

Surgical Uterine-Sparing Management of Adenomyosis: Techniques and Review of Literature

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Abstract

Objectives: To analyze the current available data on the different conservative surgical techniques for the management of focal and diffuse adenomyosis.

Methods: A comprehensive review of literature was made of publications in English on PubMed and Google Scholar. The studies utilized were then selected by one author in line with the aim of this review.

Results: The uterine-sparing surgical treatment of adenomyosis could be classified in three groups regarding the extension of the remotion of healthy myometrium and the integrity of the uterine wall: Type I: The complete resection of the Adenomyosis (Including Adenomyomectomy and Cystectomy); Type II: Citoreductive surgery (Partial Adenomyomectomy); and Type III: Non-excisional techniques. Many surgical approaches and variants has been described for each technique, predominantly for laparotomy approach. Even when the quality of evidence about benefits of these types of surgery (infertility and symptoms control) remains poor, an 80 % to 85 % of dysmenorrhea and 50 % to 75 % of AUB symptoms improvement is obtain, regardless the technique performed. A important benefit in terms of subfertility - infertility is achieved, with mean pregnancy rates (at 1 year postoperative) of 50 % (Partial remotion) and 65 % (Complete remotion), significantly higher in younger patients. Up to date, no specific technique or approach showed higher benefits in intra or postoperative outcomes. No intra or post operative differences has been found between laparotomy or laparoscopy, therefore laparoscopy is a feasible and effective approach, with all the benefits of minimally invasive surgery.

Abbreviations: **MRI:** Magnetic resonance imaging; **AUC:** Area under the curve; **TVUS:** Transvaginal ultrasound; **COC:** Combined oral contraceptive; **NSAIDs:** Non-steroidal anti-inflammatory drugs; **HIFU:** High frequency ultrasound; **RR:** Relative risk; **IVF:** In-vitro fertilization; **ICSI:** Intra-cytoplasmatic sperm injection; **OR:** Odds ratio; **PR:** Pregnancy rate; **AUB:** Abnormal uterine bleeding; **ART:** Assisted reproductive techniques.

Keywords: Adenomyosis, Laparoscopic surgery, Adenomyomectomy, Conservative treatment, Non-Radical Surgery.

1. OBJECTIVE

To analyze the current information related to conservative surgical treatment of adenomyosis, focused in the surgical techniques described for both focal and diffuse adenomyosis, and their effect in symptoms control and fertility improvement.

2. METHODS

A comprehensive review of the literature was performed with an extensive search of all the English publications on PubMed and Google

Scholar related to adenomyosis and the non-radical surgical management. We included all studies found under the search of following keywords: Adenomyosis AND Laparoscopic Surgery OR Myometrectomy OR Adenomyomectomy OR Non-radical Surgery.

One author independently made a selection of relevant abstracts according to the aim of this review. The primary objective was to know and describe the main surgical techniques and analyze the post operative fertility and symptoms-control outcomes.

3. INTRODUCTION, DEFINITIONS AND EPIDEMIOLOGY

Over a century has passed since adenomyosis was described for the first time, and yet it remains a disease difficult to understand and approach for both clinicians and investigators.

Initially named ‘Adenomyoma’ was firstly described in 1860 by the German pathologist Karl Freiherr Von Rokitansky, who found endometrial glands within the myometrium and designated this finding as a ‘Cystosarcoma Adenoids Uterinum’. [1]

The first modern definition of the disease was described by the American Journal of Obstetrics and Gynecology of 1972: “Adenomyosis may be defined as the benign invasion of endometrium into the myometrium, producing a diffusely enlarged uterus which microscopically exhibits ectopic non-neoplastic, endometrial glands and stroma surrounded by the hypertrophic and hyper-plastic myometrium”. [2,3]

Final diagnosis is histopathological, showing the classic ectopic endometrium (Glands and/or Stroma) more than 2.5 mm in-deep in the myometrium or more than one microscopic field at 10X magnification from the endometrium - myometrium junction, surrounded by bundles of hypertrophic smooth muscle cells in a “collar fashion”. [4]

Table1. Risk factors for Adenomyosis

Factor	Characterstics	
Age	70% to 80 % are in 4th our 5th decade	Higher hysterectomy rate at this age
Multiparity	Multiparous	Pregnancy facilitate formation of adenomyotic foci due invasive nature of trophoblast
Prior Uterine Surgery	Inconsistent evidence	Surgical disruption of Endometrial–Myometrial layer
Smoking Habit	Controversial evidence	Decrease serum levels of estrogen
Ectopic Pregnancy	Higher rate in Adenomyosis patients	Risk factor of intramural ectopic pregnancy
Number of Tissue Samples	Directly prorportional to number of analysis	Diagnosis in the same uterus could rise from 31% to 62% depending on samples analyzed
Tamoxifen	Higher incidence in tamoxifen users	Estrogen agonist at endometrium level

The largest series evaluating the prevalence of the disease found a wide range, between 5% to 70%, with a mean histological diagnosis of 20% to 30%. These wide variations are explained by a combination of patients characteristics and diagnostics method. Nevertheless, clear risk factors have been reported, and are show in Table 1. [3]

Suspicion is made based on clinical and imaging findings, mostly on ultrasound and MRI explorations.

Clinical manifestations commonly include dysmenorrhea and menorrhagia, but also dyspareunia, chronic pelvic pain and infertility have been reported.[5]

The specificity of preoperative diagnosis of adenomyosis based on clinical findings is poor, ranging from 2% to 26% and many cases of adenomyosis go undetected: Therefore, the understanding ofthe prevalence and clinical impact is impaired.[6]

The classic ultrasound findings established by numerous authors over time are shown in Table 2.

Table2. Imaging Signals of Adenomyiosis

Imaging Method	Signals	
Transvaginal Ultrasound	Asymetric Thickening of Miometryum	Hyperecogenic Islets
	Paralel Shadows - Linear Striations	Nodular Heterogéneal Myometrtial Mass
	Myometrial Cysts	Irregular Myometrial-Endometrtial Junction Zone
	Globular or Spherical Shape	Focal “ Honeycomb”
MRI	Scatered-Cystic – Anechoic Lacunae	Blurred Endometrial - Myometrial Border
	Focal or Global Thickening of Junction Zone	Lineal Striations Outside the Endometrium
	Ill Defined Intra-Myometrial Nodule	Minimum Width at Junction Zone (5 to 12 mm)
	Intro-myometrial Hipereintensity Foci	Low Intensity at Junction Zone
	High-Intensity Spots Scattered within the Junction Zone	Focal and Uneven Width at Junction Zone

The major studies show a sensibility, specificity and AUC of 72%, 81% and 0.85 respectively.[7] A meta-analisis published by Meredith in 2009

confirm the TVUS as a moderately accurate but a easy, wide available and cost-effective preoperative diagnostic test. [8]

Meanwhile, MRI show better results because it is less operator dependent, show reliable findings and had better correlation with histology analysis .Common findings are shown in Table 2. The sensibility, specificity and AUC reported are 77%, 89% and 0.92 respectively.[7]

Many theories has born trying to explain the origin of the disease, nevertheless four are the most accepted and are showed in Table 3.[7]

Table 3. *Theories for Adenomyosis Origin*

Theory- Author	Characteristics
Endometrial Invagination Bergeron 2006 - Parrot 2001	Myometrial invasion from the endometrium basalis
De Novo Development of Ectopic Endometrium Matsumoto 1999 - Propst 2001	Mullerian remnants Metaplasia of pluri-potential mullerian cells
Invagination of Junction Zone by the Lymphatic System Sampson 1927	Potential pathogenesis of endometriosis
Bone Marrow Stem Cells Hufnagel 2015	Endometrial cells mobilized by the vascular system

The first line treatment for adenomyosis is medical, based on hormone therapy and symptomatic drugs, including NSAIDs, GnRH agonists, Danazol, COC, among others. In when such treatments are contraindicated, failed or when patient seek for fertility, surgical treatment is indicated. [9]

Since Hyams first suggested the use and benefits of the conservative surgical management for adenomyosis in 1952, many surgical techniques have been described. [10]

The aforementioned passages highlight the current level of conceptual understanding regarding the techniques to treat adenomyosis, however, on a global scale the general level of knowledge surrounding these procedures is still in the development stages for laparoscopy. Therefore the intent of this review analyses the available proposals of surgical uterine-sparing techniques focused on laparoscopic approach for the treatment of symptomatic adenomyosis, and tries to assess the effect of each type of surgical treatment on future fertility and symptoms control. We start giving definitions and

epidemiological information. Afterward, reviews of conservative surgical techniques are presented. Finally, we discuss these techniques in terms of fertility and symptoms control issues and draw conclusions.

4. CLASSIFICATION OF CONSERVATIVE UTERINE-SPARING SURGICAL TECHNIQUES

Broadly talking, surgical management of adenomyosis can be separated in two main options: Radical and Conservative. Radical include the hysterectomy, a invasive, definitive and no fertility sparing approach.

Before discussing the conservative surgical techniques, classification can be made based on the extent of removal of adjacent healthy myometrium and the preservation of the uterus integrity. [9]

The basic principle of all “uterine-sparing” techniques is that most of the time a piece of healthy myometrium is resected, despite the technique preformed.

Therefore, three types of conservative surgical treatments had been established:

- 1. Complete Excision of Adenomyosis (Type I).** Includes Adenomyomectomy and Cystectomy. Preferably used in cases of localized adenomyosis (Adenomyoma) but also in selected cases of more diffuse adenomyosis with reconstruction of the uterine wall. This includes the complete removal of all recognizable macroscopic disease. The integrity of uterine wall is maintained. It is the most radical approach and offers the major advantages among all. [11-14]
- 2. Partial Adenomyomectomy (Type II).** Cytoreductive surgery used in cases of diffuse adenomyosis, including partial removal of clinically recognizable disease including as much of macroscopic lesions as possible. Generally, it is more related to less symptom control efficacy and higher postoperative recurrence rate. [12, 14, 15]
- 3. Non-Excisional Techniques (Type III).** A heterogeneous group of procedures where removal of adenomyotic tissue is not included. This Include laparoscopic, hysteroscopic and combined procedures, using devascularization, coagulation and ablation techniques. [14,15]

A resume of these surgeries, specific techniques and variants is described in Table 4

Table4. *Conservative surgical management of Adenomyosis*

Type of Surgery	Techniques and Variants
Complete Excision	Classic Technique - <i>Hyams 1952 - Grimbizis 2008</i>
Adenomyomectomy	Triple Flap Method - <i>Osada 2011</i>
	U- Shaped Suture- <i>Sun 2011</i>
	Overlapping Flaps - <i>Tacheshi 2006</i>
Cystectomy	Classic Technique
Citoreductive Excision	Classic technique - <i>Fujishita 2004</i>
	Transverse H incision - <i>Fujishita 2004</i>
Partial Adenomyomectomy	Wedge resection of uterine wall - <i>Sun 2011</i>
	Assimetric dissection of uterine wall - <i>Nishida 2010</i>
Non-Excisional Surgery	Uterine artery ligation - <i>Wang 2002</i>
	Electrocoagulation of myometrium - <i>Wood 1998</i>
	Endometrial resection - <i>Wood 1998</i>
Laparoscopic	Endometrial ablation - <i>Preuthhupan 2010</i>
Hysteroscopic	Hysteroscopic cystectomy
Combined	High frequency ultrasound - <i>Yang 2009</i>
Others	Endometrial non-hysteroscopic ablation by Radiofrequency - <i>Ryo 2006</i> Microwave - <i>Kanaoka 2004</i> Ballon - <i>Chan 2001</i>

Differences exist between these three types of surgery, clearly presented by Horng in 2014. [9] A comparison between type I and II surgeries are presented in Table 5. (Shown Adapted from Horng et al. 2014)

Table5. *Main characteristics of Type I and II surgeries*

Characteristics	Type I	Type II
Disease Excision	Complete	Citoreduction
Residual Disease	None	Optimal or Sub-optimal
Surgical Technique	Easier	Difficult
Risk of Enter the Miometrium	Low	High
Risk of Damaging Functional Myometrium	Low	High
Uterine Integrity	Conserved	Probably conserved
Risk of Gestacional Uterine Rupture	Low	High
Symptom Control	Good or Excellent	Acceptable
Fertility Preservation	High	Probably low

The election of the best surgical approach depends in many variables, but mainly in the anatomical locations of the disease diagnosed in the preoperative imaging exams. (Focal or Diffuse)

4.1. Complete Excision of Adenomyosis (Type I Procedures)

4.1.1. Adenomyomectomy

The Adenomyomectomy technique is based on a completely new idea that differs from conventional surgical procedures. The method involves reconstruction of the uterine wall surgical defect using normal uterine wall muscle. The technique is not only effective for diffuse, but also for focal adenomyosis, and it has the potential to contribute to the prevention of uterine ruptures during future pregnancies. The classic and the overlapping flaps techniques (with their variants) will be described. [16]

4.1.2. Classic Technique

The Adenomyomectomy (open or laparoscopic) includes the same steps performed in a myomectomy, including a linear myometrial incision and find (and remain) in the right cleavage plane. [11]

The major problem here is that Adenomyoma show intra-operative ill- defined limits and absence of a pseudo-capsule around him, this difficult the surgical approach since no clear cleavage plane is obtained during dissection. Hence, bloodless and complete resection procedure turns challenging.

The technique could be performed either by laparoscopy or laparotomy, it includes the following consecutive 6 steps clearly presented by Grimbizis in 2014:1. Recognition of the lesion's location and borders by inspection and direct palpation (or laparoscopic grasper haptic feedback); 2. Longitudinal incision of the uterine wall direct over the lesion; 3. Sharp and blunt dissection of the adenomyoma with scissors, graspers, and/or diathermy similarly to performed during a myomectomy; 4. Suturing of the uterine cavity using 4-0 synthetic absorbable suture (if the endometrium cavity was opened); 5. Closure of the uterine wall with 1-0 synthetic absorbable suture layer by layer; 6. Closure of the serosa layer with 4-0 or 5-0 absorbable sutures. [9,11] As we see, the surgical technique is quite similar to myomectomy, and is presented in Figure 1.

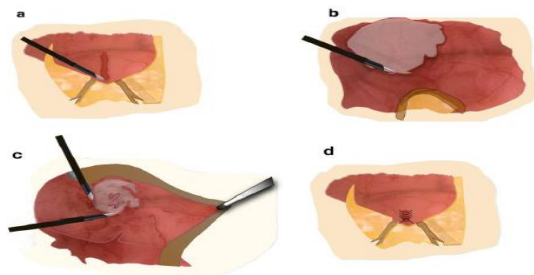


Figure1. Classic Technique for Adenomyomectomy: Steps are quite similar to a laparoscopic myomectomy.

1: Longitudinal myometrial incision over the adenomyoma. 2: Blunt and sharp dissection of the Adenomyoma trying to remain in the macroscopic lesion edge-plane. 3 and 4: Closure of wound effect in at least two layers using synthetic re-absorbable suture. If endometrium is opened, suture of this layer must be done independently.

Ending the procedure, the key steps are always perform a sero-muscular closure (one or two planes) and use an adequate morcelation technique under protection. The use of intra-operative ultrasonographic guidance could improve the result of the resection.

There are two major modifications for this classic technique: The U-shaped Suturing proposed by Sun in 2011 and the Overlapping Flaps of Takeshi in 2006, both for the laparoscopic approach.

The **U-shaped Suturing** consists in the approximation of the uterine walls using U-shape sutures at the muscle layer, trying to completely approximate the “walls cave like wound” resulted after disease resection. Posteriorly, the sero-muscular layer is closed by figure eight stitches, using the same threads as the classic technique. [11]

In the **Overlapping Flaps**, a transverse incision is made over the adenomyotic tissue, and the lesion is excised with a monopolar needle, following the macroscopic edges of the disease, trying to respect all the clinical adenomyosis.

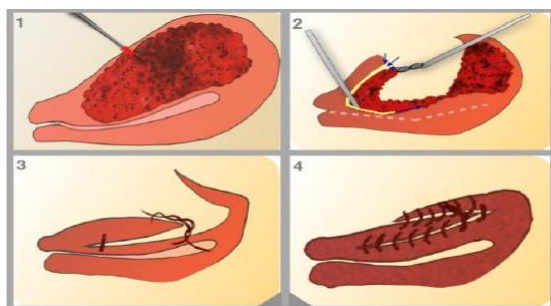


Figure2. Overlapping Flaps Variation: 1: Transverse myometrial incision over the Adenomyotic tissue. 2: Resection of disease tissue

following the macroscopic (apparent) edge-plane using monopolar needle. 3 and 4: Sero-muscular layers are overlapped and closed to the contract the muscles loss, and avoiding any reach spaces

The remaining sero-muscular layer is overlapped and sutured to counteract the lost muscle layer of the uterus resulted after the resection. [11] The surgical technique is showed in Figure 2.

4.1.3. Triple flap Technique

Osada in 2011 present the Triple-Flap Method, another Type I procedure described for laparotomy, starting with a transverse suprapubic incision, leaving after the excision, 1cm margin of tissue above the endometrium and a 1 cm margin of tissue below the serosal surface. This surgical technique is described for laparotomy and it is performed following 6 consecutive steps: 1. Use a rubber tourniquet placed in the Itsmical area for hemostasis; 2. Bisection of the uterus in the midline and in the sagittal plane with a cold scalpel until the uterine cavity is reached and opened; 3. Introduction of the index finger to guide excision of the adenomyotic tissue; 4. Use of a Martin forceps to resect the adenomyotic tissue from healthy surrounding myometrium; 5. Closure of the endometrium with multifilament synthetic reabsorbable thread (3-0 Vicryl); 6. Closure of myometrium walls and uterine serosa: on one side of the bisected uterus they are approximated in the antero-posterior plane with interrupted sutures of 2-0 Vicryl, while the contra lateral side is brought over the reconstructed first side in such a way as to cover the sero-muscular suture line. [12]

Special care must be taken for do not overlap the suture lines; only myometrial tissue flaps must overlap. To perform this, the serosal surface of the underlying flaps must first be stripped, that is, the myometrium of the underlying flap must be denuded of serosa. [12]

4.2. Partial Adenomyomectomy (Type II Procedures)

Since the major part of these techniques and variations are described for laparotomy, no detailed description of these procedures is presented here.

Many techniques has been described for citoreductive treatment, and four are classically presented: The Classic Technique, The Transverse H Incision, The Wedge resection of the Uterine Wall and The Asymmetric Dissection of the Uterine Wall. [11]

4.2.1. The Classic Technique

This technique is performed in four consecutive steps starting with a vertical or transverse incision in the middle of uterine wall, recognition and resection of all macroscopic disease and a final wound closure in at least 2 layers, taken care of not leave any uterine defect behind.

4.2.2. The Transverse H Incision Technique

This technique consists in a modification of the classic technique, indicated for adenomyosis affecting the anterior uterine wall. Helped by a vasoconstriction agent, a vertical incision is performed followed by two transverse incisions perpendicularly to the initial one, along the upper and lower edges of the uterus. Resection of all macroscopic adenomyotic tissue is performed in a slicing fashion, helped by direct manual palpitation. Closure is finally made in at least two layers of interrupted stitches.

4.2.3. The Wedge Resection of Uterine Wall

It is another technique, that could be performed in both laparotomy and laparoscopy approaches. Consist in a wedge resection of the sero-muscular layer related to the adenomyotic lesion. Afterward, closure is performed similarly to the classic technique previously described.

4.2.4. Asymmetric Dissection of the Uterine Wall

It is an approach where the uterine wall is dissected longitudinally using electrosurgery in an asymmetrical fashion, to divide the inside from the outside, preserving both the uterine cavity and uterine arteries. Posteriorly, the myometrium is dissected diagonally until endometrial cavity is opened and adenomyotic tissue is excised using a loop electrode, helped by the index finger inserted into endometrial cavity. Finally, wound closure is performed separately, initially for the endometrial cavity and then for the myometrial and serosal layers.

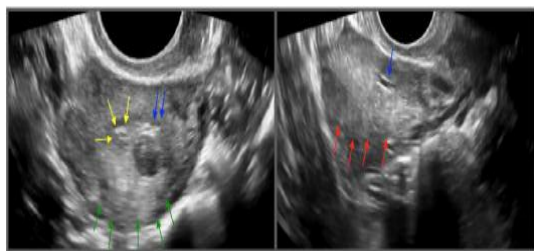


Image1. Main TVUS findings: Direct: A: Anechoic 2-4 mm sub-endometrial micro-cysts (Blue Arrows). B: Ill defined or thickening junctional zone (Green Arrows). C: Heterogeneous myometrial appearance combined with small hypoecogenic ill- defined sub endometrial pseudo-nodular formations without

mass effect (Yellow Arrows) and hyperechoic linear striations (Red Arrows) Indirect: A: Asymmetrical uterine walls (Hypertrophy signal). B: Enlarged and globulous uterus appearance, with regular margins. C: Linear pattern of myometrial vascularization through the adenomyotic lesions.

4.3. Non Excisional Technique (Type III Procedures)

The following groups of non-excisional techniques have been described in the literature for the uterine-sparing management of adenomyosis. As previously said, removal of adenomyotic tissue is not the aim of the surgery.

4.3.1. Laparoscopic Non-Excisional Techniques

These techniques include laparoscopic electro coagulation of the myometrium [15, 17, 18] and laparoscopic uterine artery ligation. [19] Both are described as fertility sparing techniques, with minor effects in future fertility.

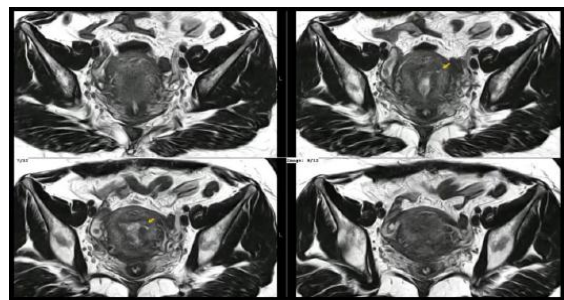


Image2. Main MRI findings: A: Globous uterus with irregular margins. B: Asymmetrical thickening of myometrial walls (more often in posterior wall). C: Thickening of junctional zone (more than 12 mm) D: Focal hyper-intense points lateral to endometrium corresponding to dilated endometrial glands fill with blood (Yellow arrow)

4.3.2. Hysteroscopic Non-Excisional Techniques

These techniques include operative hysteroscopy [20], roller ball endometrial ablation [21], trans-cervical resection of the endometrium [22, 23], and endomyometrial resection. [15] Many authors report these techniques as a fertility harming procedures, since all of them will include some degree of damage to endometrium and/or myometrium.

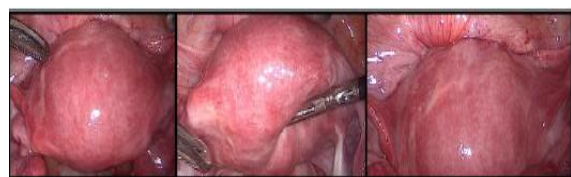


Image3. Laparoscopic main view of Adenomyosis: Note the global enlargement in. A “globulous” fashion, without nodularities in the major view and laparoscopic haptic feed back of the myometrium.

4.3.3. Other Techniques

These techniques include ablation of focal adenomyosis with high frequency ultrasound (HIFU) [24], Alcohol instillation under ultrasound guidance (for the treatment of cystic adenomyosis) [25], radiofrequency ablation of focal adenomyosis [26], microwave endometrial ablation [27], and balloon thermo-ablation [28] for diffuse adenomyosis. As well as hysteroscopic techniques, these techniques have been reported as fertility harming.

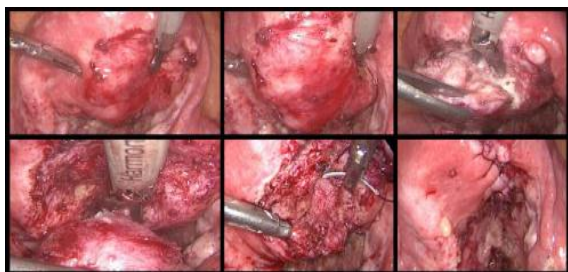


Image4. Laparoscopic view of Focal Adenomyosis: Note the focal enlargement of the posterior uterine surface. Adenomyomectomy is performed using Ultrasound Scalpel and closure is made in two layers using figure of eight interrupted (Myometrial) and running "Baseball style" (Sero-muscular) Caprofyl-0 suture.

Also, the combination of excisional (Type II) and non- excisional technique (Type III) could be perform in order to improve postoperative results. The main combination will be the laparoscopic resection of adenomyosis after a previous uterine artery occlusion. This occlusion could be transient or permanent. [29]

If some part of the adenomyotic tissue is resected, and as Type II procedures, it is nearly impossible to remove all adenomyotic foci. Additionally, concomitant resection of a large amount of healthy myometrium with destruction of functional myometrium cannot be totally avoided. [10, 30]

5. SYMPTOM CONTROL OUTCOMES AFTER CONSERVATIVE TREATMENT

The main symptoms related to adenomyosis is the dysmenorrhea, menorrhagia and chronic pelvic pain. [3]

The clinical effectiveness of conservative uterine-sparing surgery for adenomyosis is reported in the literature as promising. In the review of Gregoris Grimbizis presented in the Fertility and Sterility of 2014, this surgical approach provide significantly improvement of symptom control, achieving reduction of more than 81% of dysmenorrhea and 50% of

menorrhagia. Hence, symptoms improvement in more than two-thirds of patients after type I uterine- sparing surgery, and nearly a half of the patients after type II uterine-sparing procedures is reported. Meanwhile for a Type III, the major studies report a reduction in 54% of dysmenhorrea and 73% of AUB. [11]

6. FERTILITY OUTCOMES AFTER CONSERVATIVE TREATMENT

Broadly talking, adenomyosis appears to have a detrimental impact on reproductive performance in terms of decreased clinical pregnancy rate (PR) and increased abortion rate. Nevertheless, clear and direct relationship between adenomyosis and fertility is still a controversial issue.

Some retrospective studies showed an absence of a direct relationship between adenomyosis and the clinical PR, with no significant differences in PR among women with and without adenomyosis. [31]

By contrast, prospective evidence are show significantly lower PR in affected patients. In the study of Vercillini and Cosonni in 2014, comparing pregnancy rates in between 98 positive to 567 negative adenomyosis patients, women's with adenomyosis had a significantly lower clinical PR (24/98, 24.5%) than women without adenomyosis (245/567, 43.2%), with a RR of 0.55. [31]

The summary of findings in terms of reproductive outcomes in women with and without adenomyosis, demonstrate that patients with the disease has a significantly decreased clinical PR and increased miscarriage rate, contributing to a important decrease in the final live birth rate. These results hardly suggest that there is a strong association between adenomyosis and fertility. [32]

But, even though these studies are more balanced towards the side of adenomyosis as an associated factor in the negative impact on a woman's fertility, we must bear in mind that there is no definitive consensus on when to choose between medical or conservative surgery as a primary treatment.

As well, women with adenomyosis submitted to ART seemed to have a lower implantation rate per embryo transfer, PR and live birth rate, but a higher spontaneous abortion rate. Therefore, a significant decrease in the clinical PR is reported (RR 0.72), and a twofold risk of miscarriage is also observed (RR 2.12). These findings suggest that the adenomyotic uterine environment increases the risk of miscarriage

independently of oocyte and embryo quality. [31]

K.-H.Tsui suggest an approach initially with a long-protocol GnRH agonist suppression for natural conception in women with normal ovarian function, but an urgent IVF procedure in women's with diminished ovarian reserve. When repeat failure of along GnRH agonist-based IVF/ICSI therapy is observed, conservative uterine -sparing surgery of adenomyosis should be indicated, and urgent following long-protocol IVF/ICSI 3 months later after complete treatment it's also recommended. [32,33]

According to published, the uterine-sparing surgical treatment certainly improve the pregnancy outcome. Pregnancy rates are around 60% in women's with Type I and over 46% in women's with Type II surgery. Two-thirds of the women treated with Type II surgery and more than four-fifths of the women treated with Type I surgery had a successful delivery.

Women's with localized adenomyosis after adenomyomectomy had a pregnancy rate that ranged from 48.2% to 77.5%, with a successful delivery rate between 26.8% to 69.0%. [24,34]

Although conservative surgery might not have a similarly promising effect on reproductive performance in women with diffuse-type adenomyosis, the PR reported after sparing surgery in this group range between 30% - 40% , amounting to nearly 25% to 30% of the women who had a successful delivery.[11,35,36]

Nevertheless, clinician must never forget that the most critical factor of fertility is age, and has been demonstrated that PR among women with adenomyosis treated with conservative surgery vary significantly according to this variable. A Japanese study published in 2014 including 102 patients showed that the clinical PR among women with adenomyosis treated with conservative laparoscopic surgery were 41.3% in those aged 39 years and 3.7% in those aged 40 years, suggesting a direct adverse impact of age (OR 0.77). Therefore, the authors recommended that conservative surgery for adenomyosis could be a beneficial treatment for women who experienced IVF treatment failures, especially those aged 39 years or less. [33]

The major benefits of this surgery in both fertility and pain control outcomes, is in those patients with the association of adenomyosis and endometriosis. Hence, efforts must be increase in this specific group.

Finally, surgeons must remember that this surgery could lead to pelvic and endometrial

adhesions, uterine cavity deformations and reduction of uterine capacity, all of them potentially harming the fertility success. Hence, a broad preoperative patient counselling, a meticulous surgical technique and a thorough post-operative follow-up is always recommended.

7. CONCLUSIONS

Conservative uterine-sparing surgical management of adenomyosis is a safe and feasible, but technically difficult treatment for those women with future pregnancy desire, achieving both good symptom control and preservation of fertility. Independently of the type of surgery performed, significant benefits are reported, with mean control of Dysmenorrhea about 50%, AUB in 50% to 75% and a 12 months postoperative pregnancy rate between 50% to 65%.

The success rate will vary according the type of procedure performed. For Type I surgeries, 82% of pain reduction and 68% of bleeding reduction is reported, with a mean of 60.5% of PR. Meanwhile for type II disease, 84% to 86% of symptoms control is achieved. Finally, Type III techniques will achieve a 54% of pain reduction, 73% of bleeding reduction and 55 % of PR.

Laparoscopy is a feasible approach, and must be used regularly to treat the disease, with lower risk of conversions and intra - post operative complications. The main advantage of laparotomy is the direct palpation and clear recognition of the lesion (and their limits), difficult to achieve by the reduced haptic feedback of the laparoscopy. Nevertheless, this is completely split with the actual MRI exams, clearly delimiting and defining the disease, giving and excellent preoperative work - up, allowing a safely and effectively approach by laparoscopy.

To date, the lack of good evidence mislead the efficacy of different surgical techniques for the treatment of the adenomyosis. It will be necessary to study the benefits of each technique through large-scale randomized studies with adequate follow-ups.

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