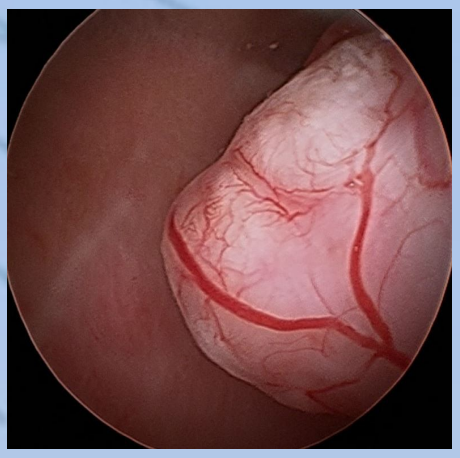
Hysteroscopy Newsletter

Vol 7 Issue 1



HYSTEROSCOPY Editorial teaM

Dear hysteroscopy friends,

A new year means a new opportunity for a new start, a new year is an opportunity to initiate new projects, to find new illusions, to set the ambitious "New year resolutions". It is something that has always been like this. But this year, it is something that is happening with more force.

After leaving a disastrous year 2020 behind, we ALL want to believe that 2021 will be better, that it will be a different year and that it will come loaded with new illusions. This is how we have understood it from Hysteroscopy Newsletter and thus we decided starting from the previous issue to give a new direction to our publication. A publication that begins its seventh season and reinvents itself with the idea of serving as an information and training channel for all hysteroscopists on this crazy planet.

In this new issue that you now are holding in your hands we wanted to focus on submucous fibroids, a pathology that affects more than 50% of women throughout their lives and is responsible for symptoms such as abnormal uterine bleeding, chronic pelvic pain and infertility.

In this issue, you will find the opinion of great experts in the field on this common pathology, you will find relevant information on how to treat it correctly, in a precise way and without damaging the healthy endometrial tissue that is located around them. Terms such as pseudocapsule, hydro-masage, sonohysterogram, enucleation, monoclonal, submucosal, vascularization, morcellation, and myolysis among other, are terms commonly associated with submucosal fibroids, terms that you will discover between the pages of this monograph.

In short, this new issue of Hysterosocpy Newsletter, is a short summary focusing on submucosal fibroids, explained in a clear and "fresh" way, with everything you need to know to tackle this pathology. A small manual on fibroids that from Hysteroscopy Newsletter we are sure you will enjoy.

Our goal is simple... to share the knowledge of the great minds of our field in a simple way.

The coordinators, the editorial committee and the members of the scientific committee wish you an excellent 2021... full of health, peace, love... and hysteroscopy.

Take care,

Luis Alonso Pacheco, MD

If you are interested in sharing your cases or have a hysteroscopy image that you consider unique and want to share, send it to hysteronews@gmail.com

Physiology and importance of the myoma pseudocapsule

Andrea Tinelli, "Veris delli Ponti" Hospital, Scorrano, Lecce, Italy

Uterine fibroid, during its growth, cause the progressive formation of a peripheral surgical-anatomical biological structure, the myoma pseudocapsule. This anatomical entity, unknown for many years, began to have a lot of interest among gynecologists dealing with fertility surgery in the new century.

This biological structure originates from the fibroid compression of the surrounding myometrium and separates, even if in a few millimeters, fibroid from the healthy myometrium (Figure 1). In short words, pseudocapsule shifts the intact myometrial muscular fibers, like a kind of thin fibromuscular wall, maintaining the integrity and contractility of uterine musculature.

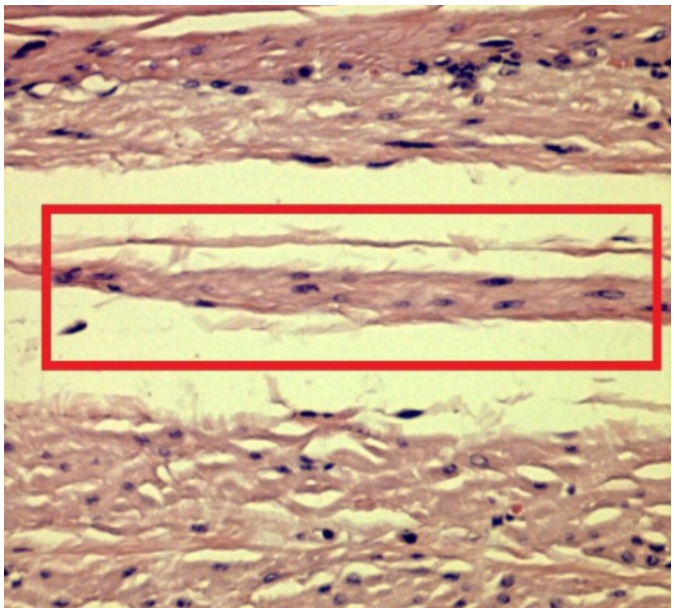


Figure 1. Anatomical section image in which, in the red box, the myoma pseudocapsule is highlighted, which separates the myoma from the myometrium.

Furthermore, from the anatomical point of view, uterine fibroid is structurally anchored to its pseudocapsule by connective bridges, but it lacks its own true vascular pedicle and, occasionally, bridges of vessels and collagen fibers anchoring myoma to myometrium, interrupting the pseudocapsule surface.

All this results in the formation of a clear plane between myoma and the pseudocapsule, called the cleavage plane.

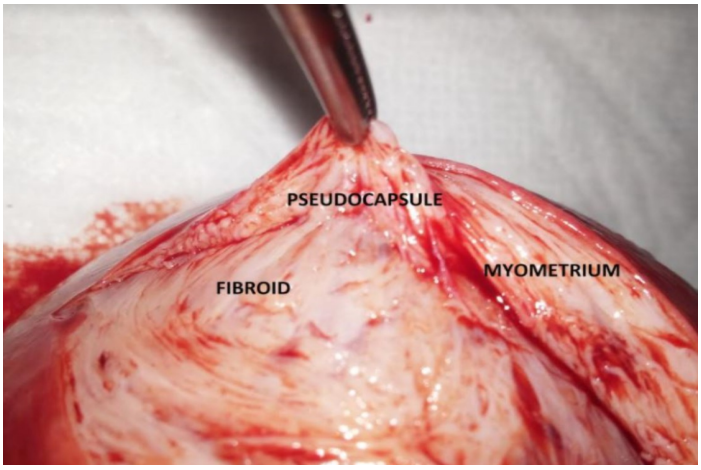


Figure 2. Anatomical image of a myoma undergoing enucleation from the uterus; the three structures are clearly visible: pseudocapsule (top), fibroid (bottom) and myometrium (right)

From a biological point of view, the myoma pseudocapsule has the same bio-structure as the myometrium. At the ultrastructural level, visualized by transmission electron microscopy (TEM), the pseudocapsule cells have the features of smooth muscle cells like the myometrium, indicating that the pseudocapsule is part of the myometrium compressed by the myoma (Figure 2).

The most interesting biological activity that has been highlighted in the myoma pseudocapsule is that concerning the neoangiogenetic activity. In fact, myoma pseudocapsule is plentiful of collagen fibers, neurofibers and blood vessels (Figure 3), as a neurovascular bundle surrounding fibroid. Within the neurovascular bundle, some neoangiogenic factors were also studied. Angiogenetic factors identified in the pseudocapsule vessels are already widely involved in the physiology of the myometrium.

Moreover, these biochemical growth factors evaluation showed intense angiogenesis in

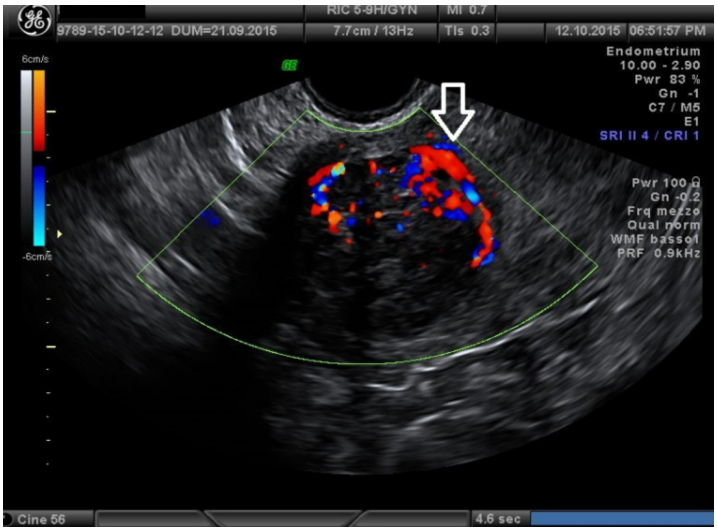


Figure 3. Ultrasonographic transvaginal scan of the fire ring of the pseudocapsule, highlighted with the white arrow, using echo color doppler.

pseudocapsule vessels and these substances are thought to have a pivotal role in wound healing and in muscular innervation. Hence, growth factors present in the myoma pseudocapsule induce angiogenesis peripherally to myometrium.

From here, therefore, we went to study a very important phase of the physiology of the uterus, wound healing, which is also based on muscular innervation. The myometrial wound healing is an interactive, dynamic process based on neuromodulators, angiogenetic factors, neuropeptides, blood cells, extracellular matrix, and parenchymal cells that follows three complex and overlapping phases: inflammation, tissue formation, and tissue remodeling. In the physiology of these processes, they also fit also nervous system and its neurotransmitters, as Substance P (SP), Vasoactive Intestinal Peptide (VIP), neuropeptide Y (NPY), Oxytocin (OXT), Vasopressin (VP), PGP 9.5, calcitonin gene-related peptide (CGRP), growth hormone-releasing hormone (GHRH). They play a role in mediating inflammation and wound healing, involved in physiology and scar repair in different tissues, including uterine muscle.

In regenerative processes associated to pseudocapsule sparing (Figure 4), as in post-myomectomy uterine scar, neuropeptides and neurotransmitters are speculatively involved in wound healing and myometrial regeneration.

The intracapsular myomectomy is based on muscular physiology and respecting anatomy, and it can be done by laparotomic, laparoscopic, robotic, vaginal and hysteroscopic approach. It can be safely done also during cesarean section, by a cesarean myomectomy.

The surgical benefit is visible during and after myomectomy: the bleeding is reduced, the myometrial anatomy is largely respected, the myometrial healing is preserved and enhanced, as confirmed by clinical and ultrasound investigations on scar site after intracapsular myomectomy.

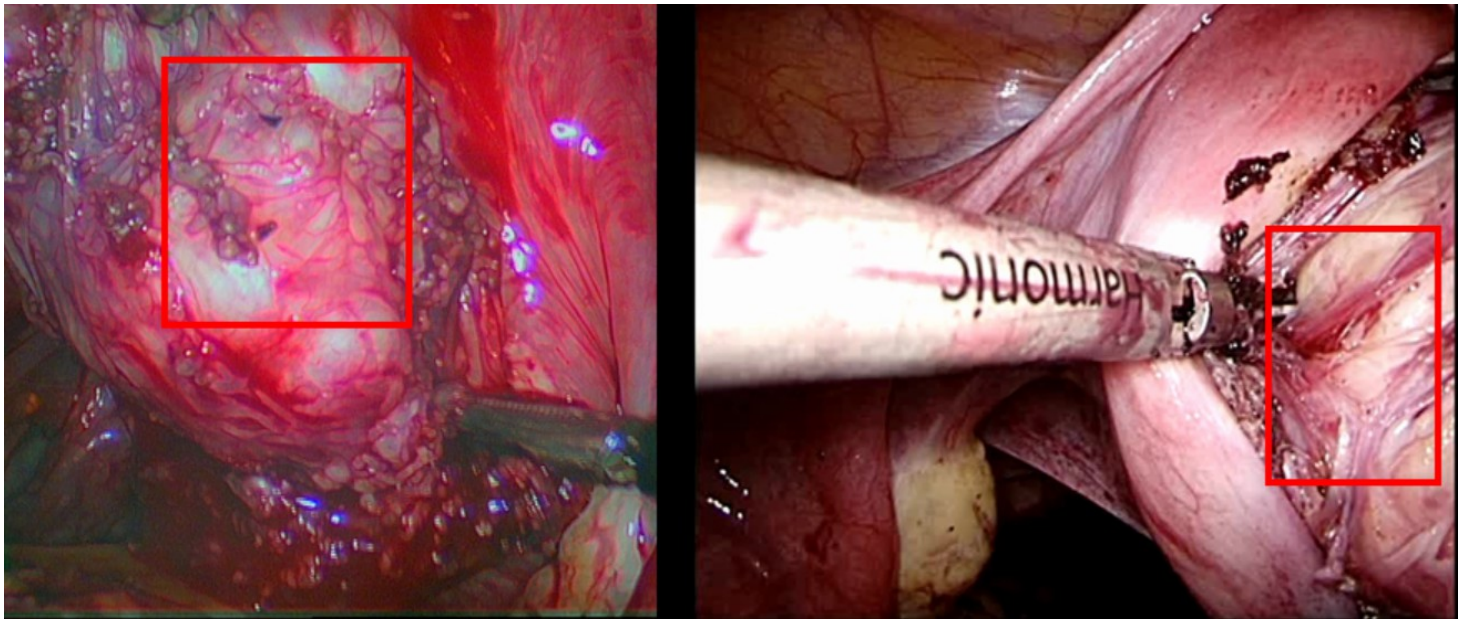


Figure 4. Laparoscopic image of pseudocapsule during intracapsular myomectomy, highlighted in the red box, both left and right.

Evaluation of the Uterine Cavity and Diagnosis of Submucous Myomas

Amy Garcia, MD. Albuquerque, New Mexico, USA

The FIGO abnormal uterine bleeding (AUB) category of myomas and subclassification of submucous myomas as types 0, 1 and 2 is used to diagnose and describe myomas within the uterine cavity. There are several imaging modalities available to the gynecologist for submucous myoma diagnosis.

Transvaginal Ultrasound

A 2-dimensional transvaginal ultrasound (2DTVUS) is generally the first-line diagnostic procedure for evaluating AUB for most women. (Figura 1) It is a safe and cost-effective tool which is fully utilizable in the office. Initial 2DTVUS findings of any endometrial abnormality, presence of fibroids or suspicion of adenomyosis warrants evaluation of the cavity with hysteroscopy.

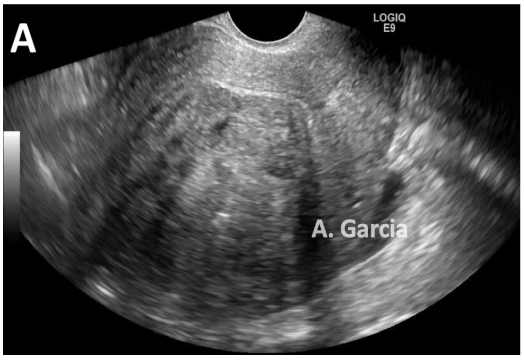
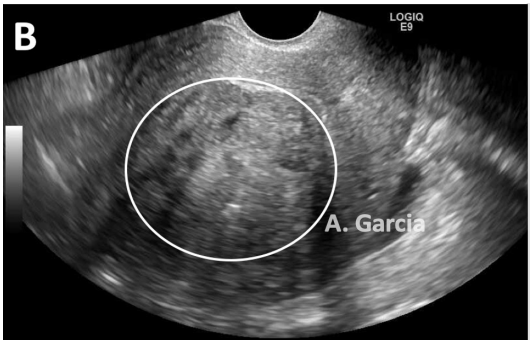


Figure 1A. Transvaginal ultrasound image of an anteverted uterus with a 5 cm submucous myoma. The submucous myoma is classified as AUB-L, with a sub-classification *SM* and a type of 0 (AUB-L, SM, 0).



Fiure 1B. The same uterine image with the circle (white) outlining the myoma for clarity.

Power Doppler is more sensitive than color Doppler for the detection of blood flow but provides no information about the direction of flow. When added to gray scale TVUS, circular vessel flow pattern correlates with a high level of specificity for the diagnosis of submucous myomas compared to HS (sensitivity 72.2%, specificity 100%, PPV 100% and NPV of 88.9%). There are differences, however, in diagnostic accuracy of intracavitary pathology between 2DTVUS, saline infusion sonography (SIS) and hysteroscopy. In a large systematic review of studies comparing these three imaging techniques, both SIS and HS identify intrauterine pathology better than 2DTVUS.

With 3DTVUS imaging, uterine cavity evaluation is enhanced above gray scale 2DTVUS. The 3D scan simultaneously displays three perpendicular image planes creating a detailed image construction of surface detail. One advantage of 3DTVUS over HS is the evaluation of sub-endometrial regions of the uterus as well as the endometrial cavity (Figure 2) . Hysteroscopy, however, still more accurately identifies submucous myomas.

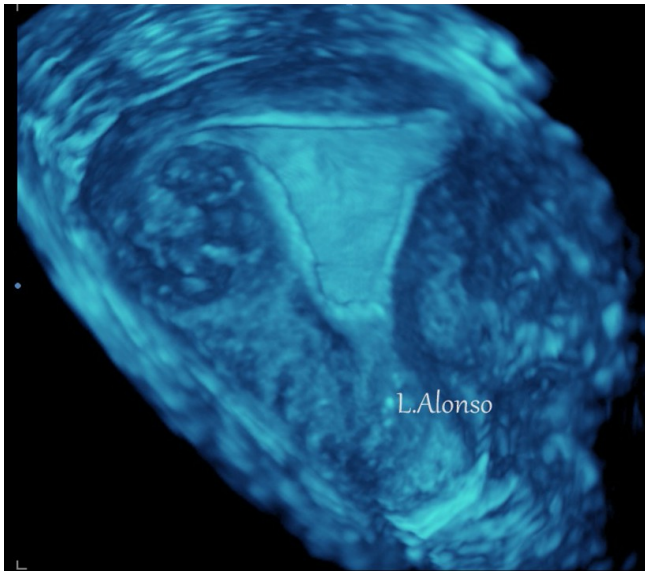


Figure 2: 3-dimensional transvaginal ultrasound image showing a normal uterine cavity with delineation of sub-endometrial uterine myoma, which is a limitation of hysteroscopic evaluation of the uterine cavity.

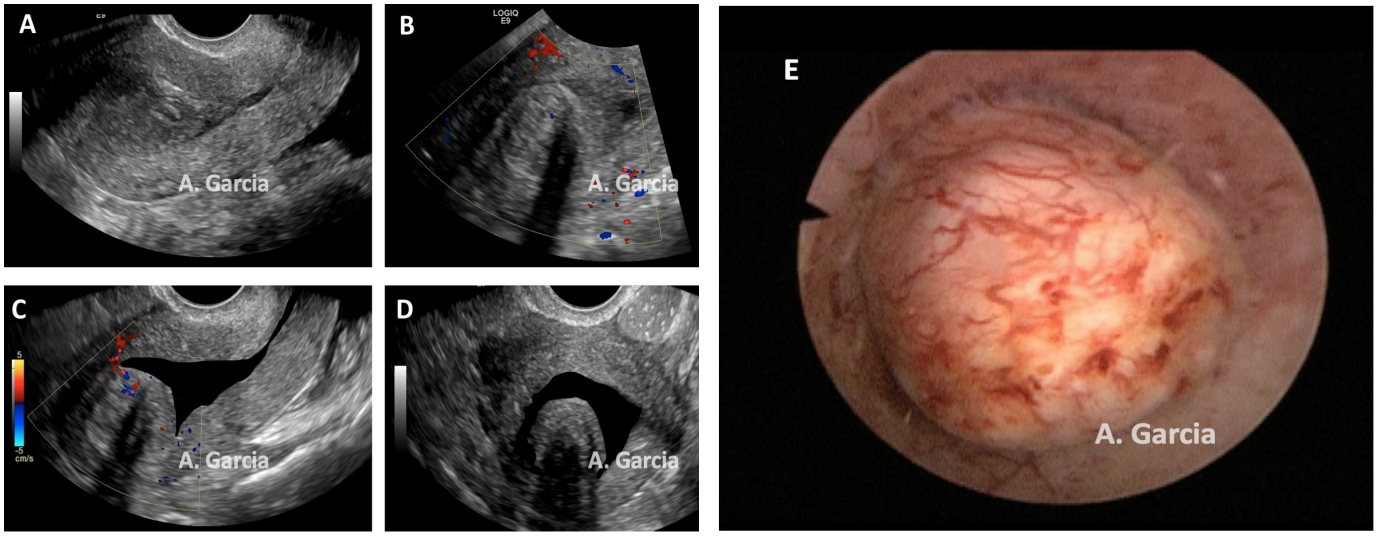


Figure 3: A and B are transvaginal ultrasound images of a 2.5 cm submucous myoma (AUB-L, SM, 0). C and D are the same ultrasound
images as A and B after instillation of saline into the uterine cavity. Shadow artifact represents areas of calcification which is also seen at hysteroscopy as yellowish areas on the surface of the same myoma in E.

Saline Infusion Sonography

Saline infusion sonography is well tolerated by patients and performed when endometrium on TVUS is abnormal. A small catheter is placed first into the uterine cavity via the cervical canal, and a small amount of saline is instilled via syringe into the uterine cavity during a TVUS procedure. The saline provides a contrast medium so focal lesions of the endometrium are identifiable more readily than for TVUS alone. ***Figure 3*** Compared to hysteroscopy, SIS is not as good at identification of submucous myomas.

A Cochran Systematic Review (meta-analysis) comparing studies of 2DSIS versus 3DSIS concluded that there is no statistically significant difference between 2DSIS and 3DSIS for diagnostic accuracy in the evaluation of the uterine cavity.[5] However, a recent comparison of 3DSIS versus HS for the classification of submucous myomas found agreement between the two with 92% for type 0, 92% for type 1 and 75% for type 2 with hysteroscopy remaining superior. As with 2D and 3D TVUS, the SIS also requires fundamental skills in ultrasound interpretation.

Hysteroscopy

Hysteroscopy is essential in the evaluation of AUB and especially in the office environment where it is cost effective and well tolerated by patients. Dr. Linda Bradley, a preeminent leader in hysteroscopic surgical education has coined the phrase, “My hysteroscope is my stethoscope.” As gynecologists, we should be as adept at using a hysteroscope in the office as the cardiologist is at using a stethoscope. Hysteroscopy remains the gold standard for evaluation of the uterine cavity as it improves our diagnostic capabilities over blinded procedures such as endometrial biopsy and dilation and curettage and has consistently shown superiority over 2D and 3D sonography modalities for identification of intracavitary lesions. **Figure 5, 6, 7**

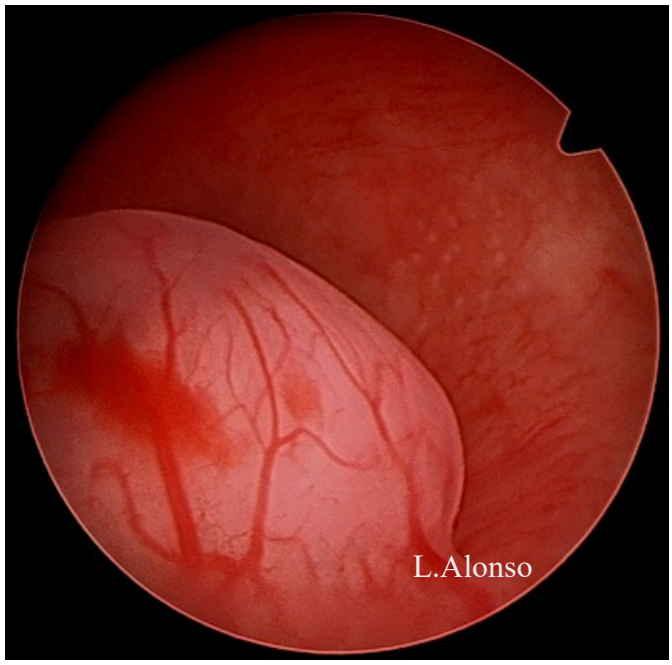


Figure 5. Detailed view of a submucous Type I myoma

Figure 6: Multiple submucous myomas as seen by hysteroscopy

Figure 8: Sagittal, T2 weighted magnetic resonance image of the pelvis showing a 6 cm type 2 submucous myoma (AUB-L, SM, 2)

Figure 7: Solitary submucous fibroid

Figure 9: Sagittal, T2 weighted magnetic resonance image of the pelvis showing multiple uterine myomas

Magnetic Resonance Imaging

A study evaluating preoperative TVUS, SIS, HS and magnetic resonance imaging (MRI) showed that submucous myomas were best identified with MRI (100% sensitivity, 91% specificity). Also, MRI evaluates submucous, intramural and subserosal myomas, helping to define preoperative myoma mapping ***Figure 8,9***. However, MRI is a more expensive imaging technique than sonography and office hysteroscopy and may not be readily available because of prohibitive cost and is not accessible in the office.

Conclusion

Diagnosis of submucous myomas and pre-operative decisions often utilize a combination of imaging such as sonography and hysteroscopy to assess myoma morphologic qualities, size, number, position with the cavity and subclassification of type to determine the degree of difficulty for removal and the likelihood of success. Use of MRI has distinct advantages beyond cavity evaluation for myoma mapping of uterine myomas prior to myomectomy.

Why use pseudocapsules of myoma in hysteroscopic myomectomy?

Ricardo Lasmar. Professor of Gynecology of Federal Fluminense University. Rio de Janeiro.Brazil.

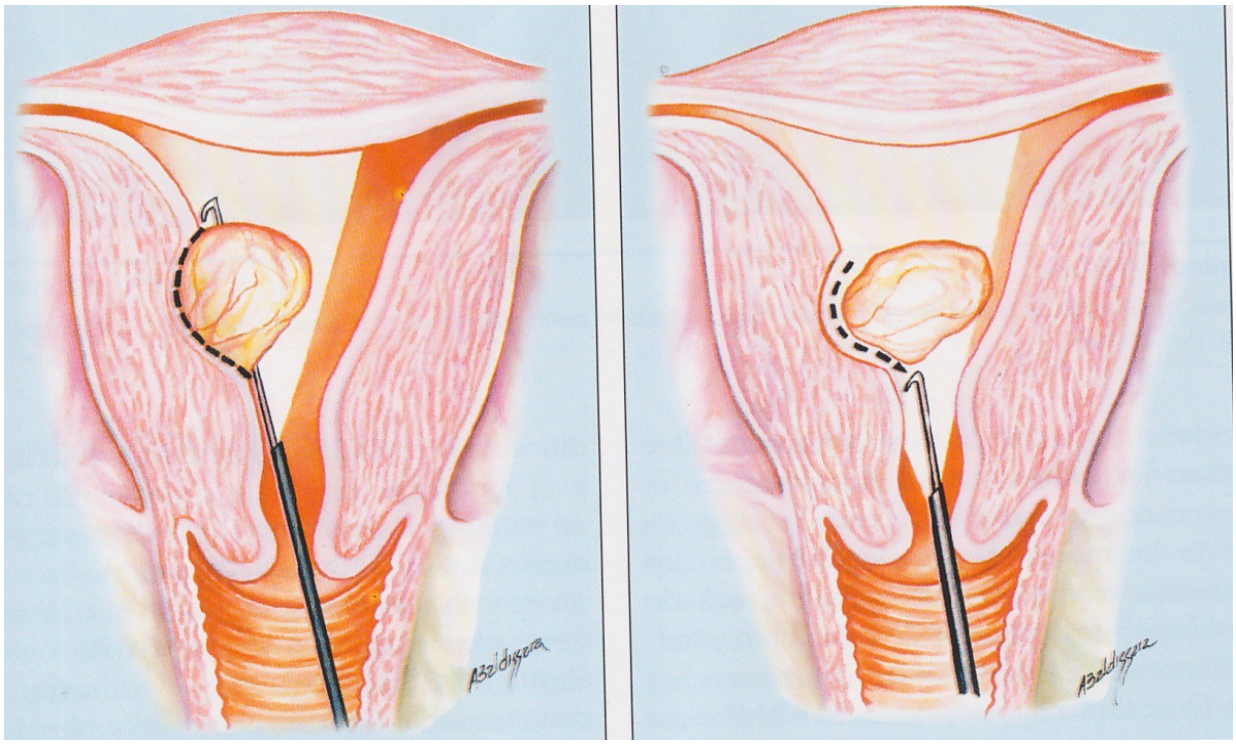
Uterine leiomyomas are frequent, have an impact on reproductive function and on women quality of life.

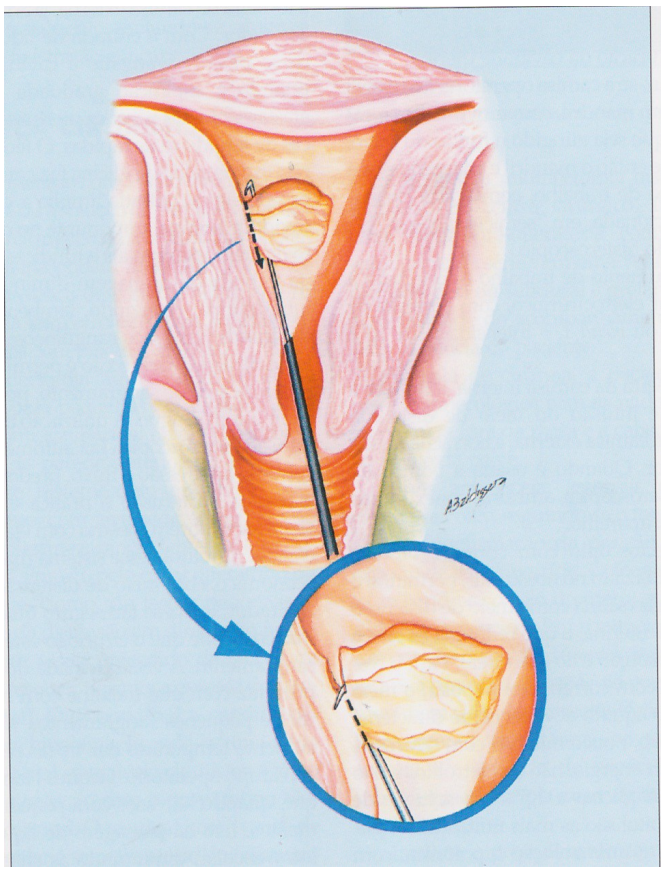
They are classified according to their location in the uterus, and submucosal fibroids would be most related to the uterine bleeding. When they are symptomatic, should be removed by surgery and the approach for myomectomy depends on their classification. In open and laparoscopic myomectomy after to incise the serosa and the myometrium, we start the blunt dissection in the plane between the myoma and its pseudocapsules. The uterine myoma pseudocapsule is a fibrous structure surrounding the neurovascular leiomyoma, separating it from the normal peripheral myometrium.

The fibroid pseudocapsule is composed of a rich neurovascular network in neurofibers similar to the neurovascular bundle surrounding the prostate.

In the larger fibroids, after being completely withdrawn from the uterine wall, they are morcellated. In no surgical technique of abdominal myomectomy the myoma is fragmented before removed from the uterine wall, it is always taken whole, mobilizing the nodule through the pseudocapsule. In this two surgical techniques, the myoma is fragmented after myomectomy, only to be retired of pelvis cavity.

In 1978, Neuwirth held the first hysteroscopic myomectomy using urological resectoscope with applying surgical technique similar to the resection of the prostate, with anresectoscope and "U" loop, slicing the fibroid and, sometimes, damaging the adjacent myometrium. The slicing technique fibroid, gold standard technique, leads to severe exposure lump vessels, causing greater blood loss, through strain absorption and sometimes myometrium damage with consequences for reproduction.





Some authors already make hysteroscopic myomectomy using the pseudocapsule. Litta et al, make the release after the resection of the intracavitary portion of the myoma, while Mazzon releases the intramural portion of the fibroid with cold loop. The technique published in Brazil in 2002 by our group uses the pseudocapsule in a similar form of the laparotomy or laparoscopic myomectomy, without partial resection of this, mobilizing the whole fibroid, believing that the integrity of pseudocapsule facilitates surgery.

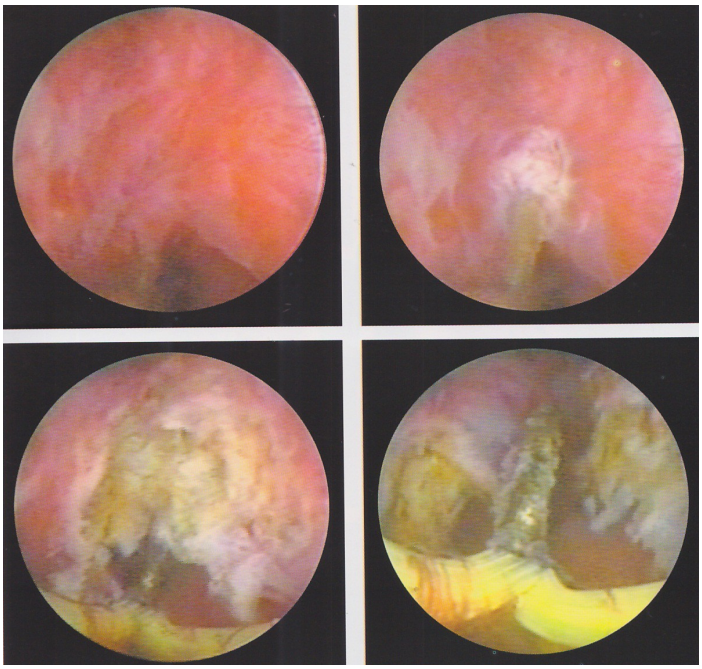
This technique, with the resectoscope with "L" loop (Collins), initiates with the incision of the myoma bed, surrounding it completely. From there, we enter the fibroid plan / pseudocapsule and releasing the fibrous bands, with occasional clotting of the vessels found. The vascular network generally surrounds the myoma, detachment of the myoma occurring inside the pseudocapsule should cause less bleeding and maintain the integrity myometrial, Allowing the facilitation of uterine healing and is of benefit for future reproductive outcome.

The first incision should always be done through the posterior portion, completely surrounding the endometrium until you reach the pseudocapsule. When reaching pseudocapsule starts the mobilizations of the nodule, with blunt dissection of the myoma pseudocapsule from adjacent myometrium, without cutting the nodule.

Only after the complete withdrawal of it we make sliced in the longitudinal direction and then, taken from the uterine cavity with grasping. In some larger fibroids, we make the myoma fragmentation before the complete liberation of the myometrium, because there is not enough space to mobilize the nodule in the uterine cavity.

The direct mobilization technique myoma prevents damage to adjacent myometrial and minimizes the risk of overload of the procedure. Moreover, during the mobilization of the fibroid, more intramural portion of the nodule is pushed by the myometrium to the uterine cavity, increasing the myometrium thickness and the distance of the fibroid to serosa, allowing the approach of fibroids with distances smaller than 5 mm to serosa safely.

The direct mobilization of the myoma is possible at the ambulatory surgery, doing the same movement with scissor around de pseudocapsule.



Office Preoperative Enucleation using Non-electric Instruments for Myoma (OPENInM)

Alfonso Arias A. Centro Médico Docente La Trinidad, Caracas, Venezuela

Introduction

Submucosal myoma are associated with Abnormal Uterine Bleeding (AUB) and infertility. Therefore, when considering conservative surgery, it is mandatory to evaluate the distance from the fibroid to the serosa, myometrial penetration, size, number of fibroids to adequately plan the best surgical approach

The diagnosis is based on ultrasound evaluation, and the gold standard to decide the best surgical approach is the direct visualization by Vagino-Hysteroscopy in the office. Hysteroscopic myomectomy is the ideal minimally invasive technique for excision of submucosal myoma, which has proven to be effective in controlling AUB symptoms and increasing the pregnancy rate

The penetration of the submucosal myoma in the myometrium and its proximity to the serosa can be modified in the office setting allowing its treatment in only one procedure, with lower complication rate and cost.

Staging of Submucous fibroids to decide the best extraction technique

Wamsteker et al. (1993) published the correlation between the intramural proportion of the myoma and its successful hysteroscopic extraction, showing that when the intramural extension is greater than 50%, its complete resection decreased, the need for 2 procedures increased and the rate of complications was higher. For this reason, they proposed a classification that was later adopted by the ESGE, classifying the submucous fibroids as type 0 has no penetration inside the myometrium, type 1 <50% of the fibroid inside the myometrium and type 2> 50% inside the cavity.

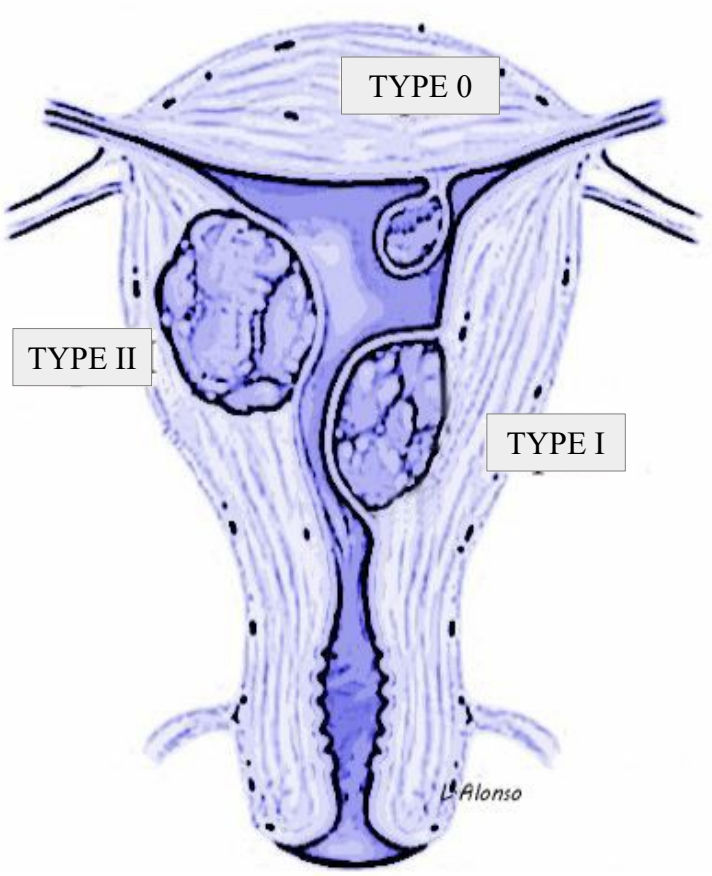


Fig 1: ESGE submucous miomas classification

For this reason, before performing an hysteroscopic myomectomy, a hysteroscopic in office evaluation is recommended with emphasis on the angle of penetration to the uterine wall and the myometrial component and to predict the feasibility of its resection, as well as anticipating the risk of intraoperative complications. The smaller the angle and the less the intramural component, the hysteroscopic excision will be more feasible.

Until 2 decades ago, the hysteroscopic removal of Submucous Myoma Wamsteker's type 2 and

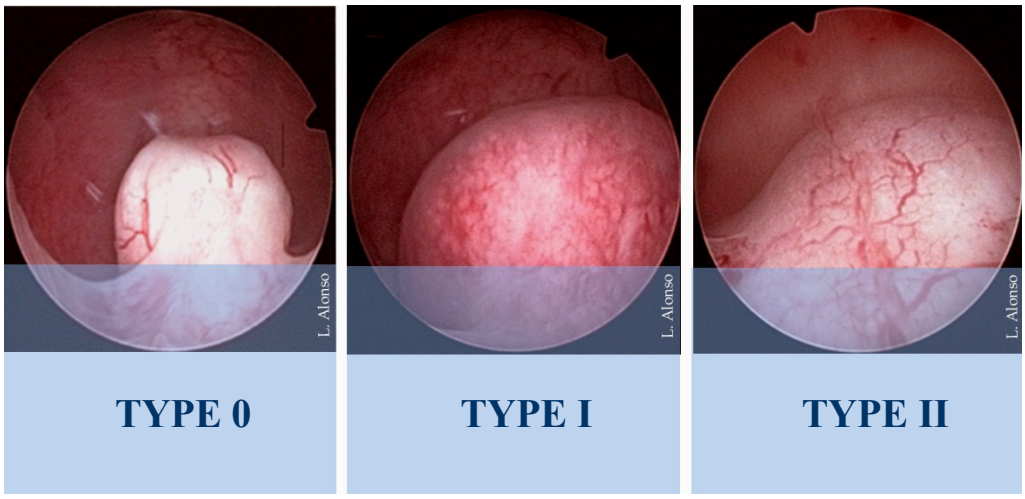
those with> 50% myometrial penetration was contraindicated, and hysteroscopy was only indicated for fibroids with mostly submucosal component with myometrial involvement <50% or Type 0 or 1

Currently, most authors consider hysteroscopy as the first minimally invasive option for submucosal myoma, which depends on:

1. Penetration intramural myoma
2. The electrical system of the resector (Monopolar or Bipolar)
3. The size, location, number of fibroids
4. The experience of the surgeon.

The surgeon's experience should not only be in traditional resectoscopic myomectomy with resectoscope, but also mastering the additional techniques to change the penetration of the myoma using different techniques such as cold Loop, Litta, OPPIuM or the OPENInM technique.

In order to achieve the protrusion of the intramural component into the cavity with the "resectoscope in the operating room" and to favor its removal there have been several recommendations and chronologically it has been like this: First, Litta in 2003 proposes the "toto enucleation" in the operating room, using a 26 Fr resectoscope, 12° optic and Collins monopolar straight loop, making an elliptical incision around the base of the myoma, surrounding it at the level of its insertion in the uterine wall until accessing the interface (pseudocapsule), breaking the adhesion of the myoma to the myometrium, forcing it to come out by the pressure exerted by the surrounding myometrium into the cleavage plane already released, achieving intraoperative protrusion of the intramural portion of the myoma. The Litta technique is based on the fact that the uterine wall is a dynamic anatomical structure, where the myoma growth compresses and stretches the adjacent myocytes, without breaking them, preserving their contractile capacity, allowing the myoma to be expelled by releasing the tension.



Office techniques to facilitate extraction

The development of electrosurgery with the creation of the Bipolar Resectoscope, the reduction of its diameter, an adequate preoperative ultrasound evaluation measuring the distance from the myoma to the serosa and the degree of penetration of the myoma into the myometrium, and especially using techniques that facilitate its protrusion into the uterine cavity prior to surgery, either in the operating room with the Litta technique or in office OPPIuM or OPENInM have made it easier to remove submucosal myoma surgery without affecting the serosa and preserving the integrity of the cavity and uterine wall

Bettocchi S, Di Spiezio A in 2009 proposed that 4 weeks or more, before the definitive surgery with “resectoscope in the operating room”, the OPPIuM technique to be performed in the office. It consists of cutting at the base of the myoma to favor its early protrusion. They make small cuts in the pseudocapsule that covers the myoma using the bipolar electrode, facilitating its protrusion into the cavity during the following menstrual cycles. The conversion of type 2 myoma to type 1 or type 0 was successful in 93.2% of cases, and failure was only observed when the total size of the myoma was> 40 mm.

Since 2011, we have proposed the same technique with scissors and grasper for the Office Preoperative Enucleation with Non-electric Instruments of Myomas (OPENInM) that allows the office to change the type of fibroid before the definitive surgery in the Operating Room and fulfills the same function as the OPPIuM in the Office or the Litta technique in the Operating Room, but with "non-electrical" instruments, reducing surgical time, risk of fluid overload, perforation and other complications.

Haimovich S et al present another variance of Bettocchi's approach to perform myomectomy in 2 stages, but now both procedures are performed in the office without anesthesia, without using the resectoscope or the operating room. In addition, the second step for the definitive cleavage is performed with Diode laser. Additionally, Haimovich suggests leaving the fibroids inside the cavity for spontaneous expulsion, which in his publication was reported as 100% of cases in an average of 2 months.

Office Preoperative Enucleation No-electric Instruments Myoma or OPENInM

This procedure in the Office is based on:

1. The sensory innervation of the uterus is mainly located in the myometrium and does not reach the endometrium and fibrous tissues; therefore, the vast majority of the procedure can be performed in the office, without anesthesia.

2. It is safe and inexpensive, reducing the penetration of the myoma and increasing the chances of its complete surgical resolution with the resectoscope in a single procedure.

3. It is entirely performed with mechanical instruments.

On the same day of the hysteroscopic in office evaluation, a pelvic ultrasound is performed to evaluate the size, angle of penetration to the myometrium and especially the "distance from the fibroid to the serosa" is documented, finally the depth of myometrial penetration will be estimated.

The Office Hysteroscopy is performed with the Bettocchi 5 hysteroscope, using the vaginoscopy approach. The myometrium is separated with fine-tipped scissors delineating the contour of the fibroid, accessing the myoma-myometrum interface to favor its protrusion and its partial enucleation, modifying the initial staging. Fig. 3 illustrates the beginning of the OPENInM procedure, observing the posterior penetration angle that is highlighted by the arrow. This procedure is performed in the office without the need for anesthesia .

We use the Storz Endomat automatic pump (14-16) at a pressure of 70 mm Hg, with a flow rate of 400 ml / minute. We do not use prior medication with Misoprostol, as it causes preoperative pain, genital bleeding, excessive and uncontrolled dilation of the cervical canal, preventing adequate expansion of the cavity.

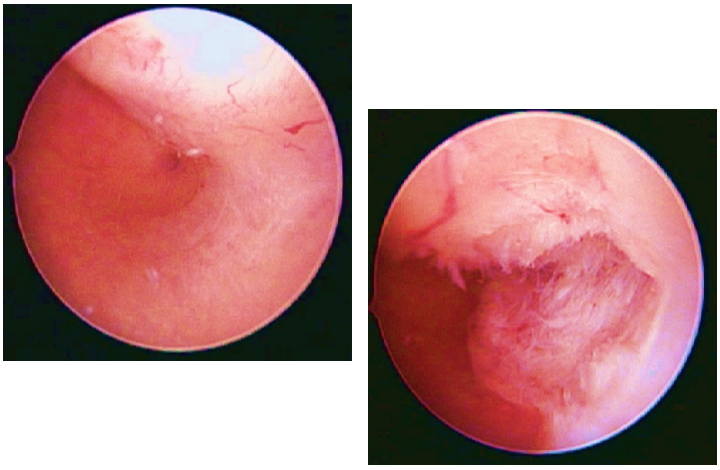


Fig 3: The beginning of the OPENInM procedure

While the patient waits for the surgery in the operating room, this partial decapsulation allows the surrounding myometrium to spontaneously contract and protrude the intramural part in the uterine cavity and so, that myoma that was not totally resectable with the resectoscope weeks later becomes accessible in a single time and with less risks.

In another case (Fig. 4), the type 2 myoma is observed where the red line of the initial base is seen, in which the protrusion of 4 mm is achieved at 21 days and after menstruation it increases to 8 mm at 45 days after the OPENInM procedure. Simultaneously, it moves away from the serosa in proportion, making its definitive excision with the resectoscope easier and with less risk in the operating room.

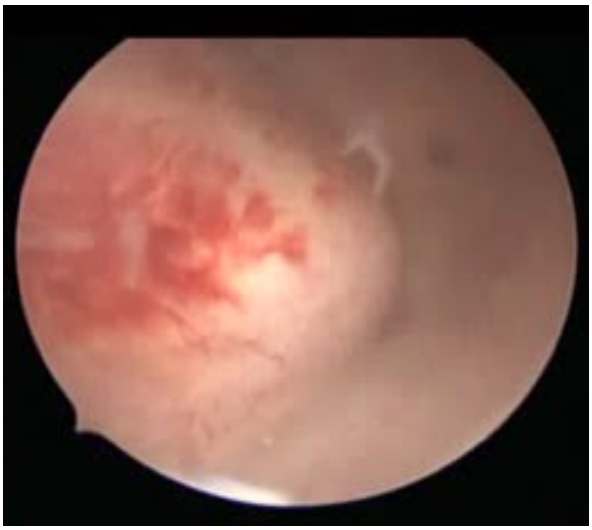


Fig 4: 8 mm at 45 days after the OPENInM

In summary, both OPPIuM and OPENInM decrease the intramural portion of the myoma, move it away from the serosa, shorten the surgical time and prevent complications in cases that were previously contraindicated for resectoscopic myomectomy.

It is important to highlight the following points:

1. The OPPIuM requires the office to have bipolar electrodes.

2. The OPENInM proposes the same partial enucleation in the Office, but with “non-electrical” instruments.

3. The OPENInM can be repeated in the office prior to the definitive surgery.

In the operating room, we started with hysteroscopy using the vaginoscopy technique to verify the change in staging and the new characteristics of the fibroid. If it is not yet protruded into the cavity, it is advisable to do the already described Litta technique as the first surgical stage, so that it finishes protruding.

Our group perform all the resectoscopic myomectomies under spinal or epidural anesthesia, since during the intervention it is necessary to maintain constant communication with the patient, especially looking for respiratory symptoms, such as cough or shortness of breath, since these symptoms could represent the onset of fluid overload.

Di Spiezio A, Mazón I, Bettocchi S 2008 and the Consensus on myomectomy of the Global Congress Hysteroscopy 2018 recommend in the single myoma type 0 <15 mm to perform resection in the Office, using the Bipolar Versapoint or Autocon 400 Storz electrode. In myoma > 15 mm, it is recommended to use the Resectoscope. In myoma > 40 mm, the risk of fluid overload and incomplete resection of the myoma increases, leading to the need to repeat the procedure and decreases the success rate in a single procedure.

The "Cool Loop" Technique

Ivan Mazzon. Endoscopic Centre "Arbor Vitae". Roma. Italy

At the beginning of nineties, for the first time I presented the "cold loop" hysteroscopic myomectomy at the National Congress of the Italian Society of Gynecologic Endoscopy. In the following years, this technique was spread among Italian endoscopic surgeons and nowadays the majority of Endoscopic Centres in Italy, routinely performing hysteroscopic myomectomy, utilizes "the cold loop technique" for the treatment of G1 and G2 myomas. Until now, outside Italy few Centres in USA, Belgium, Germany, England, South America know and perform such technique.

Unfortunately, only in the last years I started to publish data about the cold loop technique in international Journals and probably for this reason the technique is still not utilised in all over the world. Nevertheless, I am noticing an international growing interest on the cold loop hysteroscopic myomectomy.

The technique is articulated in two phases:

1) Slicing the Intracavitary Component of the Myoma

The intracavitary component of myoma is removed using the conventional slicing technique powered by monopolar or bipolar current (in pure cutting mode). When the cleavage plane between the myoma and myometrium is identified, the slicing has to be stopped. In order to identify the correct cleavage plane between myoma and myometrium, it is very important to reach accurately the plane of the endometrial surface: remaining above or falling below of such plane makes it difficult to recognize the correct dissection plane.

2) Enucleation of the Intramural Component of the Myoma

The electric cutting loop is subsequently replaced with a not electrified cold loop (mechanical loops of Mazzon; Karl Storz, Tuttlingen, Germany). Usually, it is better to start with the "straight cold loop" (the most atraumatic), which is inserted into the cleavage plane and applied repeatedly along the surface of the myoma. In this way, the connective fibers anchoring the myoma to the pseudocapsule are disconnected by blunt dissection. In case of wide and tough fibro-connectival bridges, it is useful to resort to the "rake-shaped" or to the "knife-shaped" cold loops. In this way, the intramural component of myoma is progressively detached from the myometrium and becomes an endocavitary neoformation, safely removable by slicing. In case of myomas of large volume, it is possible to repeat for more times this phase.

The main objective of the "cold loop hysteroscopic myomectomy" is to avoid the contact of the electrical cutting loop with the myometrium: in this way it is possible to achieve efficacy and safety.

1- the tissues are preserved from the thermal injury caused by the electric energy. In this way, the myoma, the myometrium and the cleavage plane between myoma and pseudocapsule are easily distinguishable.

2-uterine perforation with the electrical thermal loop is virtually eliminated.

3-avoiding the damage of the healthy myometrium, the risk of haemorrhage and post-surgical intrauterine synechiae is reduced. Indeed, haemostatic contraction of the myometrium is maintained and the fibrous reaction caused by the thermal injury is avoided.

4-the thickness of the free myometrial margin loses its importance.

5- the chance to accomplish the treatment of G1 or G2 myomas in only one surgical step is greatly improved; only the achievement of a critical value limit in absorption of distension media could need the interruption of the procedure and so the scheduling of a new surgical step to complete the treatment.

Theoretically, every submucous myoma may be removed hysteroscopically in only onesurgical step. Nevertheless, the limit is determined by the absorption of the distension media and such limit may significantly change according to the surgeon experience. The surgeons should treat only submucous myomas that really are able to remove.

"Hysteroscopic Hydromorcellation" A technique to treat fibroids with intramural component

Cinta Vidal Mazo. Hospital Juan Ramon Jimenez. Huelva, Spain

Uterine fibroids are the most common benign pelvic tumors of the female genital tract. The incidence is approximately 25% to 30% and may be higher depending on race, family history and genetics. Submucosal fibroids are frequently associated with abnormal uterine bleeding and infertility and represent 5.5% to 10% of all uterine fibroids.

Submucosal fibroids can be localized in any part of the uterine cavity. Some are at the fundus other are located anterior, posterior or on the lateral uterine walls. Small fibroids can also arise from the cornual regions, which could block the fallopian tube ostium. Some fibroids are located in the cervical canal.

In 1993, in the face of the surgical complexity posed by some deeply penetrating submucosal myomas, Wamsteker et al. proposed a classification system for submucosal fibroids to allow the prediction of the degree of difficulty of the surgical procedure, depending on the degree to which the myoma penetrates the myometrium. With this classification, gynecologists can estimate the probability to complete the hysteroscopic removal of the submucosal fibroid in one procedure. The Wamsteker classification was adopted by the European Gynecological Endoscopy Society (ESGE) and the leiomyoma classification system of the International Federation of Gynecology and Obstetrics (FIGO) includes the Wamsteker classification for submucosal fibroids. Figure 1

According to this classification, a myoma G0 is completely inside the uterine cavity and appears only attached to the wall of the uterine cavity by a thin pedicle; a myoma G1 has its largest part (50%) in the uterine cavity; and a myoma G2 has its largest part (50%) in the myometrium.

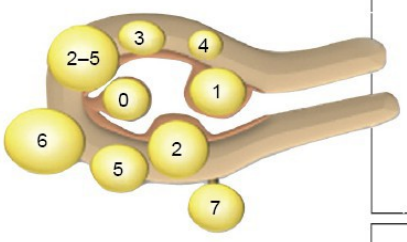
Lasmar et al. (2005) proposed a new preoperative classification of submucosal fibroids that considers not only the degree of penetration of the fibroid in the myometrium, but also other parameters that include the extension of the base of the fibroid with respect to the wall of the uterus, the size of the nodule (cm) and the topography of the uterine cavity. The authors found a greater correlation of this new classification with the complexity of the myomectomy, the length of the procedure and the fluid deficit, than with the previous other classifications that only value the portion of the fibroid invading the myometrium. Figure 3

Another feature to add to the complexity of hysteroscopic myoma surgery is the concept established by Haimovich of continent / content, considering the ratio of the size of the myoma to the uterine cavity.

Indications for Hysteroscopic Myomectomy

Abnormal uterine bleeding (AUB) represents the most common indication for hysteroscopic myomectomy. In fact, submucosal myomas are associated with abnormal uterine bleeding more

Leiomyoma subclassification system



SM – Submucosal	0	Pedunculated intracavitary
	1	<50% intramural
	2	≥50% intramural
O – Other	3	Contacts endometrium; 100% intramural
	4	Intramural
	5	Subserosal ≥50% intramural
	6	Subserosal <50% intramural
	7	Subserosal pedunculated
	8	Other (specify eg, cervical, parasitic)
Hybrid leiomyomas (impact both endometrium and serosa)	Two numbers are listed separated by a hypen. By convention, the first refers to the relationship with the endometrium, while the second refers to the relationship to the serosa. One example is given below	
	2–5	Submucosal and subserosal, each with less than half the diameter in the endometerial and peritoneal cavities, respectively

than intramural and subserosal fibroids, presumably due to the distortion of the cavity and an increase in the bleeding surface of the endometrium.

Although most women affected with fibroids are fertile, the available evidence suggests that fibroids can interfere with fertility, and submucosal fibroids are reported to exert the most detrimental effects on pregnancy rates. Reproductive problems represent the second main indication for hysteroscopic myomectomy, although the lack of randomized studies does not allow to draw definitive conclusions on the improvement of spontaneous fertility after hysteroscopic myomectomy.

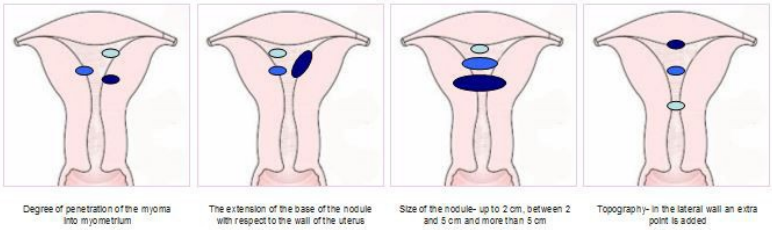
Less frequent reported indications include dysmenorrhea, nonspecific pelvic pain, and asymptomatic submucosal fibroids in postmenopausal females prior to initiate hormone replacement therapy.

Treatment of Submucous Myomas

Hysteroscopic myomectomy is the surgical procedure of choice for the treatment of submucosal fibroids, it is less invasive than other methods of treatment, and has a short recovery time. However, current literature has revealed some limitations of the hysteroscopic approach to the treatment of submucosal fibroids, such as the size, location and position of the myoma and associated with risks such as longer operation time, incomplete removal of myomas, and uterine perforation.

The development of endoscopy has made submucosal fibroids accessible and resectable from the inner surface of the uterus. During the last 20 years, thanks to advances in instruments and the improvement of techniques, hysteroscopic myomectomy has acquired the status of "surgical technique" and, at present, represents the standard minimally invasive surgical procedure to treat intra-cavitary fibroids.

Efforts to improve intrauterine treatment have led biomedical engineering to develop new devices capable of combining the advantages of ambulatory hysteroscopy with the effectiveness of the resectoscope. Using a modified prototype based on an orthopedic arthroscopic tissue shaver, Dr. Mark Hans Emanuel from the Netherlands was able to create the first generation device that used mechanical energy instead of electricity, thus creating hysteroscopic morceration. Recently, new devices have been introduced into clinical practice,



STEP-W classification

	Size (cm)	Topography	Extension of the base	Penetration	Lateral Wall	Total
0	< 2	Low	< 1/3	0	+1	
1	2 to 5	Middle	1/3 to 2/3	< 50%		
2	>5	Upper	> 2/3	>50%		

= Score 0
= Score 1
= Score 2

Score	Group	Complexity and Therapeutic options
0 to 4	I	Low complexity hysteroscopic myomectomy
5 to 6	II	High complexity hysteroscopic myomectomy. Consider GnRH use. Consider Two-step hysteroscopic myomectomy.
7 to 9	III	Consider alternatives to the hysteroscopic technique

known as intrauterine morcellators (IUM) and consist of a set of 2 metal tubes, hollow, rigid and disposable with a wide range of diameters adaptable to the use of 5.00 to 9,00 mm hysteroscopes.

The possibility of treating the most common intrauterine lesions in a consultation without the need for cervical dilation, general anesthesia and monopolar/bipolar energy may represent an important step to improve perioperative results, patient satisfaction and reduction of cost.

MyoSure® TISSUE REMOVAL SYSTEM

In 2009, the FDA approved a second hysteroscopic morcellation device: the MyoSureR tissue removal system (Hologic, Bedford, MA). Like the TRUCLEAR, approved in 2005 by the FDA, of the first generation, the second-generation MyoSure R system is based on a rotary tubular cutting system with mechanical energy based on suction instead of high-frequency electric power historically used by resectoscopy. The new MyoSureR system has a smaller 2.5mm internal blade that rotates and oscillates within a 3mm outer tube at speeds up to 6000rpm and features an external bezel instead of an internal bevel at the edge of the rotating blade (Figure 5). The blade and the hand-piece are combined into a single-use device which is then connected to the suction and an engine control unit. The device is inserted into the uterus through a 6.25 mm offset lens, 0° custom designed continuous flow hysteroscope that is compatible with all currently available fluid delivery systems.

This hysteroscopic system, by its diameter, allows the performance of myomectomies in an office setting, using only local paracervical block anesthesia.

HYDROMORCELATION TECHNIQUE

Physiologic Principles

The myoma with intramural component -G1, G2- especially the latter, for their total elimination, require a standardized technique and an experienced hysteroscopist. A well performed myomectomy requires the enucleation of the fibroid by dissecting its pseudocapsule.

The pseudocapsule is an independent entity formed by a layer between the myometrium and the myoma. It is formed by collagen fibers and a network of small blood vessels that form a vascular ring. With the exception of pedunculated fibroids, a vascular pedicle that nourishes the fibroid is not identified. It is the neurovascular network of the pseudocapsule what is responsible for the blood perfusion of the fibroid.

When dissecting the correct plane of the pseudocapsule we find lax connective tissue bridges and multiple capillaries or small vessels. Dissecting this plane is easy because of its laxity and allows the myoma to be dislodged while its blood supply is compromised by cutting the vascularization that surrounds it. Dissection in the right surgical plane decreases bleeding during surgery.

Another advantage of maintaining the right plane of dissection is the preservation of the integrity of the underlying myometrium, thus avoiding scars. Scars on the myometrium affect subsequent fertility and contribute to the formation of postoperative adhesions. This factor is the reason for the low rate of adhesions when keeping the dissection plane of the pseudocapsule.

Fundamentals of the hydromorcelation technique

Bettocchi was the first to understand the importance of this fact in the surgery of submucous myomas when he published his OPPIuM technique. Basically, by opening the mucosa and pseudocapsule of the myoma, it accelerated its natural tendency to migrate to the uterine cavity. This action converted the deep myomas G2 into G1, increasing the success rate of the optimal surgery in only one procedure. G2 fibroids are the biggest challenge of hysteroscopy. There is very little evidence regarding the management of G2 fibroids in an office setting. This means that any technique in office hysteroscopic management of type G2 myomas supposes an innovative approach in this field.

How can we get to the pseudo-capsule, which by definition is intramural, with the morcellator, which is a blunt instrument with an angle of 0o? What technique should be used? With the Hydromorcelation Technique "we propose some combined maneuvers with the morcellator and the irrigation system (continuous infusion pump) for the distension of the intrauterine cavity, making changes in the intrauterine pressure with ups and downs of flows that will favor myometrial contractions.

The objective of this combined technique is to weaken the endometrial surface that covers the myoma and thereby allow the myoma to protrude into the cavity. To weaken the endometrial surface that covers the myoma, we will use the Morcellator and to favor the protrusion of the myoma inside the uterine cavity with the myometrial contractions, we will perform “hydro-massage maneuvers” with changes in the flow of intrauterine distension.

We will contact the morcellator with the surface that covers the fibroid, either in its upper pole or in the plane of cleavage of the myoma with the uterine cavity and once this surface is weakened, we will perform maneuvers to change intrauterine distension, lowering and raising the flow pressures, even stopping the procedure for 1 or 2 minutes, in cases of myomas with large intramural component. With these innovative maneuvers of intrauterine pressure change we favor contractions of the myometrium and allow the myoma to protrude into the cavity, arriving to visualize the plane of the pseocapsule and its bridges and proceed to morcelate the intracavitary portion that is protruding from the intramural portion of the myoma.

We can perform the myomectomy in only one session if the procedure is fast and the skillfulhysteroscopist, since the limitation in any hysteroscopic procedure, either in office or in the operating room is surgical time, because of the risk of fluid overload and in our case, as it is a procedure performed in office due to pain tolerance.

Hysteroscopic enucleation without removal of myoma

Sergio Haimovich. Hillel Yaffe Medical Center, Hadera. Israel

Throughout history, many discoveries are made by error or an unexpected circumstance.

In 2009 Stefano Bettocchi published his technique "Office Preparation of Partially IntramUral Myoma" (OPPIuM). This technique consists of performing, in office setting without anesthesia, a circular cut around the myoma, using bipolar energy, as a consequence, the myoma migrate towards the uterine cavity, making a deep or partially intramural myoma (G2) become more intracavitary (G1). Then the patient was sent to a second staged procedure in the operating room under anesthesia where a resectoscopy of the fibroid was performed using the conventional technique.

In the hysteroscopy unit of the gynecology service of the Hospital Universitario de Mar in Barcelona, we had been doing hysteroscopy in consultation for many years and when we read the OPPIuM technique we were inspired to try total myoma enucleation in office

In our case, the energy applied to cut around the myoma is laser, since it is an energy that is not transmitted to the myometrium, so it is well tolerated in the office setting without anesthesia, in addition to providing coagulating while cutting ensuring hemostasis. To avoid bleeding is very important during procedures performed without anesthesia since on many occasions we are forced to increase the intrauterine pressure which increases the discomfort perceived by the patient.

After the initial cut was performed, the next step was to locate the dissection plane, of the pseudocapsule. Figure 1 shows the protrusion of the myoma into the cavity after the initial cut and in Figure 2 we can see the dissection plane or pseudocapsule between the myoma and the wall.

Surprisingly, when dissecting this plane, bleeding is minimal allowing to maintain low fluid pressures. Once the plane is located, the dissection phase begins. We follow the same principle that is used for abdominal myomectomy. We always look for the avascular plane to quickly perform myoma dissection and enucleation. In the case of hysteroscopy, this dissection is performed with forceps (graspers).

In this plane we see fibers of connective tissue (Fig. 3), very lax and easy to dissect, but together they anchor the myoma, among them are the small vessels that nourish the myoma and by dissecting them we compromise its vascularization. Slowly, the myoma migrates and enters the uterine cavity until its enucleation or total separation of the myometrium is achieved.

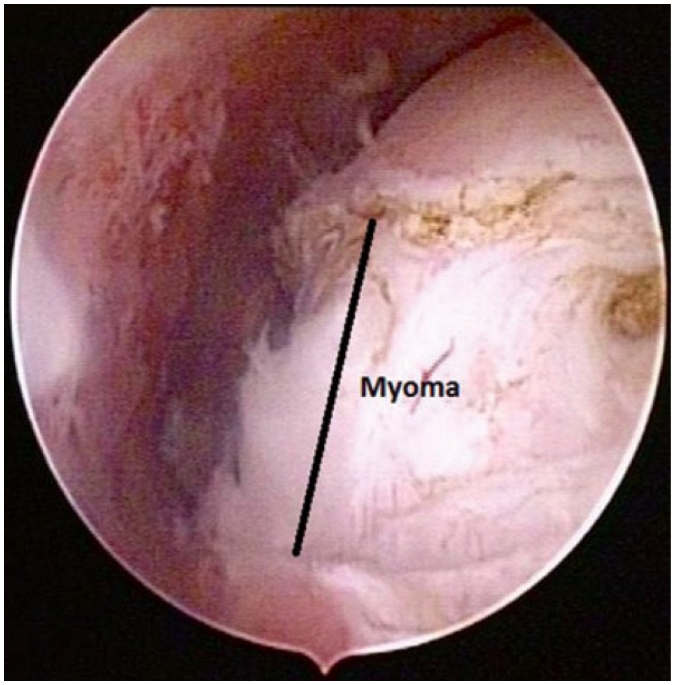


Fig. 1 Myoma protrudes into the cavity after the initial cut

The first in office enucleation procedure performed by our group was of a myoma of 2 cm on the anterior uterine wall. The moment of joy when seeing that myoma enucleation in office was feasible and seeing the fibroid floating inside the cavity led us to a very different feeling. The question now was "what do we do now?" “How do we get it out?” We had a free fibroid of almost 2cm floating inside the uterine cavity and a hysteroscope of less than 5mm, how can we remove the fibroid?

Fig. 2 Magnified view of the pseudocapsule.

Given the impossibility to remove it, we performed a biopsy and left it inside the cavity planning to follow-up 4 weeks later. When the patient came back, the ultrasound gave us a normal image with no fibroid in the cavity, and the patient denied passing the fibroid.

Our first publication in 2015 with 61 fibroids left inside the cavity, 10 of them over 3cm, confirmed what had happened.

No patient suffered any complications. No infections, no foul smelly discharge, no bleeding, no pain. Some reported passing the small fibroid but most of the patients were neither conscious nor noticed it.

This study was presented at the AAGL Meeting in Barcelona in 2014 prior to its publication and it was highly criticized. You have to understand the context of the moment, it was in the midst of a crisis of the morcellation of fibroids in the abdominal cavity. There is a clear difference between the abdominal cavity where it spreads to nearby organs and the uterine cavity.

In the AAGL guidelines on submucosal myoma, in the section on malignancy and submucosal myoma states that "there is no data in this regard." There have only been isolated case reports. Leiomyosarcoma does not have these reduced sizes and they tend to appear during postmenopause, in women over 65 years of age.

Although we worry about the dissemination in case of malignancy, through the fallopian tubes into the abdominal cavity, it has never been documented. During resectoscopy, the fibroid is cut, and some amount of tissue debris could potentially flow into the abdominal cavity through the fallopian tubes. There is no evidence that has demonstrated malignant spread during resectoscopic myomectomy. In the case of enucleation, the mass is left intact into the uterine cavity so it could be considered safer compared to resectoscopy.

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Full length article

Office hysteroscopic myomectomy without myoma extraction: A multicenter prospective study

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ABSTRACT

Objective: To evaluate the feasibility and safety of leaving the submucous myoma (SM) in the uterine cavity after office hysteroscopic enucleation.
Study Design: Prospective multicenter study including patients who had a single SM diagnosed by transvaginal ultrasounds with surgical indication. Office hysteroscopic enucleation of the SM was performed using a 5 mm continuous flow office hysteroscope with a 2.9 mm rod lens optical system and a 5 Fr operative channel. After the SM was released preserving the pseudo capsule using cold instruments, it was left into the uterine cavity. The primary endpoint was the proportion of patients without evidence of the myoma at the transvaginal ultrasound performed after 90 days from surgery.
Results: Between January 1st, 2018, and March 31st, 2020, a total of 204 patients were enrolled. Most patients were nulliparous and reported abnormal uterine bleeding as the leading symptom. 76.5 % of enucleated myomas had a diameter ranging between 1.5 and 2.5 cm, and 81.4 % of SMs were of G0 or G1. Hysteroscopic procedures had a mean duration of 23.2 ± 10.5 min. The operative time was associated with the SM grade and size. All hysteroscopic procedures were completed. A vasovagal reaction was observed in 3 women (1.5 %), and minimal post-operative bleeding was reported after 7 procedures (3.4 %). None reported pelvic pain or vaginal discharges/bleeding during follow-up. The average patient satisfaction from surgery was 4.59 (5-points Likert scale). The level of patient satisfaction was not associated with the grade and the size of the myoma. In 192 (94.12 %; 98 %CI: 89.03–96.93 %) out of 204 patients, the SM was absent at the transvaginal ultrasound performed at the follow-up end. A higher prevalence of G2 SMs and lower prevalence of G1 SMs were observed among patients with evidence of the myoma after 90 days from the surgery.
Conclusion: Office hysteroscopic myomectomy with SM enucleation without mass extraction appears safe, well-tolerated, and effective in at least 89 % of patients. G2 SMs may be the factor associated with the procedure's failure.

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The scientific community also received with skepticism the results of the study that we published in 2015. We then decided to design a prospective multi-centered study aiming to consolidate the existing evidence.

This recently published study was carried out in 9 centers in different countries (Spain, Bulgaria, Czechia, India, Algeria and Egypt) with a unified technique including more than 200 fibroids (4). The fibroids after enucleation in office setting were left free inside the uterine cavity. A follow-up ultrasound performed up to 90 days after the procedure, it was found that the fibroids that were left free in the cavity had disappeared. In the case of fibroids that had not disappeared (12%) it was due to a technical failure because total enucleation was not achieved.

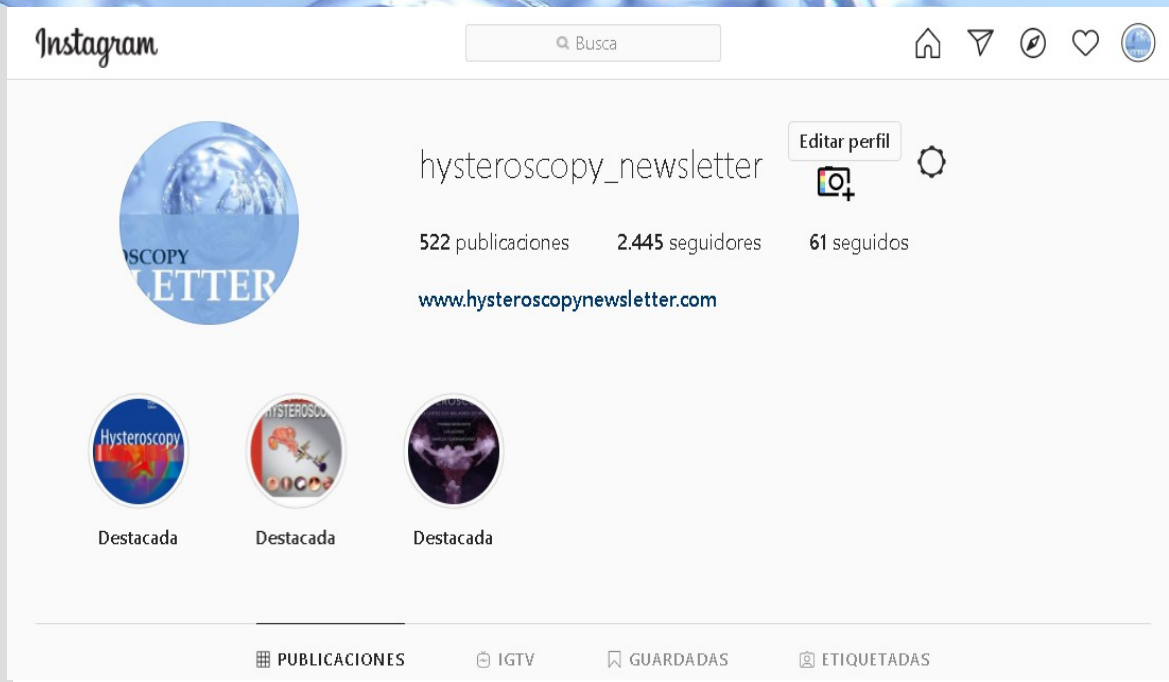
This technique has great advantages, especially in pedunculated fibroids (G0) where with only cutting the pedicle (always obtaining tissue for histology) the procedure is completed. The mean procedure time in these cases was 9 minutes, based on 90 G0 fibroids (27 of them over 3cm in diameter) included in my doctoral thesis. The only condition is access to the pedicle and being able to transect it. Another advantage is the possibility of performing myomectomies in an office setting, especially of small fibroids, using only hysteroscopic scissors and forceps.

Fig. 3 View of the loose connective tissue of the pseudocapsule.

Until now, the systems used in the operating room have focused on extracting the myoma, both resctoscopes removing small slices of the myoma, and morcellators. A new option is to enucleate the fibroid by preserving the pseudocapsule, avoiding damaging the myometrium with the derived implications for subsequent fertility, and then, leaving the myoma free inside the cavity after its enucleation.

We have now demonstrated that extraction of the myoma is not needed and it is safe to leave the myoma free inside the uterine cavity.

Hysteroscopy Newsletter is an opened forum to all professionals who want to contribute with their knowledge and even share their doubts with a word-wide gynecological community



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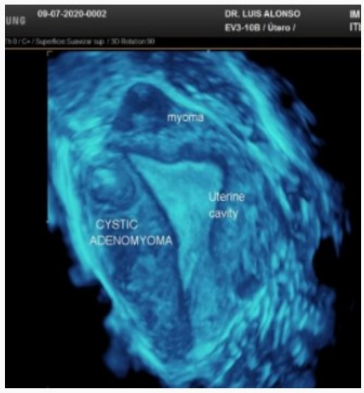

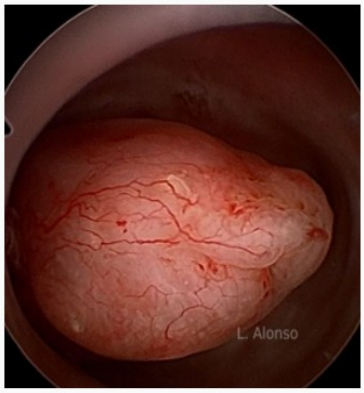

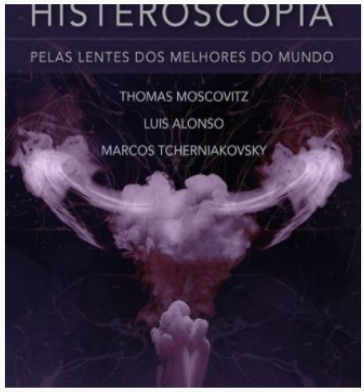

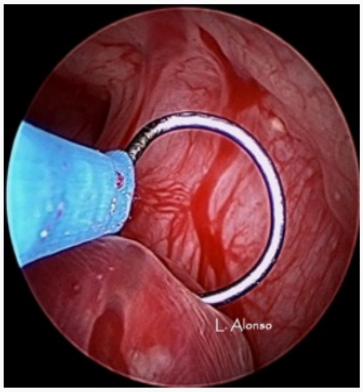

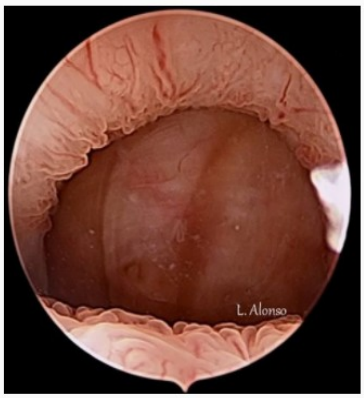

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