to laparoscopy [3]. Zhu et al. evaluated the long-term efficacy of the two methods. After six years, they observed that efficacy was higher (75% vs. 62,1%) and recurrence was lower (27,8% vs. 17,1%) in the laparotomic group, but it did not reach statistical significance [21]. Recurrence was lower where long-term medical treatment was instituted (GnRHa plus SIU-levonorgestrel or OC) compared to GnRHa alone. Ahn et al. compared a total of 277 patients submitted to laparoscopy (82 patients), laparotomy (170 patients), and laparoscopic-assisted mini-laparotomy (25 patients) for adenomyomectomy [22•]. The laparotomic and laparoscopic-assisted mini-laparotomy groups had similar blood loss, mass volume removed, and length of stay. The laparoscopic group had less estimated blood loss, febrile morbidity, and shorter hospital stay; however, the mass volume of adenomyotic tissue excised was lower. The authors suggested that the association of laparoscopy and mini-laparotomy might benefit the complete excision of adenomyotic tissue while maintaining a minimally invasive approach.

Results

Reproductive Outcomes After Conservative Surgery

A systematic review from 16 studies with a combined 1396 women treated with conservative surgery showed that the pregnancy rate seems to be better in those with focal disease than those with diffuse adenomyosis. Compiled results are shown in Table 1, and it appears that diffuse adenomyosis surgery alone has better pregnancy rates than surgery associated with medical treatment. On the other hand, adding medical therapy to surgical procedures improves pregnancy rates for the focal disease. The same occurs with successful delivery rates. They also found that focal adenomyosis has a higher rate of natural conception after surgery than diffuse, suggesting that the disease extension of the last may compromise the surgical cytoreduction and increase the risk of damaging the uterine integrity [23].

Complications

Complications related to hysterectomy are already well known, but the main complications of interest in the surgical treatment of adenomyosis are related to conservative procedures.

Table 1 Pregnancy outcomes after conservative surgery for adenomyosis

Adenomyosis type	Treatment	Pregnancy rate (%)	Successful delivery rate (%)	Miscarriage rate (%)
Diffuse	Surgery Alone	38.5	31.3	16.2
	Surgery & Medical	17.6	9.8	33.3
Focal	Surgery Alone	49.1	38.6	27.6
	Surgery & Medical	67.1	61.3	11.6

After conservative surgical treatment, the gynecologist should pay attention to the appearance of a newly developed mass and the increase in the size of the remaining lesion in the uterus to detect the recurrence of uterine adenomyosis. In addition, the return of symptoms is vital to determine the clinical significance [24]. There are few reports on the factors that influence the recurrence of adenomyosis. In 2018, a review indicated that recurrence rates of adenomyosis were associated with the extent of excision [6]. Yu et al. analyzing 46 patients, observed that those with adenomyosis associated with endometriosis and higher CA 125 levels were more likely to experience the relapse of dysmenorrhea following adenomyomectomy [25].

The risk of uterine rupture during pregnancy is possible after conservative adenomyosis surgery. The specific risk is unknown, but some cases were reported [26–28]. In addition to direct damage to the uterine wall, excessive energy use would be another cause that could explain uterine ruptures in patients undergoing procedures for adenomyosis resection. The use of energy (high power cut current whenever possible) may delay the healing process. The use of vasopressin and removal of adenomyotic tissue with cold scissors could be an interesting option to better tissue healing and may reduce the incidence of uterine rupture [29].

Conclusions

Although hysterectomy is the main form of treatment, conservative options should be offered to women who wish to maintain their fertility. Several excisional and non-excisional techniques can be indicated for selected patients with promising results, always keeping in mind the risks of uterine rupture and recurrence with these techniques.

Compliance with Ethical Standards

Conflict of Interest None of the authors have any conflict of interest.

Research Involving Human and Animal Participants As a review manuscript, this article does not contain any studies with human participants or animals performed by any of the authors.

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